

CHRISTINA RIEHL

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Department of Ecology and Evolutionary Biology
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EDUCATION

2011 Ph.D. PRINCETON UNIVERSITY, Princeton, NJ
Department of Ecology and Evolutionary Biology

2005 B. A. HARVARD UNIVERSITY, Cambridge, MA
Magna cum laude with highest honors in Biology

PROFESSIONAL APPOINTMENTS

Assistant Professor Princeton University, Princeton, NJ
(2015 – present)

Junior Fellow Harvard Society of Fellows, Cambridge, MA
(2012 – 2015)

Postdoctoral Research Fellow Smithsonian Tropical Research Institute, Panama
(2011 – 2012)

Lecturer Princeton University, Princeton, NJ
(2011 – 2012)

GRANTS AND FELLOWSHIPS

2019 National Science Foundation (CAREER IOS-184543) “The evolution of female alternative tactics in a cooperatively breeding bird” (\$568,296)

2018 National Science Foundation (IOS – 1755279) “Mechanisms and adaptive consequences of collective decision-making in a communally nesting bird” (\$463,587)

2016 Princeton Environmental Institute – *Grand Challenges Grant* (\$70,000)

2015 National Geographic Society – *Committee for Research and Exploration* (\$19,200)

2014 Putnam Expedition Grant – *Harvard University* (\$6,120)

2012 Milton Fund Research Grant – *Harvard University* (\$35,082)
Putnam Expedition Grant – *Harvard University* (\$5,000)
3-Year Postdoctoral Fellowship – *Harvard Society of Fellows*

- 2011 1-Year Postdoctoral Fellowship – *Smithsonian Conservation Biology Institute* (declined)
1-Year Postdoctoral Fellowship – *Smithsonian Tropical Research Institute*
- 2008 Graduate Research Fellowship – *Princeton Latin American Studies*
Student Research Grant – *American Ornithologists' Union*
Frank M. Chapman Research Grant – *American Museum of Natural History*
- 2007 Short-term Fellowship – *Smithsonian Tropical Research Institute*
Graduate Research Fellowship – *Princeton Latin American Studies*
- 2006 Graduate Research Fellowship – *National Science Foundation*
- 2004 Harvard College Research Fellowship – *Harvard University*

HONORS AND AWARDS

- 2019 NSF CAREER Award – *National Science Foundation*
- 2018 Elective Member – *American Ornithological Society*
- 2017 Kavli Frontiers of Science Fellow – *National Academy of Sciences*
- 2013 Young Professional Award – *Cooper Ornithological Society*
- 2011 Excellence in Teaching Award – *Princeton University* (university-wide)
- 2004 Barry M. Goldwater Scholar – *Goldwater Excellence in Education*
- 2002-2003 Dean's List (Top 10% of Harvard University Class of 2005) – *Harvard University*

PUBLICATIONS

- 36. Riehl, C.,** and Strong, M. J. 2019. Social parasitism as an alternative reproductive tactic in a cooperatively breeding cuckoo. *Nature* 567: 96-99. **(Cover article.)**
- 35. Riehl, C.** 2019. Cooperative and communal breeding. Pp. 41-59 in *Behavioral Ecology of Neotropical Birds* (Reboreda, J. C., Fiorini, V. D., and Tuero, D. T., eds.). Springer.
- 34.** Feeney, W. E., and **Riehl, C.** 2019. Monogamy without parental care? Social and genetic mating systems of avian brood parasites. *Philosophical Transactions of the Royal Society of London, Series B* 374: 20180201.
- 33.** Dainson, M., Mark, M., Hossain, M., Yoo, B., Holford, M., McNeil, S., **Riehl, C.**, and Hauber, M. E. 2018. How to make a mimic: Brood parasitic Striped Cuckoo eggs match host shell color, but not pigmentation. *Journal of Chemical Ecology*, 44: 940-946. **(Cover article.)**
- 32.** Pruitt, J.N., Berdahl, A., **Riehl, C.**, Pinter-Wollman, N., Moeller, H.V., Pringle, E.G., Aplin, L.M., Robinson, E.J., Grilli, J., Yeh, P. and Savage, V.M. 2018. Social tipping points in animal societies. *Proceedings of the Royal Society of London, Series B*, 285: 20181282.
- 31.** Strong, M. J., Sherman, B. L., and **Riehl, C.** 2018. Home field advantage, not group size, predicts outcomes of inter-group competition in a social bird. *Animal Behaviour* 143: 205-213.

30. Hauber, M., Dainson, M., Baldassarre, D., Hossain, M., Holford, M., and **Riehl, C.** 2018. The perceptual and chemical basis of egg discrimination in communally breeding Greater Anis (*Crotophaga major*). *Journal of Avian Biology* 49: e01776. **(Cover article.)**
29. **Riehl, C.**, and Strong, M. J. 2018. Stable social relationships between unrelated females increase individual fitness in a cooperative bird. *Proceedings of the Royal Society of London, Series B.*, 285: 20180130. **(Cover article.)**
28. **Riehl, C.** 2017. Reproductive Synchrony. In *Encyclopedia of Animal Cognition and Behavior*, Springer-Verlag. J. Vonk and T. Shackelford, eds.
27. Portugal, S. J., Bowen, J., and **Riehl, C.** 2017. A rare mineral, vaterite, acts as a shock absorber in the eggshell of a communally nesting birds. *The Ibis* 160:173-178.
26. **Riehl, C.** 2017. Kinship and incest avoidance drive patterns of reproductive skew in cooperatively breeding birds. *The American Naturalist* 190:774-785.
25. Ursino, C. A., De Mársico, M. C., Rebores, J. C., and **Riehl, C.** 2017. Kinship and genetic mating system of the Baywing (*Agelaioides badius*), a cooperatively breeding Neotropical blackbird. *The Auk: Ornithological Advances* 134: 410-420.
24. Porter, S. A., and **Riehl, C.** 2017. Diet of the Crested Guan (*Penelope purpurascens*) in Panama: leaf-eating by a tropical frugivore. *Wilson Journal of Ornithology* 121: 191-195.
23. **Riehl, C.** 2016. Infanticide and within-clutch competition select for reproductive synchrony in a cooperative bird. *Evolution* 70-8: 1760-1769.
22. Taborsky, M. Frommen, J., and **Riehl, C.** 2016. The evolution of cooperation based on direct fitness benefits. *Philosophical Transactions of the Royal Society of London, Series B*, 371: 20140474.
21. Taborsky, M., Frommen, J., and **Riehl, C.** 2016. Correlated payoffs are key to cooperation. *Philosophical Transactions of the Royal Society of London, Series B*, 371: 20150084.
20. **Riehl, C.**, and Frederickson, M. E. 2016. Cheating and punishment in cooperative animal societies. *Philosophical Transactions of the Royal Society of London, Series B* 371: 20150090.
19. **Riehl, C.***, and Stern, C. A.* 2015. How cooperatively breeding birds find relatives and avoid incest: New insights into dispersal and kin recognition. *BioEssays* 37:1303-1308. * Denotes equal author contributions.
- Highlighted **Editor's Choice** in *BioEssays*
18. **Riehl, C.**, and Strong, M. J. 2015. Social living without kin discrimination: experimental evidence from a cooperatively breeding bird. *Behavioral Ecology and Sociobiology* 69: 1293-1299.
17. **Riehl, C.**, Strong, M. J., and Edwards, S. V. 2015. Inferential reasoning and egg rejection in a cooperatively breeding cuckoo. *Animal Cognition* 18: 75-82.
16. **Riehl, C.** 2014. Cuckoos of the world. *Wilson Journal of Ornithology* 126: 411-412.
15. **Riehl, C.** 2013. Evolutionary routes to non-kin cooperative breeding in birds. *Proceedings of the Royal Society of London, Series B* 280: 20132245.
- A *Proceedings B* **"Most Viewed"** article during 2013

- Highlighted **Editor's Choice** in *Proceedings B*
14. **Riehl, C.** 2013. The Harris's Hawk. *Journal of Raptor Research* 47: 333-334.
 13. **Riehl, C.** 2012. Parental care and reproductive skew in a communally breeding cuckoo: hard-working males do not sire more young. *Animal Behaviour* 84: 707-714.
 12. **Riehl, C.** 2011. Living with strangers: direct benefits favor non-kin cooperation in a communally breeding bird. *Proceedings of the Royal Society of London, Series B* 278:1728-1735
 - A *Proceedings B* "**Most Viewed**" article during 2013
 - **Science Editor's Choice** (*Science* 330:1289)
 - Rated "Must Read" by **Faculty of 1000** (<http://f1000.com/13357090>)
 - **Covered in *Animal Behavior* 10th Ed.** (John Alcock, 2013)
 11. **Riehl, C.** 2011. Paternal investment and the "sexually selected" hypothesis for the evolution of eggshell coloration: revisiting the assumptions. *The Auk* 128: 175-179.
 10. **Riehl, C.** 2010. A simple rule reduces conspecific brood parasitism in a communally breeding bird. *Current Biology* 20 (20): 1830-1833.
 - Rated "Must Read" by **Faculty of 1000** (<http://f1000.com/6381960>)
 - **Covered in *Evolutionary Analysis* 5th Ed.** (Freeman & Herron, 2013)
 9. **Riehl, C.** 2010. Egg ejection risk and hatching asynchrony predict egg mass in a communally breeding cuckoo, the Greater Ani. *Behavioral Ecology* 21: 676-683.
 8. **Riehl, C.,** and S. M. Bogdanowicz. 2009. Isolation and characterization of microsatellite markers from the greater ani *Crotophaga major* (Aves: Cuculidae). *Molecular Ecology Resources* [Internet] Available from: <http://tomato.biol.trinity.edu/manuscripts/9-6/mer-09-0270.pdf>.
 7. **Riehl, C.,** and L. Jara. 2009. Natural history and reproductive biology of the communally breeding Greater Ani (*Crotophaga major*) in Gatún Lake, Panama. *The Wilson Journal of Ornithology* 121: 679-687.
 6. **Riehl, C.,** and G. S. Adelson. 2008. Seasonal insectivory by Black-headed Trogons, a tropical dry forest frugivore. *Journal of Field Ornithology* 79: 371-380.
 5. **Riehl, C.** 2008. Communal calling and prospecting by Black-headed Trogons (*Trogon melanocephalus*). *The Wilson Journal of Ornithology* 120:248–255.
 4. **Riehl, C.** 2007. Evidence for cooperative breeding by White-bellied Go-Away Birds (*Corythaixoides leucogaster*). *African Journal of Ecology* 46:421-423.
 3. **Riehl, C.** 2006. Widespread cannibalism by fledglings in a colony of Black-crowned Night-Herons. *The Wilson Bulletin* 118: 101-104.
 2. **Riehl, C.** 2002. Red-shouldered Hawk preys on Pied-billed Grebe. *Journal of Field Ornithology* 73: 410-411.
 1. **Riehl, C.** 2001. Black-crowned Night-Heron fishes with bait. *Waterbirds* 24: 285-286.

PEER REVIEW

Associate Editor:

Proceedings of the Royal Society of London, Series B (2017-present)

The American Naturalist (2016-present)

The Auk: Ornithological Advances (2014-present)

Assistant Chief Editor:

Frontiers in Ecology and Evolution (2016-present)

Reviewer: *American Naturalist; Animal Behaviour; Animal Cognition; Auk: Ornithological Advances; Behaviour; Behavioral Ecology; Behavioral Ecology and Sociobiology; Biology Letters; BMC Evolutionary Biology; Condor: Ornithological Applications; Current Biology; Ethology; Frontiers in Ecology and Evolution; Ibis; Journal of Avian Biology; Journal of Experimental Biology; The Journal of Field Ornithology; Journal of Louisiana Ornithology; Journal of Zoology; Molecular Ecology; Nature; Nature Communications; Nature Scientific Reports; Naturwissenschaften; Oecologia; Philosophical Transactions of the Royal Society of London, Series B; Proceedings of the National Academy of Sciences; Proceedings of the Royal Society of London, Series B; Science; Waterbirds; Wilson Journal of Ornithology*

TEACHING EXPERIENCE

- 2015-2019 Lecturer, *Behavioral Ecology*, Dept. of Ecology and Evolutionary Biology, Princeton University
- 2018 Lecturer, *Animal Cognition* (Junior Tutorial), Dept. of Ecology and Evolutionary Biology, Princeton University
- 2015-2017 Lecturer, *Recent Research in Population Biology* (graduate seminar), Dept. of Ecology and Evolutionary Biology, Princeton University
- 2014-2017 Lecturer, *Evolutionary Ecology of Tropical Birds*, NSF Integrative Graduate Education and Research Traineeship (IGERT) Program, Panama.
- 2011 Lecturer, *Introduction to Population and Community Ecology*, Dept. of Ecology and Evolutionary Biology, Princeton University
- Lecturer, *Junior Tutorial*, Dept. of Ecology and Evolutionary Biology, Princeton University
- Laboratory Instructor, *Comparative Anatomy and Physiology*, Dept. of Ecology and Evolutionary Biology, Princeton University
- 2010 Teaching Assistant, *Evolutionary Biology*, Dept. of Ecology and Evolutionary Biology, Princeton University
- 2007-08 Writing Instructor, *The Writing Program*, Princeton University
- 2006 Teaching Assistant, *Behavioral Ecology*, Dept. of Ecology and Evolutionary Biology, Princeton University
- 2005 Laboratory Instructor, *The Biology of Organisms*, Dept. of Ecology and Evolutionary Biology, Princeton University

STUDENTS AND INTERNS

- 2019 Danielle Almstead (Undergraduate student, Princeton University)
Conducted senior thesis research on nest-site selection of greater anis
- 2019 Dennis Duffin (Undergraduate student, Princeton University)
Conducted senior thesis research on invasive reef fish in Honduras
- 2019 Devon Block-Funkhauser (Undergraduate student, Princeton University)
Conducted senior thesis research on Coquerel's sifakas in Madagascar
- 2018 Elias Berbari (Undergraduate student, Princeton University)
Conducted senior thesis research on spider monkey foraging ecology in Mexico
- 2018 Camden Olson (Undergraduate student, Princeton University)
Conducted senior thesis research on behavior of diabetic guide dogs
- 2017 Ellie McNulty (Undergraduate student, Princeton University)
Conducted senior thesis research on conservation of Poplar Island
- 2017 Emma Latham (Undergraduate student, Princeton University)
Conducted senior thesis research on sustainable farming in New Jersey
- 2017 Mitchel Charles (Undergraduate student, Princeton University)
Conducted senior thesis research on timing of songbird migration
- 2016 Vivien Bazarko (Undergraduate student, Princeton University)
Conducted senior thesis research on primitively eusocial bees in Panama
- 2016 Allison Conwell (Undergraduate student, Princeton University)
Conducted senior thesis research on parental care in Florida scrub-jays
- 2016-19 Zach Smart (Undergraduate student, Princeton University)
Won Princeton Environmental Institute internship to assist in field work in Panama
- 2016-19 Luke Carabbia (Undergraduate student, Princeton University)
Won Princeton Environmental Institute internship to assist in field work in Panama
- 2015 Haley Gordon (Undergraduate student, Princeton University)
Conducted senior thesis research on food-caching behavior of agoutis in Panama
- 2015 Sarah Porter (Undergraduate student, Princeton University)
Conducted senior thesis research on foraging behavior of Crested Guans in Panama
- 2015 Amanda Savagian (Intern)
Won STRI Short-Term Fellowship to study neighbor-stranger discrimination in Greater Ani groups
- 2015 Chiti Arvind (Undergraduate student, Mount Carmel College, Bangalore, India)
Won Khorana Fellowship to assist in study of Greater Anis
- 2014-15 Cynthia Ursino (Ph.D. student, University of Buenos Aires, Argentina)
Conducted genetic analyses on parentage and mating patterns in South American brood parasitic cowbirds and their hosts
- 2013-14 Meghan Strong (Master's student, University of California Northridge)
Conducted field experiments to determine whether cooperatively breeding female anis track their own eggs in a shared nest
- 2013 Richard Simpson (Ph.D. student, Arizona State University)
Won STRI Short-Term Fellowship to study visual perception in Red-throated Ant-Tanagers; co-advised by C. Riehl and STRI Staff Scientist John Christy
- 2008-2010 Laura Jara Reyes (Undergraduate student, Universidad de los Andes, Colombia)
Assisted in field research on Greater Anis in Panama

CONFERENCE PRESENTATIONS

- 2018 – Fitness consequences of social bonds in cooperatively breeding greater anis. American Ornithological Society, Tucson, AZ.
- 2018 – Mechanisms of communication and kin recognition in social evolution. Society for the Study of Evolution, Montpellier, France. (**Symposium co-organizer with Mark Elgar**)
- 2016 – Cheating in intraspecific cooperative interactions. Symposium funded by École Normale Supérieure, Paris, France (**Invited address**)
- 2016 – Fitness consequences of multilevel sociality. Presidential Symposium, Animal Behavior Society, Columbia, MO. (**Invited address**)
- 2016 – Evolutionary stability of cooperation and parasitism. International Society for Behavioral Ecology, Exeter, UK.
- 2016 – Why be a social parasite in a cooperative world? Winter Animal Behavior Conference, Steamboat Springs, CO
- 2014 – Infanticide promotes reproductive synchrony in a communally breeding bird. Animal Behavior Society, Princeton, NJ.
- 2014 – Why cooperate with unrelated individuals? International workshop funded by Conférence Universitaire de Suisse Occidentale, Arolla, Switzerland. (**Keynote address**)
- 2014 – Cooperation among non-kin: what prevents cheating? European Conference on Behavioural Biology, Prague, Czech Republic (**Symposium co-organizer with Michael Taborsky**)
- 2013 – Sneaky reproductive strategies in a “cooperative” bird. American Ornithologists’ Union and Cooper Ornithological Society, Chicago, IL. (**Young Professional Award**)
- 2013 – Cheaters and collaborators: the evolution of conspecific brood parasitism in a cooperatively breeding bird. Wilson Ornithological Society, Williamsburg, VA.
- 2012 – Paternal care and reproductive skew in a communally breeding cuckoo. Animal Behaviour Society, Albuquerque, NM.
- 2010 – Greater Anis can discriminate between predatory Yellow-headed Caracaras and similar, non-predatory Snail Kites. Association for the Study of Animal Behaviour, London, UK.
- 2010 – Cooperation and parasitism in a communally breeding bird, the Greater Ani. Animal Behaviour Society, Williamsburg, VA.
- 2010 – Alternative reproductive strategies: joint nesting and social monogamy. American Ornithologists’ Union and Cooper Ornithological Society. San Diego, CA.
- 2009 – Unusual variation in egg size in the Greater Ani, a communally breeding cuckoo with extreme reproductive competition. Wilson Ornithological Society and the Association of Field Ornithologists. Pittsburgh, PA.

INVITED DEPARTMENTAL SEMINARS

- 2018 Drexel University, PA: Biology Department Seminar
 Villanova University, PA: Biology Department Seminar
 Utah State University, UT: Biology Department Seminar
- 2017 University of Arizona, AZ: Biology Department Seminar
 Rutgers University, NJ: Biology Department Seminar
 Cornell University, NY: Neurobiology and Behavior Department Seminar
 McGill University, Canada: Biology Department Seminar
 University of Connecticut: EEB Department Seminar
- 2016 Santa Fe Institute, NM: Seminar Series
 University of Pennsylvania, PA: Behavioral Ecology Seminar

- 2015 Duke University, NC: Biology Department Seminar “Superspeaker”
 McMaster University, Canada: Biology Department Seminar
 Ferris State University, MI: Biology Department Seminar
- 2014 Arizona State University, AZ: Evolution of Social Complexity Seminar Series
 University of New Hampshire, NH: Biology Department Seminar
 Stonehill College, MA: Biology Department Seminar
 Dartmouth College, NH: Neukom Institute for Computational Science
 Princeton University, NJ: EEB Department Faculty Candidate Search
 University of Texas at Austin, TX: Department of Integrative Biology Seminar
- 2013 University of Pennsylvania, PA: Evolution Cluster Faculty Candidate Search
 University of Pennsylvania, PA: Behavioral Ecology Seminar
 Boston University, MA: Animal Behavior Seminar
- 2012 University of New Hampshire, NH: Behavioral Ecology Group Seminar
 Smithsonian Tropical Research Institute, Panama: Tupper Seminar
- 2010 Tulane University, LA: Department of Ecology and Evolutionary Biology Seminar
 Harvard University, MA: Program in Evolutionary Dynamics Seminar
 Lake Forest College, IL: Biology Department Seminar
 City University of New York, NY: Animal Behavior and Conservation Seminar

SERVICE IN THE SCIENTIFIC COMMUNITY:

Mentor: Graduate Women in STEM, Women in Science at Princeton

Guest Editor, theme issue on the evolution of cooperation between non-kin, *Phil Trans Roy Soc B*

Editorial Staff for *The Journal of Field Ornithology*

Grant Reviewer: National Science Foundation, National Geographic Society, European Research Council, Israel Science Foundation, Smithsonian Tropical Research Institute, Animal Behavior Society

Book Reviewer: Yale University Press, Harvard University Press, Princeton University Press, Louisiana State University Press

POPULAR & SCIENTIFIC PRESS COVERAGE:

July, 2016: *Science*. ScienceShots: For these birds, being the middle child is the best way to avoid an early death. <http://www.sciencemag.org/news/2016/07/these-birds-being-middle-child-best-way-avoid-early-death>

August, 2013: *Evolutionary Analysis*, Freeman & Herron, 5th Ed (Textbook).

May, 2013: *Proceedings of the National Academy of Sciences*. Inner Workings: Studying an elusive cuckoo. <http://www.pnas.org/content/110/22/8755.full>

January, 2013: *Harvard Magazine*. Survival of the cooperative. <http://harvardmagazine.com/2013/01/survival-of-the-cooperative>

April, 2012: *Smithsonian Tropical Research Institute*. Meet our scientists (Webcast).

December, 2010: *Science*. Editor’s Choice: Good for you, good for me too. <http://www.sciencemag.org/content/330/6009/1289.3.full?sid=e7a4feb8-c03a-4b92-957f-b577587257a0>

November, 2010: *Current Biology*. Dispatch: Clever defense against cheats. [http://www.cell.com/current-biology/abstract/S0960-9822\(10\)01213-3](http://www.cell.com/current-biology/abstract/S0960-9822(10)01213-3)