Dr Kevin Healy

Research Fellow in Zoology at Trinity College Dublin

I am a research fellow interested in the comparative biology, ecology and evolution of animals with a particular focus on life history evolution and trophic ecology.

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Education and Academic Career

2015 - Present Research Fellow in Zoology, Trinity College Dublin.

My current position focuses on using the animal and plant demography datasets COMADRE and COMPADRE to test questions regarding how body size and trophic ecology effects lifespan evolution. Supervised by Prof. Yvonne Buckley (Trinity College Dublin) and Dr Salguero-Gomez (University of Sheffield).

2011 - 2015: Ph.D. in Zoology, Trinity College Dublin. Title: Predator-prey allometry across body size and interaction dimensionality.
I investigated how various ecological and physiological traits, including visual perception, species lifespan and predatory traits, such as venom, define predator-prey interactions using comparative approaches across vertebrates. Supervised by Dr. Andrew Jackson and Dr. Andrew Parnell.

2007-2011: B.A. Mod in Zoology, First class honours and Gold Medal winner, Trinity College Dublin. Thesis: ”Fractal structure of intestinal parasite communities in field mice”. (Overall mark of 82%). I investigated the body size distribution of intestinal parasites in the wood mouse (*Apodemus sylvaticus*). This involved trapping in the field, dissection work, parasite identification, preservation and data analysis.

2010: Ureka research position in SoMER program, National College of Ireland Maynooth. Ten week program under the supervision of Dr. Christen Griffen investigating the evolutionary divergence of entomopathogenic nematodes. This work involved the construction of a phylogeny for a groups of entomopathogenic nematodes collected from Bull island Dublin using molecular techniques.

2006 and 2007: General archaeological operator for Valerie J. Keeley Ltd.
I worked as a general operator on site for three months in 2006 and worked both on site and in post excavation in 2007 for three months.

Awards and Grants

2014: Gordon Research Seminar mentoring program position. Funded by Gordon Research Conferences and the National Science Foundation. (€1,300)

2014: Awarded runner up in both the School of Natural Sciences postgraduate lightning talks and at the Zoology and Botany postgraduate symposium.

2014: Named top contributer to TCD ecology and evolution discussion group ”NERD club”.

2011: Awarded Gold medal by TCD for exceptional merit at degree examinations in final year of B.A Mod. Zoology by coming first in class and achieving an overall final year mark of 77%.

Skills

Field, Communication and Laboratory skills

- Use of museum materials for public events such as part of TCD Research Night.
- Species identification skills gained from studying helminth parasites.
- Experience in small mammal trapping
- Fieldwork experience in archaeological excavation.
- Image and video production using graphics software including Inkscape, GIMP and ImageJ.
- Document typesetting using LaTex.
- Data management using the version control software GitHub
- Public speaking; including on radio, television and public events such as TEDxUCD.
- Molecular techniques including DNA extraction PCR gained during UREKA program.

Quantitative skills

- Modelling and Statistical analysis in R, in particular phylogenetic comparative methods
- Bayesian modelling using JAGS software and High performance computing using UNIX based parallel computing in the Trinity Centre for High performance Clusters.
- Individual based modelling using Netlogo software.

Outreach, teaching and academic service

Outreach

- I have co-organised three Discover Research Night events in the TCD Zoology Museum aimed at communicating research in evolution and ecology to the general public. These events have attracted a combined attendance of over 600.
- I have given several public talks, such as in the Science Gallery Dublin, and I produce videos and images relating to my research (see website).
- I am a regular contributor to the EcoEvo blog with one of my posts reaching the semifinal stages of the 3 quirks daily science blog awards.
- I have been involved in numerous outreach events including BioBlitz events, PubPhD, Soapbox Science and I was a finalist in the ”I’m a scientist get me out of here” event in 2014.
- Postgraduate Representative for the Zoology Department 2014-15.

Professional society membership

- European Society for Evolutionary Biology (ESEB), British Ecological Society (BES) and the Irish Ecological Association (IEA).

Reviewing

- I regularly act as a reviewer for several international academic journals including Ecology Letters, Journal of Animal Ecology,Perspectives in Plant Ecology, Evolution and Systematics, Scientific Reports, the Journal of Biogeography, and Proceedings of the Royal Society B.

Teaching Experience

Teaching and Tutorials:	I have thought courses and workshops for Undergraduate, Masters and Postgraduate level students. Classes include; Evolution classes for 2nd and 4th year science students; Research comprehension for final year Zoology students. Statistics for the TCD masters course in Biodiversity and Conservation; Comparative analysis for postgraduate students both in University College Cork and the Max Plank institute in Rostock, Germany.
Field Course Assistant:	I was a field assistant for a week long ecology field course for 3rd year zoology students teaching field skills in small mammal trapping, insect and bird identification and other general ecology field skills.
Project supervision:	I have supervised several final year zoology student thesis projects

Conferences and invited presentations

2015: TEDxUCD invited speaker were I gave a talk on ”Listening to evolutionary oddities”.
2015: Invited speaker to the Dublin Science Gallery Cafe Dark Secrets event. I gave a talk on ”BIOLUMINESCE: How living organisms produce and emit light”.
2015: Attended the British Ecological Society Annual meeting Edinburgh. Were I gave a talk on ”Venom evolution in snakes; body size, habitat dimensionality and a diet of eggs”.
2014: Attended the Gordon Research Seminar ”Unifying Ecology Across Scales”. were I gave a talk on my theropod research entitled ”A tail of two extremes”.
2014: I was the keynote student speaker at the BES Macroecology meeting Nottingham. with my talk ”Ecology and mode-of-life explain lifespan variation in birds and mammals”.
2014: I was an invited speaker for the Irish Longitudinal Study on Aging group (TILDA). With my talk ”Ecology and mode-of-life explain lifespan variation in birds and mammals”.
2014: I was an invited speaker to the Dublin Science Gallery Cafe DEAD BEATS event. with my talk on my snake venom evolution research ”Why so venomous?”.
2013: Attended the ESEB XIV Congress, Lisbon, Portugal. Were I presented my talk ”Metabolic rate and body size linked with perception of temporal information”
2013: Attended the British Ecological Society Macroecology SIG meeting. Were I presented my talk ”Metabolic rate and body size linked with perception of temporal information”.
2013: Attended the TCD Zoology and Botany Postgraduate Symposium. Were I presented ”Metabolic rate and body size linked with perception of temporal information”.
2012: Attended the IsoEcol: International Conference on Applications of Stable Isotope Techniques to Ecological Studies, Brest, France. I presented my talk entitiled ”Accounting for the process of foraging in source-level variation in isotopic mixing models”.

Workshops

Workshops I have thought on

2016: Ran two day workshop on ”Using Bayesian approaches in comparative analysis” University College Cork, Cork.
2016: Thought course on ”Phylogentic comparative methods using MCMCglmm”. as part of the ”Comparative Approaches in Ecology and Evolution” workshop. Max Planck Institute for Demographic Research (MPIDR), Rostock, Germany.
2015: Teaching Assistant on ”Using the COMPADRE Plant Matrix Database for comparative plant demography” workshop. BES annual meeting, Edinburgh.

Workshops I have attended

2015: Methods in Ecology and Evolution Workshop on Open Science, Darwin House London.
2014: Tansley Workshop: Collaborative meeting to develop metrics to measure ecosystem multistabilty, Silwood Park, Imperial College London.
2014: Software Carpentry Workshop covering Unix, Git repositories and creating R packages, University of Nottingham.
2013: Spatial Analysis in R Workshop, Barry Rowlingson, University of Sheffield.
2013: Introduction to Morphometrics Workshop, Franois Gould, Trinity College Dublin.
2013: IUCN Red List of Ecosystems Workshop, Edmund Barrow, Trinity College Dublin.
2012: Introduction to Bayesian analysis using WinBugs, David Lund, University of Cambridge.
2012: Innovation Academy Creative thinking workshop, Trinity College Dublin.
2012: Innovation Academy Film production workshop, Trinity College Dublin.
2012: Introduction to the website management software DreamWeaver, Trinity College Dublin.
2011: Introduction to Stable Isotope Mixing models, Andrew Jackson, Trinity College Dublin.
2009: Mayfly Identification workshop, Mary Kelly Quinn, National Biodiversity Data Centre.

Publications

Kane, A., ***Healy, K.,*** Ruxton, G.D., and Jackson, A.L. 2016. Body size drives importance of scavenging in theropods. *The American Naturalist*.**6**(187), 706-716. DOI: 10.1086/686094 Link to paper

As corresponding and *Co-first author, I show that theropod dinosaurs of intermediate body size are more efficient scavengers than individuals at the extreme ranges of body sizes. I achieved this through using a novel individual based modeling approach that was parameterised using biomechanical models of theropod locomotion. I co-conceived the idea and carried out the data collection, analysis and writing of the paper.

Donohue, I., Hillebrand, H., Montoya, J.M., Petchey, O.L., Pimm, S.L., Fowler, M.S., **Healy, K.,** Jackson, A.L., Lurgi, M., McClean, D., O'Connor, N.E., O'Gorman, E.J., Yang, Q. 2016 A., **Healy, K.,** Ruxton, G.D., and Jackson, A.L. 2016. Navigating the complexity of ecological stability. *In Press Ecology Letters*.

Reviews and Syntheses article outlining the need to create a consistent language for ecological stability from the perspective of theoreticians, empiricists and policy makers. I contributed to this paper by developing methods to quantify overall ecological stability for management proposes that integrating across multiple dimensions to provide a single stability score.

Healy, K., Guillerme, T., Finlay, S., Kane, A., Kelly, S.B.A., McClean, D., Kelly, D.J., Donohue, I., Jackson, A.L. and Cooper, N., 2014. Ecology and mode-of-life explain lifespan variation in birds and mammals. *Proceedings of the Royal Society B*, **281**(1784), 20140298. DOI:10.1098/rspb.2014.0298. Link to paper.

As lead author I developed and carried out the main analysis along with data collection and writing of the manuscript. This paper showed that birds and mammals that either fly, forage underground or are arboreal live longer than expected for their size. This publication received significant media attention both nationally (e.g. the Moncrieff show, Irish Independent) and internationally (Discovery Channel) and has 21 google scholar citations.

Healy, K., McNally, L, Ruxton, G., Cooper, N. and Jackson, A.L. 2013. Metabolic rate and body size linked with perception of temporal information. *Animal Behaviour*. **86**, 685-696. DOI:10.1016/j.anbehav.2013.06.018. Link to paper.

As lead author I developed and carried out the main analysis along with data collection and writing of the manuscript. I showed that small animals with high metabolic rates process temporal information faster than large species with low metabolic rates. This was extensively covered in the media including coverage from The Guardian, The Economist, an appearance in BBC World News and has the highest ever alt-metric score for this journal. This publication has 30 google scholar citations.

Donohue, I., Petchey, O.L., Montoya, J.M., Jackson, A.L., McNally, L., Viana, M., **Healy, K**., Lurgi, M., OConnor, N.E. and Emmerson, M.C. 2013. On the dimensionality of ecological stability. *Ecology Letters*. **16**, 421-429. DOI:10.1111/ele.12086. Link to paper.

I co-developed the conceptual framework and statistical analysis used to produce the multidimensional ellipsoids and contributed to writing the manuscript.This publication has 46 google scholar citations.

Comment response

Healy, K. 2015. Eusociality but not fossoriality drives longevity in small mammals. *Proceedings of the Royal Society B*, **282**, 20142917. DOI:10.1098/rspb.2014.2917. Link to paper.

Single author. I carrying out additional analysis in response to a comment on my Healy et al 2014 paper where I show eusociality but not fossoriality is a driver of longevity in mammals.

Other Publications

Pre-peer review publication
Healy, K., Kelly, S.B.A., Guillerme, T., Inger, R., Bearhop, S., Jackson, A.L. 2016. Predicting trophic discrimination factor using Bayesian inference and phylogenetic, ecological and physiological data. DEsIR: Discrimination Estimation in R. PeerJ. https://doi.org/10.7287/peerj.preprints.1950v1 Link to paper.

As the lead author I convinced and developed the method to predict trophic discrimination factors which are a vital parameter in models using stable isotopes to study species trophic ecology. This method is currently in the processes of being developed as an R statistical package and has already been viewed over 500 times as a pre-peer reviewed publication.

In review
Healy, K., Carbone, C., and Jackson, A.L. Venom evolution in snakes is driven by body size, habitat dimensionality and a diet of eggs. IN review in PNAS.

As lead author I collected the most complete dataset of physiological and ecological data relating to venomous snake species to date and show that the evolution of venom toxicity and volume are driven by snake body size, diet and the dimensionality of the habitat. I conceived the concept, collected the data, performed the analysis and wrote the manuscript.

Adam Kane, **Healy, K.,**, Guillerme, T., Ruxton, G., and Jackson A.L. 2016. A recipe for scavenging and natural history. In review in Ecography.

I contributed to developing a framework to predict the importance of scavenging in extinct species using comparative physiology, ecological modeling and metabolic theory.

References

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