

Appointments

Research Scientist
Indiana University (2017-present)
Department of Biology

Education and Training

Postdoctoral Fellow
Indiana University (2014–2017)
Department of Biology (with A. Moczek)

NSF Postdoctoral Fellow
North Carolina State University (2011–2013)
Department of Molecular Biomedical Science (with N. Nascone-Yoder)
University of South Florida, Tampa (2011)
Department of Integrative Biology (with L. Martin)

Ph.D. University of North Carolina, Chapel Hill (2005–2010)
Department of Biology (advisor: D. Pfennig)

B.S. University of California, Davis (2001–2004)
Department of Evolution and Ecology

Publications

*co-first authors
†corresponding author

In review, revisions or prep

Ledón-Rettig C.C. †. (*in review*). The benefits and reversibility of thermally induced transgenerational plasticity in beetles.

Published

Ledón-Rettig C.C.†, Moczek A.P.M., Ragsdale E.J. 2018. *Diplogastrellus* nematodes are sexually transmitted mutualists that alter the bacterial and fungal communities of their beetle host. *Proceedings of the National Academy of Sciences*. (featured in [The Atlantic](#), [Quirks and Quarks](#), and [Science Friday](#))

Macagno, A.L.M., Zattara, E., Ezeakudo, O., Moczek, A.P., **Ledón-Rettig, C.C.**† 2018. Adaptive maternal behavioral plasticity and developmental programming mitigate the transgenerational effects of temperature in dung beetles. *Oikos*. doi: 10.1111/oik.05215

Ledón-Rettig, C.C.*, Zattara, E.*, Moczek, A.P. 2017. Asymmetric interactions between *doublesex* and tissue- and sex-specific target genes mediate sexual dimorphism in beetles. *Nature Communications*. doi:10.1038/ncomms14593

Ledón-Rettig, C.C.† and Moczek, A.P. 2016. The transcriptomic basis of tissue- and nutrition-dependent sexual dimorphism in the beetle *Onthophagus taurus*. *Ecology and Evolution*. doi-

10.1002/ece3.1933

Gilbert, S.F., Bosch, T.C.G., **Ledón-Rettig, C.C.** 2015. Ecological Developmental Evolutionary Biology: Developmental symbiosis and developmental plasticity as evolutionary agents. *Nature Reviews Genetics*. 16, 611-622

Moczek, A.P., Sears, K.E., Stollewerk, A., Wittkopp, P.J., Diggle, P., Dworkin, I., **Ledón-Rettig C.C.**, Matus, D.Q., Roth, S., Abouheif, E., Brown, F.D., Chiu, C., Cohen, C.S., De Tomaso, A.W., Gilbert, S.F., Hall, B., Love, A., Lyons, D.C., Sanger, T., Smith, J., Specht, C., Vallejo-Marin, M., Extavour, C.G. 2015. The significance and scope of evolutionary developmental biology: a vision for the 21st century. *Evolution & Development*. 17, 148-159

Ledón-Rettig, C.C.†, Chunco, A.J., Pfennig, D.W., Dworkin, I. 2014. Cryptic genetic variation in natural populations: A predictive framework. *Integrative and Comparative Biology*. 54, 783-793.

Ledón-Rettig, C.C.†. 2013. Ecological epigenetics: An introduction to the symposium *Integrative and Comparative Biology*. 53, 307-318

Bloom, S.* **Ledón-Rettig, C.C.***, Infante, C., Everly, A., Hanken, J., Nascone-Yoder, N. 2013. Developmental origins of novel gut morphology in frogs. *Evolution and Development*. 15:3, 213-223 (featured in [Science Daily](#))

Ledón-Rettig, C.C.† and Pfennig, D.W. 2012. Antipredator behavior promotes diversification of feeding strategies. *Integrative and Comparative Biology*. 52, 53-63

Ledón-Rettig, C.C.†, Richards, C.L., and Martin, L.B. 2012. Epigenetics for behavioral ecologists. *Behavioral Ecology*. 24, 311-324 (Invited review)

Ledón-Rettig, C.C.†, Richards, C.L., and Martin, L.B. 2012. A place for behavior in ecological epigenetics. *Behavioral Ecology*. 24, 329-330 (Invited commentary)

Ledón-Rettig, C.C.† and Pfennig, D.W. Emerging model systems in eco-evo-devo: the environmentally responsive spadefoot toad. 2011. *Evolution & Development*. 13, 391-400

Moczek, A., Sultan, S., Foster, S., **Ledón-Rettig, C.C.**, Dworkin, I., Nijhout, F., Abouheif, E. and Pfennig, D.W. The role of developmental plasticity in evolutionary innovation. 2011. *Proceedings of the Royal Society, London B*. 278, 2705-2713

Ledón-Rettig, C.C.†, Pfennig, D. W. and Crespi, E. J. 2010 Diet and hormones reveal cryptic genetic variation: implications for the evolution of novel feeding strategies. *Proceedings of the Royal Society, London B*. 277, 2569-3578 (featured in *Nature Research Highlights*, vol. 466 pg 11)

Buchholz, D.R., Hollar, A.R. and **Ledón-Rettig, C.C.** 2010. *Scaphiopus couchii* (Couch's spadefoot). Developmental morphology. *Herpetological Review*. 41, 480

Ledón-Rettig, C.C.†, Pfennig, D.W. and Crespi, E.J. 2009. Stress hormones and the fitness

consequences associated with the transition to a novel diet in larval amphibians. *Journal of Experimental Biology*. 212, 3743-3750

Pfennig, D.W. and **Ledón-Rettig, C.C.** 2009. The flexible organism. *Science* 325, 268-269 (Invited book review of *Ecological Developmental Biology: Integrating Epigenetics, Medicine, and Evolution*, by S.F. Gilbert and D. Epel)

Ledón-Rettig, C.C.†, Pfennig, D.W. and Nascone-Yoder, N. 2008. Ancestral plasticity and the potential for genetic accommodation in larval amphibians: Implications for the evolution of novel feeding strategies. *Evolution & Development*. 10, 316-325

Non-peer reviewed

Ledón-Rettig, C.C. 2017. What dung beetles are teaching us about the genetics of sex differences. [The Conversation](#).

Book Chapters

Ledón-Rettig, C.C. 2019. *Cellular Epigenetics and Behavioral Evolution*. In: **Encyclopedia of Animal Behaviour 2nd edition**.

Awards and Honors

Major Funding (Current)

Funding Agency: National Science Foundation (NSF)

Collaborative proposal: evaluating phenotypic plasticity's role in adaptive evolution

PI: D.W. Pfennig; CoPI: C.C. Ledón-Rettig; Program: Evolutionary ecology; Amount to C.L.R.: **\$209,721** (direct and indirect);

Duration: 06/01/2018-05/31/2022

Major Funding (Completed)

- NSF Postdoctoral Research Fellowship (3 year fellowship) 2011-2014
- NSF Graduate Research Fellowship (3 year fellowship) 2006-2009
- University Merit Scholarship, UNC Chapel Hill (1 year fellowship) 2005-2006

Other (Completed)

- Indiana University Provost's Travel Award for Women in Science 2015
- Society for the Study of Evolution Travel Grant (\$1,000) 2010
- Elected Student Speaker, Department of Biology, Annual Symposium and Retreat, UNC Chapel Hill 2009
- Journal of Experimental Biology Travel Grant (\$1,300) 2009
- Sigma Xi Grants in Aid of Research (\$1,000)

- Undergraduate Diversity Program: Society for the Study of Evolution Program (competitive) 2007
2004

Symposium Organization

- Organizer (with A. Liebl, A. Schrey, and C. Richards) of symposium “Ecological Epigenetics”; sponsored by the Society for Integrative Biology (featured in Nature News, doi:10.1038/nature.2013.12179) January 2013

Invited Symposium Presentations

- Invited speaker in the symposium “Evolutionary models of intergenerational change in invertebrates”, as part of the meeting “Mechanisms and Evolution of Intergenerational Change”; sponsored by the Wellcome Genome Campus September 2019
- Invited speaker in the “SOLA (Sacred Order of the Lamellate Antennae) Annual Symposium”; sponsored by the Entomological Society of America November 2019
- Invited speaker in the symposium “Eco-Evo-Devo”; sponsored by the European Society for Evolutionary Developmental Biology June 2018
- Invited speaker in the symposium “Evidential Challenges of Studying Developmental Plasticity and its Role in Evolution”; sponsored by the Philosophy of Science Association November 2016
- Invited speaker in the symposium “Developmental Synergy between Genome Regulation and Environmental Stimuli”; sponsored by the Entomological Society of America November 2015
- Invited speaker in the symposium “Adaptation or Developmental Constraint? Uniting Evolutionary Theory and Empirical Studies of Phenotypic Plasticity”; sponsored by the Society for Integrative and Comparative Biology January 2014
- Invited speaker in the symposium “Development, Behaviour and Evolution”; sponsored by the Congress for the European Society for Evolutionary Biology August 2013
- Invited speaker in the symposium “Phenotypic Plasticity: Variation, Alteration and Speciation”; sponsored by Lund University November 2012
- Invited speaker in the symposium “Evolution of polyphenisms: Pathways to innovation and diversification”; sponsored by the January 2011

Society for Integrative and Comparative Biology

Invited Seminars

- University of Tennessee, Knoxville, Department of Evolution and Ecology. “Developmental Evolution in Context: Environment, Sex and Symbionts” (Faculty recruitment seminar) March 2016
- University of Missouri, Department of Biology. “Developmental Evolution in Context: Environment, Sex and Symbionts” (Faculty recruitment seminar) February 2016
- University of North Carolina, Greensboro. “Developmental Evolution in Context: Environment, Sex and Symbionts” (Faculty recruitment seminar) January 2016
- DePauw University, Department of Biology. “The sexually dimorphic transcriptome of the horned beetle, *Onthophagus taurus*: contributions of and interactions between sex, nutrition and body region” November 2015
- Duke University, Behavioral, Population and Community Ecology Seminar Series. “Altered developmental programs underlying the novel gut phenotypes in cannibalistic anuran larvae” October 2013
- Lehigh University, Department of Biological Sciences. “The developmental origins of a novel gut morphology in anuran larvae.” February 2013
- Georgia Institute of Technology, Department of Biology. “Ecological Developmental Biology: A critical field for a changing world” (Faculty recruitment seminar) November 2012
- University of South Florida, Tampa, Department of Integrative Biology. “Phenotypic plasticity's role in the origins and diversification of feeding strategies” September 2011
- University of North Carolina, Chapel Hill, Biology Department Annual Symposium and Retreat, Elected Student Speaker. “Stress hormones and the evolution of a novel feeding strategy” October 2010

Conference Presentations

- **Ledón-Rettig, C.C.** & Moczek, A.P. (poster) The transcriptional basis of tissue- and nutrition-dependent sexual dimorphism in the beetle *Onthophagus taurus*. Inaugural Meeting for the Pan- Summer 2015

- American Society for Evolutionary Developmental Biology Summer 2013
- **Ledón-Rettig, C.C.**, Infante, C., Hanken, J., Nascone-Yoder, N.M. (talk) Altering retinoic acid and thyroid hormone signaling produces integrated modifications in gut morphology and physiology. Society for the Study of Evolution Meeting, 2013
 - Crespi, E.J., Warne, R.W., **Ledón-Rettig, C.C.** (talk) Integrating stress physiology with quantitative evolutionary models to predict population responses to environmental change: An amphibian perspective. SICB Meeting, 2013 Winter 2013
 - **Ledón-Rettig, C.C.**, Bloom, S., Infante, C., Everly, A., Hanken, J., Nascone-Yoder N. (talk) Developmental origins of a novel gut phenotype in frogs. 1st Joint Congress on Evolutionary Biology Summer 2012
 - Bloom, S., Infante, C., **Ledón-Rettig, C.C.**, Everly, A., Hanken, J., Nascone-Yoder, N. (poster) Developmental origins of novel gut phenotypes in anuran larvae. Latin American Society of Developmental Biology Meeting, 2012 Spring 2012
 - **Ledón-Rettig, C.C.**, Pfennig, D.W., Crespi, E.J. (talk) Phenotypic plasticity's role in the origins of novel feeding strategies. Society of Comparative and Integrative Biology Meeting, 2011 Winter 2011
 - **Ledón-Rettig, C.C.**, Pfennig, D.W., Crespi, E.J. (talk) Diet and hormones reveal cryptic genetic variation: Implications for the evolution of novel feeding strategies. Society for the Study of Evolution/ASN/SSB Meeting Summer 2010
 - **Ledón-Rettig, C.C.**, Pfennig, D.W., Crespi, E.J. (talk) Environmental stress and the evolution of novel feeding strategies. European Society for Evolutionary Biology, 2009 Summer 2009
 - **Ledón-Rettig, C.C.**, Pfennig, D.W., Crespi, E.J. (poster) Hormonal regulation and the evolution of a novel feeding strategy. Society of Comparative and Integrative Biology Meeting, 2009 Winter 2009
 - **Ledón-Rettig, C.C.**, Pfennig, D.W., Nascone-Yoder, N. (poster) Ancestral variation and genetic accommodation: Implications for the evolution of a novel feeding strategy. Society of Comparative and Integrative Biology Meeting, 2008 Winter 2008
 - **Ledón-Rettig, C.C.**, Pfennig, D.W., Nascone-Yoder, N. (poster) The ontogeny of developmental plasticity in amphibians. Society of Comparative and Integrative Biology Meeting, 2007 Winter 2007

- **Ledón-Rettig, C.C.**, Pfennig, D.W., Nascone-Yoder, N. (poster) The ontogeny of developmental plasticity in amphibians. IGERT Symposium: Evolution, Development and Genomics Fall 2006
- **Ledón-Rettig, C.C.** (poster) The effects of isolation-by-distance and phenology on population structure in a vernal pool annual plant. Society for the Study of Evolution Meeting, 2003 Spring 2003

Teaching and Mentoring

Teaching:

Sole instructor:

- UNC Chapel Hill, Cellular and Developmental Biology (Biol 205) Summer 2014
- UNC Chapel Hill, Evolutionary Mechanisms (471) Summer 2014

Guest lectures:

- Indiana University, Fundamentals of Biology (Biol L111) - The history of Life Fall 2016-2018
Summer 2015-2018
- Indiana University, Jim Holland Summer Enrichment Program Invited Lecture – Evolutionary Medicine
- UNC Chapel Hill, Development (Biol 443) - Ecological Development Fall 2013
- UNC Chapel Hill, Development (Biol 443) - Morphogenesis of Epithelial Tubes Fall 2013
- NC State University, Environmental Toxicology (VMB 992) – Evolutionary Development: Mechanisms of Macroevolution Fall 2012
- UNC Chapel Hill, Evolution and Development (Biol 514) - Epigenetic mechanisms. Fall 2010
- UNC Chapel Hill, Evolution and Development (Biol 514) - Levels of Selection Fall 2010
- Vassar College, Environmental Physiology/Endocrinology of Animals (Biol 380) - Hormonal regulation and feeding strategies Fall 2008

Teaching assistant:

- UNC Chapel Hill, Modes of Inquiry: Set up and maintained website for an interdisciplinary seminar series, led class discussions. 2009 & 2010
- UNC Chapel Hill, Evolutionary Mechanisms (471): Designed 2008

syllabus and planned class activities. Designed a lab project for undergraduates that involved retrieving sequences from GenBank, aligning them with ClustalW, and creating phylogenies to test alternate hypotheses about character evolution.

- UNC Chapel Hill, Ecology and Evolution (201): Assisted with writing syllabus, planning recitations, and leading field trips to Duke Forest/Battlefield Park. Designed both final writing project and corresponding rubric. 2007 & 2009
- UNC Chapel Hill, Human Physiology and Anatomy (251) 2007

Mentoring

- Undergraduate Diversity at Evolution Program Mentor, SSE/SSB/ASN meeting, Summer 2013
- My undergraduate student researchers have been involved/trained in one or more of the following: experimental design (reading relevant papers/executing design), statistics, dissection, image analysis (using NIH's ImageJ), behavioral analysis (using JWatcher), immunohistochemistry, radioimmunoassay, enzyme immunoassay, DNA & RNA extractions, primer design, cloning, and gel electrophoresis

Michelle Landstrom (UNC undergraduate)	Summer 2006
Annemarie Nagle (UNC undergraduate)	Summer 2006
Samir Patel (UNC undergraduate)	Spring 2007
Emily Graham (UNC undergraduate)	Spring 2008
Stuart Glass (UNC undergraduate)	Summer 2008
Gabriela Bustamante (Vassar undergraduate)	Fall 2008
Kristen Butler (UNC undergraduate)	Spring 2009
Jennie Nwokoye (USF undergraduate)	Spring and Summer 2011
Cristina Ruiz Lorenzo (USF undergraduate)	Spring and Summer 2011
Holly Kilvitis (USF undergraduate)	Spring and Summer 2011
Michael Wyngarden (NSCU undergraduate)	Spring 2012
Hannah Jones (NCSU undergraduate)	Summer 2013
Alex Dailey (IU undergraduate)	Spring 2015
Madison Black (IU undergraduate)	Fall 2015
Marissa Peckenpaugh (IU undergraduate)	Spring 2018-present
Christyn Willis (IU undergraduate)	Summer 2018-present
Ian Carrico (IU undergraduate)	Summer 2018-present
Cara Sullivan (IU undergraduate)	Fall 2018-present

Outreach Service

- *Girls Incorporated*: I am involved with a partnership between Marble Hill Farm (Bloomington, IN) and a nonprofit agency, Girls Inc. The agency serves ~550 girls between the ages of 6 and 18 with the aim of helping girls overcome gender inequities by bringing them research-driven

programs in an all-girls environment. In our partnership, groups of 12 girls visit the farm for three days to devise research projects that incorporate observational skills, hypothesis testing, and research presentation.

- K-12 outreach: I have routinely visit public and private K-12 schools to deliver science modules. These modules match core objectives of the Indiana Science Teaching Standards and at the same time focus on the integration of ecology, development and evolution.

Professional Service

Reviewer for:

Molecular Ecology, Nature Communications, Evolution, Trends in Evolution and Ecology, BMC Biology, Proceedings of the Royal Society B, Evolution & Development, Functional Ecology, Genetical Research International, Animal Behavior, Ethology, Current Zoology, Journal of Morphology

Panel Participant:

National Science Foundation, Integrative Organismal Systems (IOS)

National Science Foundation, Established Program to Stimulate Competitive Research (EPSCOR)

Ad hoc reviewer:

Human Frontier Science Program

Natural Sciences and Engineering Research Council of Canada (NSERC)