

A. Bradley Duthie

I am an evolutionary ecologist interested in the interactions among species and individuals within complex communities and populations. My theoretical research uses mathematical and computational modelling (primarily individual-based models) to understand coexistence among multiple interacting species, and the evolution of inbreeding strategy and polyandry in populations characterised by multiple interacting individuals. My empirical work primarily uses insect communities to test fundamental questions about mechanisms underlying species distributions and coexistence.

Professional Appointment

ERC Postdoctoral Research Fellow, June 2013-present
School of Biological Sciences, University of Aberdeen

Education

Ph.D. Ecology and Evolutionary Biology, Spring 2013
Graduate Minor: Statistics
Certificate: Graduate Student Teaching Certificate
Iowa State University

B.S. Biology (Magna cum laude), Spring 2007
Specialisation: Ecology, Evolution, Environment
Southern Illinois University Edwardsville

B.S. Philosophy (Magna cum laude), Spring 2007
Minor: Chemistry
Southern Illinois University Edwardsville

A. Bradley Duthie
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Ecological Modeller
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Publications

Duthie, A. B., A. M. Lee, and J. M. Reid. Inbreeding parents should invest more resources in fewer offspring. *Proceedings of the Royal Society B*. In review. Pre-print: <http://dx.doi.org/10.1101/062794>

Duthie, A. B., and J. M. Reid. Evolution of inbreeding avoidance and inbreeding preference through mate choice among interacting relatives. *American Naturalist*. In press.

Duthie, A. B., and J. D. Nason. 2016. Plant connectivity underlies plant-pollinator-exploiter distributions in *Ficus petiolaris* and associated pollinating and non-pollinating fig wasps. *Oikos*. In press. DOI: 10.1111/oik.02905

Duthie, A. B., G. Bocedi, and J. M. Reid. 2016. When does female multiple mating evolve to adjust inbreeding? Effects of inbreeding depression, direct costs, mating constraints, and polyandry as a threshold trait. *Evolution*. 70 (9):1927-1943 DOI: 10.1111/evo.13005

Frater, P. N., and **A. B. Duthie**. 2016. Power scaling, vascular branching patterns, and the golden ratio. *Ideas in Ecology and Evolution*. 9:15-18. DOI: 10.4033/iee.2016.9.4.n

- Reid, J. M., G. Bocedi, P. Nietlisbach, **A. B. Duthie**, M. E. Wolak, E. A. Gow, and P. Arcese. 2016. Variation in parent-offspring kinship in socially monogamous systems with extra-pair reproduction and inbreeding. *Evolution*. 70 (7):1512-1529. DOI: 10.1111/evo.12953
- Reid, J. M., P. Arcese, G. Bocedi, **A. B. Duthie**, M. E. Wolak, and L. F. Keller. 2015. Resolving the conundrum of inbreeding depression but no inbreeding avoidance: estimating sex-specific selection on inbreeding by song sparrows (*Melospiza melodia*). *Evolution*. 69 (11):2846-2861. DOI: 10.1111/evo.12780
- Duthie, A. B.**, K. C. Abbott, and J. D. Nason. 2015. Trade-offs and coexistence in fluctuating environments: evidence for a key dispersal-fecundity trade-off in five nonpollinating fig wasps. *American Naturalist*. 186 (1):151-158. DOI: 10.1086/681621
- Reid, J. M., **A. B. Duthie**, M. E. Wolak, and P. Arcese. 2015. Demographic mechanisms of inbreeding adjustment through extra-pair reproduction. *Journal of Animal Ecology*. 84 (4):1029-1040. DOI: 10.1111/1365-2656.12340
- Duthie, A. B.**, and J. M. Reid. 2015. What happens after inbreeding avoidance? Inbreeding by rejected relatives and the inclusive fitness benefit of inbreeding avoidance. *PLoS One*. 10 (4):e0125140. DOI: 10.1371/journal.pone.0125140
- Duthie, A. C., and **A. B. Duthie**. 2015. Do music and art influence one another? Measuring cross-modal similarities in music and art. *Polymath: An Interdisciplinary Arts and Sciences Journal*. 5 (1):1-22.
- Reid, J. M., P. Arcese, L. F. Keller, R. R. Germain, **A. B. Duthie**, S. Losdat, M. E. Wolak, and P. Nietlisbach. 2015. Quantifying inbreeding avoidance through extra-pair reproduction. *Evolution*. 69 (1):59-74. DOI: 10.1111/evo.12557
- Duthie, A. B.**, K. C. Abbott, and J. D. Nason. 2014. Trade-offs and coexistence: A lottery model applied to fig wasp communities. *American Naturalist*. 183 (6):826-841. DOI: 10.1086/675897
- Duthie, A. B.**, and M. R. Falcy. 2013. The influence of habitat autocorrelation on plants and their seed-eating pollinators. *Ecological Modelling*. 251:260-270. DOI: 10.1016/j.ecolmodel.2012.12.019
- Duthie, A. B.** 2004. The fork and the paperclip: A memetic perspective. *Journal of Memetics - Evolutionary Models of Information Transmission*. 8 (1). http://cfpm.org/jom-emit/2004/vol8/duthie_ab.html.

Grant and Awards

- NSF Postdoctoral Research Fellowship in Biology (2013; award declined) – 138,000 USD
- NSF Doctoral Dissertation Improvement Grant (2010) – 13,411 USD
- Iowa State University Teaching Excellence Award (top 10% of TAs; 2010)
- Biotechnology Graduate Fellowship – 20,000 USD (ISU; 2007)
- Donal G. Myer Outstanding Student Award (SIUE; awarded to one science student; 2007)
- Ober Honours Award in Philosophy (SIUE; awarded to one philosophy student; 2007)
- Phi Kappa Phi (Collegiate Honour Society; 2006)
- Chancellor's Scholarship (SIUE; full tuition for undergraduate education; 2003-2007)

Teaching Experience

As an educator, I take a learning-centred approach to guide students through course material, and I evaluate my teaching as successful when I have evidence that students are thinking actively and effectively about biological concepts. I have experience developing and delivering course content, and in student assessment, in both traditional and online formats. I have additionally developed learning software, specifically for teaching numerical and individual-based ecological modelling to undergraduate students.

Professional Development:

- **Fellow of the Higher Education Academy**
- Principles of Learning and Teaching in Higher Education programme. University of Aberdeen.
- Preparing Future Faculty (PFF) Program: Iowa State University. PFF Associate.
- Graduate Student Teaching Certificate (GSTC) Program (PFF Track): Iowa State University.

University Instruction:

- *Introduction to Ecological and Environmental Modelling – Course Contributor* (BI 4803; Undergraduate: 15 credits). University of Aberdeen. Spring 2015, 2016.
- *Biology for Undergraduates (BUGS) – Tutorial Session ZOO-4* (BI 1006; Undergraduate: 7.5 credits). University of Aberdeen. Fall 2014.
- *Biological Evolution* (BIOL 315; Undergraduate: 3 credits). Iowa State University. Summer 2011, 2012*, Spring 2013*. *Distance Learning Course (online).

University Teaching Assistantships:

- *Biological Evolution* (BIOL 315; Undergraduate: 3 credits). Iowa State University. Spring 2011-2012.
- *Principles of Biology Laboratory I* (BIOL 211L; Undergraduate: 1 credit). Iowa State University. Fall 2008, 2012.
- *Principles of Biology Laboratory II* (BIOL 212L; Undergraduate: 1 credit). Iowa State University. Fall 2009-2011, Spring 2008-2010.

Student Mentoring

Mentored undergraduate researchers at Iowa State University. Cody Duncan (2010), Megan Stoner (2010-2011), Elizabet Howe (2011), Christina Pacholec (2011), Ethan Van Helten (2011), Christine Lim (2011-2012), and Aisha Azhar (2012-2013).

Leadership

Reviewer for *Acta Oecologica*, *American Naturalist*, *Arthropod-Plant Interactions*, *Behavioral Ecology and Sociobiology*, *Biology Letters*, *BMC Evolutionary Biology* (2), the *Journal of Animal Ecology*, and the *Journal of Theoretical Biology*

EEOB Senator – Graduate and Professional Student Senate (ISU; 2011-2013)

Organiser – Midwest Ecology and Evolution Conference at Iowa State University (2010)

Vice President – Graduate Research in Evolutionary Biology and Ecology (ISU; 2009-2010)

Computer Skills

Statistical analysis, mathematical & individual-based modelling, and computer programming abilities in C, R, and MATLAB

Use of Linux, Git, and high performance computing clusters

Knowledge of HTML, Markdown, \LaTeX , and MS Office Suite

Course design and instruction in Blackboard

Presentations

*Denotes undergraduate author

Duthie, A. B., G. Bocedi, and J. M. Reid. 2015. Evolution of polyandry and inbreeding avoidance: a genetically-explicit finite population model. **Population Genetics Group Meeting 49** at the University of Edinburgh, Edinburgh, Scotland.

Duthie, A. B., G. Bocedi, and J. M. Reid. 2015. Should females mate multiply to avoid inbreeding? Insights from a computational modelling approach. **The Scottish Informatics and Computer Science Alliance (SICSA) workshop on Computational Ecology** at the University of Edinburgh, Edinburgh, Scotland.

Duthie, A. B. and J. M. Reid. 2014. Evolution of inbreeding and inbreeding avoidance among multiple relatives. **Workshop: "Evolution of Mating Systems"** at the Konnevesi Research Station of the University of Jyväskylä, Konnevesi, Finland.

Duthie, A. B., Lim*, C., and J. D. Nason. 2013. The effects of life history characteristics on male dimorphism frequency in two species of non-pollinating fig wasps. **Ento '13 International Symposium and Annual National Science Meeting** at the University of Saint Andrews, Saint Andrews, Scotland.

Duthie, A. B., K. C. Abbott, and J. D. Nason. 2013. A fluctuating environment drives coexistence in five non-pollinating fig wasps. **XIV Conference of the European Society for Evolutionary Biology** at the University of Lisbon, Lisbon, Portugal.

Lim*, C., **A. B. Duthie**, and J. D. Nason. 2012. Violence inside the fig: Sexual selection among two species of non-pollinating male fig wasps. **Symposium on Undergraduate Research and Creative Expression** at Iowa State University, Ames, Iowa.

Duthie, A. B., K. C. Abbott, and J. D. Nason. 2012. Does the storage effect maintain coexistence in non-pollinating fig wasp communities? **Nineteenth Annual GREBE Spring Symposium** at Iowa State University, Ames, Iowa.

Duthie, A. B. 2010. Turn-taking in habitat patch selection can be evolutionarily stable. **Midwest Ecology and Evolution Conference** at Iowa State University, Ames, Iowa.

Day, K., **A. B. Duthie**, and J. D. Nason. 2009. Cryptic parasites and their effects on the fitness and evolutionary stability of the fig-pollinator mutualism. **Evolution** at the University of Idaho, Moscow, Idaho.

Duthie, A. B. and M. Falcy. 2009. Spatial heterogeneity promotes coexistence in a mutualist/exploiter community. **Sixteenth Annual GREBE Spring Symposium** at Iowa State University, Ames, Iowa.

Duthie, A. B. and J. D. Nason. 2008. Dynamics of a Sonoran fig wasp community: A graphical modeling approach. **Evolution** at the University of Minnesota, Minneapolis, Minnesota.

Duthie, A. B. and J. D. Nason. 2008. Graphical modeling and the community dynamics of a sonoran desert fig, its pollinator, and exploiter wasps. **Fifteenth Annual GREBE Spring Symposium** at Iowa State University, Ames, Iowa.

Duthie, A. B. and M. Smith. 2007. Environmental effects on achenes of *Boltonia decurrens*, a threatened floodplain species: Age, mass, germination, and viability. **Illinois State Academy of Sciences Annual Meeting** at the Illinois State Museum, Springfield, Illinois.

Duthie, A. B.. 2006. This brain owns itself: How things like us project a unified agent **First Annual Undergraduate Philosophy Conference** at Southern Illinois University Edwardsville, Edwardsville, Illinois.

Posters

Duthie, A. B., and J. M. Reid. 2015. The effect of relatedness structure and sexual conflict on the evolution of inbreeding avoidance and preference **XV Conference of the European Society for Evolutionary Biology** at Lausanne, Switzerland.

Duthie, A. B., K. C. Abbott, and J. D. Nason. 2012. Does the storage effect maintain coexistence in non-pollinating fig wasp communities? **Evolution** at Ottawa, Canada.

Duthie, A. B., K. C. Abbott, and J. D. Nason. 2011. Coexistence in fig wasp communities: A lottery model. **Workshop 5: Coevolution and the ecological structure of plant-insect communities** at the Mathematical Biosciences Institute in Columbus, Ohio.

Duthie, A. B., and M. R. Falcy. 2011. Spatial heterogeneity promotes coexistence in a mutualist/exploiter community. **Workshop 5: Coevolution and the ecological structure of plant-insect communities** at the Mathematical Biosciences Institute in Columbus, Ohio.

Professional Affiliations

American Society of Naturalists, European Society for Evolutionary Biology

References

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