Erik Enbody

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About Me

I am an evolutionary biologist trained in bioinformatics, field ecology, and behavioral research. My research is driven by my fascination with the evolutionary processes that generate diversity in wild populations. This research includes projects on birds, mammals, and fish from the Americas, Eurasia, and Oceania.

Appointments

2018– **Uppsala University, Uppsala, Sweden**

Current: Postdoctoral Researcher in Genomics & Bioinformatics with Dr. Leif Andersson. Department of Medical Biochemistry and Microbiology.

Education

2013–18 **Tulane University, New Orleans, Louisiana**

Ph.D. Ecology and Evolutionary Biology. Advisor: Dr. Jordan Karubian. Dissertation: "Evolution of female ornamentation in the White-shouldered Fairywren (*Malurus alboscapulatus*)"

2008–12 **Colorado College, Colorado Springs, Colorado**

B.A. with Distinction in Biology. Advisor: Dr. Brian Linkhart. Thesis: "Factors affecting the predation of avian nest cavities by Red Squirrels (*Tamiasciurus hudsonicus*)"

Publications

Peer-reviewed journal articles

(*Papua New Guinea national & researcher, † denotes equal contribution)

in press **Erik D. Enbody†**, M.E. Pettersson†, C. Grace Sprehn, S. Palm, H. Wickström, L. Andersson. *in press*. Ecological adaptation in European eels is based on phenotypic plasticity. *Proceedings of the National Academy of Sciences*.

in press Semenov, G.A., E. Linck, **E.D. Enbody**, P. Alström, L. Andersson, D.R. Khaydarov, S.A. Taylor. *in press*. Asymmetric introgression reveals the genetic architecture of a plumage trait. *Nature Communications*.

2020 Grant, P.R., R. Grant, **E.D. Enbody**, S. Lamichhaney, L. Andersson. 2020. Darwin's finches, an iconic adaptive radiation. eLS.1:672–682.

2020 Gustafsson, R., U. Eckhard, W. Ye, **E.D. Enbody**, M. Pettersson, P. Jemth, L. Andersson, M. Selmer. 2020. Structure and characterization of phosphoglucomutase 5 from Atlantic and Baltic herring - an inactive enzyme with intact substrate binding. Biomolecules. 10(2):1631

2020 Boersma, J., **E.D. Enbody**, J.A. Jones, E. Lopez-Contreras, J. Karubian, H. Schwabl. 2020. Exogenous testosterone induces partial ornamentation which enhances vocal aggression in a female tropical songbird. Behavioral Ecology. 31(5):1233-1241.

2019 Javůrková, V.G., **E.D. Enbody**, J. Kreisinger, K. Chmel, J. Mrázek, Jordan Karubian. 2019. Plumage iridescence is associated with distinct feather microbiota in a tropical passerine. Scientific Reports (12921).

2019 Hill, J., **E.D. Enbody**, M.E. Pettersson, C.G. Sprehn, D. Bekkevold, A. Folkvord, L. Laikre, G. Kleinau, P. Scheerer, L. Andersson. 2019. Recurrent convergent evolution at amino acid residue 261 in fish rhodopsin. Proceedings of the National Academy of Sciences. 116(37): 18473-18478. Press: PNAS In This Issue, Science Daily, phys.org, Sveriges Radio. Winner of the 2019 SciLifeLab's Scientific Highlight in Ecology and Environment.

2019 **Enbody, E.D.**, J. Boersma, J. A. Jones, M. W. H. Chatfield, S. Ketaloya *, D. Nason *, D. T. Baldassarre, J. Hazlehurst, O. Gowen, H. Schwabl, J. Karubian. 2019. Social organization and breeding biology of the White-shouldered Fairywren *Malurus alboscapulatus*. Emu: Austral Ornithology. 19(3): 274-285. Special issue: Ornithology of New Guinea and the Indo-Pacific Islands. (invited contribution & cover photo).

2018 **Enbody, E.D.**, J. Boersma, H. Schwabl, J. Karubian. 2018. Female ornamentation is associated with elevated aggression and testosterone in a tropical songbird. Behavioral Ecology. 29(5): 1056–1066.

2017 **Enbody, E.D.**, Lantz S.M., and J. Karubian. 2017. Production of plumage ornaments among males and females of two closely related tropical passerine bird species. Ecology and Evolution. 00:1-11.

2017 Brouwer, L., M. van de Pol, N. H. Aranzamendi, G. Bain, D. T. Baldassarre, D. Colombelli-Négrel, **E.D. Enbody**, K. Gielow, M. L. Hall, A. E. Johnson, J. Karubian, S. A. Kingma, S. Kleindorfer, M. Louter, R.A. Mulder, A. Peters, S. Pruett-Jones, K. A. Tarvin, D.J. Thrasher, C.W. Varian-Ramos, M.S. Webster, A. Cockburn. 2017. Multiple hypotheses explain variation in extra-pair paternity at different levels in a highly variable avian family. Molecular Ecology. 26:6717–6729.

Preprints

- **E. D. Enbody**, C.G. Sprehn, A. Abzhanov, H. Bi, M.P. Dobreva, O.G. Osborne, C.J. Rubin, P.R. Grant, B.R. Grant, L. Andersson. *in review*. Transspecies beak color polymorphism in the Darwin's finch radiation. Link to bioRxiv preprint

Under review or in revision

- Odom, K.J., K.E. Cain, M.L. Hall, N.E. Langmore, R.A. Mulder, S. Kleindorfer, J. Karubian, L. Brouwer, **E.D. Enbody**, J.A. Jones, J.L. Dowling, A.V. Leitão, E.I. Greig, C. Evans, A.E. Johnson, K.K.-A. Meyers, M. Araya-Salas and M.S. Webster. *in revision*. Sex role similarity and sexual selection predict male and female song elaboration and dimorphism in fairy-wrens.
- **Enbody, E.D**, S.Y.W. Sin, J. Boersma, H. Schwabl, S.V. Edwards, M.S. Webster, J. Karubian. *submitted*. Genomic and transcriptional evidence for selection on female ornamentation.
- Liu, H., C. Chen, M. Lv, N. Liu, Y. Hu, H. Zhang, **E.D. Enbody**, Z. Gao, L. Andersson, W. Wang. *submitted*. Comparative genomic analysis reveals ecological adaptation of teleost olfactory receptor repertoires.

Manuscripts in preparation

Enbody, E.D., C. J. Rubin, D. Saito, M. Carneiro, L. Andersson. *in prep*. Structural variants in a haplotype-resolved hybrid rabbit genome.

Genome assemblies

White Wagtail assembly
Small Tree Finch assembly
European Rabbit (in progress)
Ruff: Calidris pugnax (in progress)
White-shouldered Fairywrren: Malurus alboscapulatus (in progress)

Grants and Honors

Research Grants

2017 National Science Foundation Dissertation Improvement Grant, $20,000. PI: Jordan Karubian, Collaborators: Scott V. Edwards
2016 Tulane Department of Ecology and Evolution Student Research Award, $989
2016 Tulane Department of Ecology and Evolution Student Research Award, $900
2015 National Geographic Society Young Explorers Grant, $5,000
2015 Animal Behavior Society, $1,000
2015 Chapman Memorial Fund award, AMNH, $1,500
2014 American Ornithologist Union Research Award, $1,607
2011 Colorado College Venture Grant for thesis research, $1,000
2011 Colorado College Student-Faculty Collaborative Grant for thesis research, $2,500

Travel Grants

2018 Society for the Study of Evolution Travel Award, $500
2018 Tulane Graduate Studies Student Association travel award, $350
2018 Tulane School of Science and Engineering Dean's travel award, $350
2017 American Ornithological Society Student Travel Award, $215.00
2016 American Ornithologists' Union Student Travel Award, $215.00
2016 Tulane Graduate Studies Student Association travel award, $350
2016 Tulane School of Science and Engineering Dean's travel award, $300
2014 Tulane Graduate Studies Student Association travel award, $250
2014 Tulane School of Science and Engineering Dean's travel award, $250

Other Honors

2018 American Ornithological Society Council Best Student Presentation Award
2018 The George Henry Penn Award Best Dissertation, Department of Ecology & Evolutionary Biology, Tulane University.
2012 Richard G. and Reba Beidleman Award in Ecology "Awarded to a Colorado College student demonstrating outstanding potential for becoming a professional ecologist and/or field biologist."

Invited Seminars & Visiting Lectures

2020 Evolution of color in Darwin's Finches and *Motacilla* Wagtails. Department of Medical Biochemistry and Microbiology, Comparative Genetics and Functional Genomics Seminar Series, Uppsala University, Uppsala, Sweden.

2020 Evolutionary genomics in wild populations: examples from adaptive radiations in birds and visual adaptation in Baltic herring. Invited seminar speaker for the Systematic Biology Program at Uppsala University, Sweden.

2019 Recurrent convergent evolution at amino acid residue 261 in fish rhodopsin. Science and SciLifeLab Prize, Karolinska Institutet, Solna, Sweden. Presentation of the 2019 SciLifeLab's Highlight in Ecology and Environment.

2019 Detecting selection in the past and present. Department of Biological Sciences, University of Cyprus, Nicosia, Cyprus. Invited speaker for the Departmental Postgraduate Seminars series.

2018 Genetic, transcriptional, and endocrine factors drive evolutionary transitions in female ornamentation. Department of Biological and Environmental Sciences Seminar Series, University of Gothenburg, Gothenburg, Sweden. Invited lecture.

2018 Genetic, transcriptional, and endocrine factors drive evolutionary transitions in female ornamentation. Department of Medical Biochemistry and Microbiology, Comparative Genetics and Functional Genomics Seminar Series, Uppsala University, Uppsala, Sweden.

2018 Evolution of female ornamentation in the White-shouldered Fairywren (*Malurus alboscapulatus*). School of Biological Sciences course in Behavioral Ecology guest lecture (via Skype), Hong Kong University.

2018 Genetic, transcriptional, and endocrine factors drive evolutionary transitions in female ornamentation. Louisiana State University Natural History Museum Series, Baton Rouge, Louisiana. Invited lecture.

2016 Female Ornamentation in the White-shouldered Fairywren. Guest lecture at Binatang Research Center, Madang Province, Papua New Guinea.

Conference Presentations

2020 **Enbody, E.D.**, P. R. Grant, B. R. Grant, C. G. Sprehn, A. Abzhanov, M. Dobreva, O. Osborne, C. Wang, L. Andersson. Genetic Basis and Long-Term Dynamics of a Color Polymorphism in Darwin's Finches. Invited symposium "Studies of avian radiations in the 21st century", North American Ornithological Congress, virtual conference.

2020 **Enbody, E.D.**, P. Alström, N. Menon, T. Van der Valk, R. Harris, Y. Liu, F. Lei, L. Andersson. Evolutionary genomics of a widespread continental radiation: the Motacilla wagtails. Invited symposium "Studies of avian radiations in the 21st century", North American Ornithological Congress, virtual conference.

2019 **Enbody, E.D.** Evolutionary genomics looking forward: the importance of natural history knowledge. Department of Medical Biochemistry and Microbiology, IMBIM Days "The Scientific Frontiers", Marholmen, Sweden.

2019 **Enbody, E.D.**, C. J. Rubin, M. Carneiro, L. Andersson. Structural variants in a haplotype-resolved hybrid rabbit genome. The 2019 Congress of the European Society for Evolutionary Biology. Turku, Finland.

2019 Khalil, S., J. Walsh, **E.D. Enbody**, D.T. Baldassarre, M.S. Webster, J. Karubian. Evolutionary Genomics of Variable Carotenoid-Based Ornamentation in the Red-Backed Fairywren. American Ornithological Society Meeting. Anchorage, AK. USA.

2019 Boersma, J., **E.D. Enbody**, J.A. Jones, E. Lopez-Contreras, H. Schwabl, J. Karubian. Taking a proximate view of a female ornament: do androgens mediate acquisition of the ornamented phenotype in female White-shouldered Fairywrens? Society of Integrative and Comparative Biology. Tampa, FL, USA.

2019 Jones, J.A., J. Boersma, **E.D. Enbody**, M.J. Fuxjager, K.A. Rosvall, H. Schwabl, M.S. Webster, J. Karubian. Experimental inhibition of peripheral androgen receptors dampens ornament expression in a female tropical passerine. Society of Integrative and Comparative Biology. Tampa, FL, USA.

2018 Odom, K.J., K.E. Cain, **E.D. Enbody**, M.L. Hall, J. Karubian, M.S. Webster. Selection pressures tied to elaborate female and male song across Fairy-wrens. American Ornithological Society Meeting. Tucson, AZ. USA.

2018 **Enbody, E.D.**, Y.W. Sin, J. Boersma, H. Schwabl, M.S. Webster, S.V. Edwards, J. Karubian. Evolutionary genomics and transcriptomics of variable female plumage ornamentation in a New Guinea Malurus fairywren. American Ornithological Society Meeting. Tucson, AZ. USA. **Winner of a best student presentation award**

2018 **Enbody, E.D.** Early Professional Symposium Presenter. American Ornithological Society Meeting. Tucson, AZ. USA.

2017 **Enbody, E.D.**, J. Boersma, H. Schwabl, J. Karubian. Female ornamentation is associated with increased aggression and circulating androgens in a tropical passerine bird. Joint meeting of the American Ornithological Society and Society of Canadian Ornithologists. East Lansing, MI. USA.

2017 **Enbody, E.D.**, S.M. Lantz, J. Karubian. Production of plumage ornaments among males and females of two closely related tropical passerine bird species. Society for Integrative and Comparative Biology. New Orleans, LA. USA.

2016 **Enbody, E.D.**, S.M. Lantz, J. Karubian. Structural mechanisms of plumage ornament production are maintained within sexes and across sister species of tropical passerine birds. North American Ornithological Congress. Washington, D.C. USA.

Poster Presentations

(^undergraduate student, *Papua New Guinea national & researcher)

2018 **Enbody, E.D.**, Y.W. Sin, J. Boersma, H. Schwabl, M.S. Webster, S.V. Edwards, J. Karubian. The genomic architecture of female ornament evolution. Joint Congress on Evolutionary Biology. Montpellier, France.

2017 Jones, J.A., J. Boersma, **E.D. Enbody**, J. Karubian. Ecological determinants of phenotypic divergence in female coloration of Papua fairywrens. American Ornithological Society and Society of Canadian Ornithologists. East Lansing, MI. USA.

2017 Boersma, J., **Enbody, E.D.**, J. Jones, J. Karubian, H. Schwabl. Androgens and the evolution of male and multiple female phenotypes in a tropical passerine. Society for Integrative and Comparative Biology. New Orleans, LA. USA.

2017 Jones, J.A., J. Boersma, **E.D. Enbody**, J. Karubian. Ecological determinants of phenotypic divergence in female coloration of Papua fairywrens. Society for Integrative and Comparative Biology. New Orleans, LA. USA.

2015 **Enbody, E.D.**, H. Schwabl, S. Ketaloya *, J. Karubian. Variable female plumage in White-shouldered Fairywrens: ornamentation decoupled with testosterone. Tulane SSE Poster Day. New Orleans, LA. USA.

2015 Rose, A.^, S.M. Lantz, **E.D. Enbody**, J. Karubian. How do feathers relevant to sexual selection differ within two Malurus bird species. Tulane SSE Poster Day. New Orleans, LA. USA.

2014 **Enbody, E.D.**, H. Schwabl, S. Ketaloya, J. Karubian. The adaptive consequences of female plumage in White-shouldered Fairywrens. American Ornithologist Union. Estes Park, CO. USA.

Fieldwork Experience

2019 Postdoctoral fieldwork. Sweden, Ottenby Fågelstation: Co-led team with Per Alström to collect blood samples for generating a new reference genome for White Wagtail (*Motacilla alba*)

2013–17 Dissertation fieldwork: Papua New Guinea (Milne Bay, Western, Madang, Highlands, Enga, and Morobe Provinces)

2013/su Research assistant Red-backed Fairywren behavioral ecology study, Batchelor, Northern Territory.

2012/fa Banding intern at the Palomarin field station, Bolinas, California: Seasonal internship banding passerines at various locations in the Point Reyes National Seashore (480 birds processed).

2012 Summer field biologist surveying grassland birds in North and South Dakota, Rocky Mountain Bird Observatory, Brighton, CO: Performed point counts and vegetation sampling in the Central Plains. Field work was conducted from remote regions. Interacted with private landowners for planning transects.

2011 Thesis research and Flammulated Owl crew research assistant: Developed and performed an independent research project on Red Squirrel predation of Flammulated Owls using artificial nests in natural cavities. Also assisted with spot mapping, nest searching, and banding of owls.

2011 Undergraduate research, Ecuador: Conducted various class projects surveying birds, frogs, and butterflies in the Ecuadorian Amazon and Manabí Province. Designed playback experiment to test heterospecific responses between two sympatric antshrike species.

2010 Vegetation Sampling Assistant (summer): U.S. Geological Survey, Elko, Nevada

2009/10 Avian Field Assistant (summers), Central Nevada Mountains. High Desert Research Institute and John Muir Institute of the Environment, UC Davis: performed bird and vegetation surveys in the mountains of Central Nevada for a long-term study of Great Basin bird communities.

2009 Volunteer Field Assistant (winter), Monteverde, Costa Rica. University of Washington: Developed and implemented protocols for surveying birds and conducted vegetation surveys in reforested pasture lands.

2008 Yellow-billed Cuckoo Field Assistant (summer), Lake Havasu City, AZ. Southern Sierra Research Station: Conducted playback surveys, nest searching, and mist netting on the endangered western subspecies of the Yellow-billed Cuckoo along the Lower Colorado River.

2006–08 Research Assistant, East Lansing, MI. Bird Acoustics Research Lab, Michigan State University, MI, Dr. Stuart Gage: Established ground truth for remote sensing of bird populations, conducted point-count surveys, and assisted in the development of automatic song recognition.

Teaching & Mentoring Experience

Teaching assistant and guest lectures

2020/sp Bioinformatics, Laboratory instructor - Uppsala University

2017/fa Ornithology, Guest Lecture – D. Henry, Tulane University

2017/sp Behavioral Ecology, Guest Lecture – D. Henry, Tulane University

2016/fa Introduction to Plant Biology, TA – L.T. Martínez, Tulane University

2016/fa Global Environmental Change, TA – S. Doosey, Tulane University

2015/fa Behavioral Ecology, TA – J. Karubian, Tulane University

2015/sp Experimental Animal Behavior, TA & Guest Lecture - J. Karubian, Tulane University

	2014/s/f	Plant and Human Affairs, TA – S. Darwin, Tulane University
	2013/fa	Diversity of Life, TA – D. Henry, Tulane University
Workshops	2018	Differential Expression workshop: Designed and implemented a short workshop to teach the fundamentals and methods for RNAseq data processing and differential expression analysis. Included as a part of the first Bioinformatics & Genomics Course taught at Tulane University.
	2016/su	Summer Bioinformatics Workshop, Cofounder & instructor, Tulane University: Focus on using python, R, and UNIX for analysis of RADseq datasets (eight participants).
Mentoring	2019–	Navaneeth Menon - intern training in bioinformatics techniques for the study of wagtail evolution.
	2019	Fahime Mohamadnejad - Visiting Ph.D. student in animal genomics, training in fundamentals of bioinformatics.
	2017–	Sarah Khalil - Ph.D. student in fundamentals of bioinformatics
	2015–17	Hunter Rust – photospectroscopy techniques and bird song analysis.
	2013–16	Olivia Gowan – photospectroscopy techniques and DNA extraction.
	2015	Alexander Rose – photospectroscopy techniques and electron microscopy analyses.
	2014–15	Miles Hegedus – photospectroscopy techniques.
	2015–16	Amelia Lormund – photospectroscopy techniques.
	2015–16	Zoe Albert – video-based nest observation data collection.
	2013–17	Six international recent graduates in field data collection methods in New Guinea.

Service, Outreach, and Training

Manuscript reviews		Journal of Evolutionary Biology (1), Behavioral Ecology (2), Behavioral Ecology and Sociobiology (1), Biological Journal of the Linnean Society (1), Frontiers in Ecology and Evolution (1), Global Ecology and Biogeography (1), Emu (1), Ecology and Evolution (1), Ethology Ecology and Evolution (1)
Service & Outreach	2016–18	Volunteer bird bander with Louisiana Bird Observatory / Audubon Louisiana at Palmetto State Park: Regular weekend volunteer at local bird banding station to assist with mist net set up and bird banding.
	2016	Girls in STEM, Tulane University, New Orleans, LA: Module co-instructor for "A little birdie told me". GIST is a long-term program aimed at introducing female elementary and middle school students to science and female scientists.
	2015	Workshop on Engaged Scholarly Research: Bridging the Natural Sciences and Community-based Conservation, Tulane University: Workshop participant and presenter.
	2014–15	Annual Environmental Fair, Milne Bay Province, Papua New Guinea: Co-organizer for community fair celebrating the environment to >500 students and members from surrounding communities.
	2014	Conservation training workshop, Milne Bay Province, Papua New Guinea: Organizer and instructor for 20 leaders in local communities in conservation techniques
	2014–16	Community Symposium and Awareness, Garuahi, Porotona, and Obo, PNG: Annual presentations with the goal of raising awareness about the environment, sustainable practices, and status updates on field research focal communities.
	2014–17	Research scientist training, Garuahi, Porotona, and Obo, PNG: Co-trained six local biologists in the techniques necessary to conduct field research. These individuals have become community leaders for environment outreach and work together to spread environmental awareness throughout the region. Watch a video about our work here: https://youtu.be/aFrmmB0-CbY
	2014	Garuahi Primary School Guest Teacher, Milne Bay Province, Papua New Guinea: Guest speaker at local primary school to teach fundamentals of ecology and field biology
	2014	Porotona Primary School Guest Teacher, Milne Bay Province, Papua New Guinea: Guest speaker at local primary school to teach fundamentals of ecology and field biology
	2013–17	Volunteer at Louisiana Rice & Rails festival: Annual event focused on bringing together birdwatchers and rice farmers to further appreciate the rich cultural traditions of Southern Louisiana and monitor populations of Yellow Rails. Assisted with bird banding and co-led local birding tours (2013, 2016, 2017).
Specialized Training	2012	Certified Bird Bander by the North American Banding Council
	2015	UCLA La Kretz Conservation Genomics Workshop, Santa Monica, California
	2013	Michigan State University CSE Python Workshop, East Lansing, MI
	2011	Boston University Tropical Ecology Program, Ecuador - Spring
	2009	National Outdoor Leadership School, Baja California – January

Professional memberships

2014–21	American Ornithological Society
2014–21	Society for the Study of Evolution
2019–21	European Society for Evolutionary Biology

Popular Press Articles & Photographs

2019	Press for Recurrent convergent evolution at amino acid residue 261 in fish rhodopsin. PNAS In This Issue, Science Daily, phys.org, Sveriges Radio.
2019	Photo of duetting White-shouldered Fairywrens selected for cover of special issue on New Guinea ornithology. Emu - Austral Ornithology (19), 2019.
2019	Photos (x2) in Multiple components of feather microstructure contribute to structural plumage colour diversity in fairy-wrens, Fan et al. 2019, Biological Journal of the Linnean Society.
2015	Photos (x3) in Bird Families of the World, eds. Winkler, D.W., Billerman, S. M., Lovette, I.J. (Lynx Editions).
2008	Enbody, E. D. Birding Hot Spots. Birder's World 22(1), 46.
2005	Enbody, E. D. Book Review: A Birder's Guide to Michigan. A Bird's Eye View Jul-Aug, 7.
2005	Enbody, E. D. The Big Invasion. A Bird's Eye View. Jan-Feb, 1-2.
2005	Enbody, E. D., Bankert, A. Owls, Owls, Owls: a Midwest Trip Report. A Bird's Eye View J-F, 1-2.
2005	Enbody, E. D. Atlantic Puffin and Sanderlings (photos). Birding Magazine.
2005	Enbody, E. D. Sanderlings in Flight (photos). ABA Institute for Field Ornithology.
2004	Enbody, E. D. A Report on Camp Chiricahua. A Bird's Eye View. Sep-Oct, 4-5.
2004	Enbody, E. D. Sanderlings, Red Knot, and Willet (photos). A Bird's Eye View.

Interests and skills

Lifelong naturalist and birder My interest in science was a natural progression from my lifelong passion for wildlife and birds in particular. I am a passionate field biologist and enjoy contributing to natural history knowledge, particularly through observations, photographs, and recordings to the citizen science platform eBird profile.

Languages English, Spanish (Intermediate), Swedish (Beginner)

Programming R, bash/unix, Python.

Database Filemaker, FreezerPro

Version Control GIT