

Emily Burdfield-Steel

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Research Statement

I am interested in how intra- and inter-specific interactions shape evolutionary processes. In particular I am interested in the causes and consequences of sexual conflict within and among species. Coming from a background of both genetics and behaviour, I take an integrative approach to the study of evolution.

Research Career

2010 - date **PhD. School of Biology, University of St Andrews, U.K.**

“The causes and consequences of reproductive interference in five species of seed bug (Hemiptera: Lygaeidae).” PhD Supervisor Dr David Shuker. Funded by NERC

2009 - 2010 **MSc. Evolutionary Genetics and Genomics, University of Manchester, U.K**

Projects: “Population structure in Caribbean Spiny Lobster.” Project supervisor Dr Richard Preziosi. “Phylogeography suggests population structure of *Anopheles baimaii* mosquitoes within Myanmar.” Project supervisor Dr Cathy Walton. Funded by BBSRC.

2006 - 2009 **BSc (Hons.) Zoology, University of Manchester, U.K. First class.**

Honours research project: “Shapes of Spiders; identifying the presence of microhabitat adaptations in the spider family Salticidae (Jumping spiders)”. Dr Chris Klingenberg. Winner of an Outstanding Achievement Award upon graduation for gaining the highest mark in Zoology that year.

Publications

Burdfield-Steel, E.R. & Shuker, D.M. The evolutionary ecology of the Lygaeidae. *Ecology and Evolution*, in press.

Burdfield-Steel, E.R. & Shuker, D.M. Mate-guarding in a promiscuous insect: species discrimination influences reproductive interference in seed bugs (In Review).

Burdfield-Steel, E.R., Dougherty, L.R., Smith, L.A., Collins, L.A. and Shuker, D.M. (2013) Variation in social and sexual behaviour in four species of aposematic seed bugs (Hemiptera: Lygaeidae): The role of toxic and non-toxic food. *Behavioural Processes*, 99 (2013) 52– 6.

Dougherty, L.R., **Burdfield-Steel, E.R.** and David M. Shuker (2013) Sexual stereotypes: the case of sexual cannibalism. *Animal Behaviour*. 99: 52– 6.

Truelove, N.K., **Burdfield-Steel, E.R.**, Griffiths, S., Ley-Cooper, K., Preziosi, R., Butler IV, M.J., Behringer, D.C., Box, S. and Canty, S. (2012) Genetic Connectivity of Caribbean Spiny Lobster (*Panulirus argus*) in Belize. *Proceedings of the Gulf and Caribbean Fisheries Institute* 64 464-467.

Burdfield-Steel, E.R. & Shuker, D.M. (2011) Reproductive interference. *Current Biology*. 21: R450-451.

Research Experience

Doctoral Researcher, 2010 - Present (The University of St Andrews)

The aim of the project is to investigate the causes and consequences of reproductive interference in the Lygaeidae. Reproductive interference (or RI) occurs when individuals of one species engage in reproductive activities with individuals of another species, and these interactions reduce the fitness of one or both species. While the bulk of my research is formed by several behavioural experiments, both in the laboratory and the field, I have also used techniques such as mass spectrometry and computerised tomography to investigate various aspects of mate choice and genital morphology in the Lygaeidae. Finally, I have also written a major review of the evolutionary ecology of the Lygaeidae.

Masters student, 2009-2010 (University of Manchester, Faculty of Life Sciences)

As part of my studies I carried out two separate projects. The first was an investigation of the population structure of Spiny Lobsters off the coast of Belize using microsatellite analysis. My work included the collection of tissue samples, DNA extraction, and the optimisation of microsatellite primers for multiplexing. My second project was an investigation of the phylogeography of mosquitoes in South East Asia. I extracted DNA from previously collected samples from three sites in Myanmar, sequenced three nuclear genes and aligned and analysed the resulting sequence data.

Honours project student, 2008-2009 (University of Manchester, Faculty of Life Sciences)

I worked with Dr Chris Klingenberg comparing variation in body shape in jumping spiders across microhabitats to look for evidence of microhabitat specialization in this morphologically diverse taxa. I used geometric morphometrics to analyse body shape in 29 species of Salticidae, assessing both phylogeny and ecology.

Teaching/Mentoring Experience

2013 Demonstrator on undergraduate course “Biology 1”

I assisted students in learning and performing basic laboratory techniques including microscopy and transformation of *E. coli*.

2013 Lecturer for the Biology Sutton Trust Summer School

I wrote and presented a 45 minute lecture on Sexual Conflict and its impact on evolution to Year 12 pupils as part of an initiative to encourage students from non-privileged homes to apply to University.

2012-2013 Demonstrator on honours course “Advanced Topics in Ecology & Evolution”

I assisted in marking student led presentations and discussion on key topics in ecology and evolution.

2011 - 2012 Demonstrator on sub-honours Marine Ecology Field Course

My role was to assist students in carrying out ecological and biodiversity surveys at the sea shore. I also helped students with experimental design and statistical analysis as they carried out semi-independent projects.

2011 Demonstrator on “Statistics for Biologists: Introduction to R” course

My role was to provide guidance to students on the appropriate statistical tests to use for certain data types and to help troubleshoot any issues students came across while using the R statistical software package.

2007 - 2008 Peer Assisted Study (PASS) leader

After undertaking training I organised and ran workshops and revision sessions for first year undergraduates in the Life Sciences and acted as a go between for students and staff on issues such as lecture style and content.

Professional Development and Training

President (2012-2013) St Andrews Postgraduate Biology Network

Conference Organiser (2012 and 2013) School of Biology Postgraduate Conference

Attendee at Tutoring and Assessment Training Course (January 2011).

Postgraduate Health and Safety Committee Member (2010-2011) University of St Andrews, School of Biology

Additional Relevant Skills

Specialist Computer Software: R (statistics and graphics), SPSS, Clustal, BLAST, DNAsp, ImageJ and MorphoJ.

Insect culturing and observation: In addition to the maintenance of insect cultures crucial to my PhD research, I have extensive experience from my work caring for the collection of the St Ivo Entomology and Natural History Society. I also assisted with the care of educational insect collections at the University of Manchester. During my time at St Andrews I have been responsible for setting up a laboratory population of mantids (*Sphodromantis viridis*).

Outreach: As part of my work, both with the St Ivo Entomology and Natural History Society and the Manchester Museum, I have frequently taken part in live animal displays to school children and the public. I have presented at both school and larger events such as the Manchester Museum Bug Day and the Cambridge Natural History Society Conversazione. In the past year I have assisted with several public outreach events at the Bell Pettigrew Museum to mark the British Ecological Society's Centenary Festival of Ecology.

Communication: In addition to presenting at national and international conferences I have regularly given presentations to my colleagues as part of departmental "lab chats" and student-run talks hosted by the Bio-Network. This has given me the experience of presenting my research to an audience with very different background knowledge from myself. My work has also been reported in a Science Now article ("Sexual Cannibalism Is a Case of 'He Said, She Said'" 15 January 2013).

Abstracts and Presentations

Emily Burdfield-Steel (2014) "Do the benefits of polyandry scale with inbreeding?" 47th Population Genetics Group Meeting (Poster presentation) Won first place in the student poster competition.

Emily Burdfield-Steel (2013) "The scent of a bug – do CHCs play a role in seed bug mate discrimination?" Royal Entomological Society's Annual National Science Meeting (Oral presentation) Won second place in the student talk competition.

Emily Burdfield-Steel (2013) "Why is there so little pre-copulatory choice in a promiscuous seed bug?" Congress of the European Society for Evolutionary Biology (Oral presentation)

Emily Burdfield-Steel (2013) "Why is there so little pre-copulatory choice in a promiscuous seed bug?" ASAB Easter Conference (Oral presentation)

Emily Burdfield-Steel (2013) “Why is there so little pre-copulatory choice in a promiscuous seed bug?” Scottish Conference on Animal Behaviour (Oral presentation)

Emily Burdfield-Steel (2012) “Mate, Eat or Avoid? – Investigating Reproductive Interference between seed bug species” Scottish Conference on Animal Behaviour (Poster presentation)

Emily Burdfield-Steel (2011) “Mistaken Identity – Investigating Reproductive Interference between seed bug species” ASAB Winter Meeting (Poster presentation)

References

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