

Dr. Anthony Caravaggi

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Career History

2019- Lecturer in Conservation Biology, University of South Wales

2017-19 Postdoctoral researcher; Supporting Hen harriers in Novel Environments (SHINE)

School of Biological, Earth and Environmental Sciences, University College Cork

2017-18 Visiting Research Fellow; movement ecology, invasive species

School of Biological Sciences, Queen's University Belfast

Education

2016 PhD conservation biology/invasion ecology, Queen's University Belfast

2011 MRes Biodiversity and Conservation, University of Leeds

2009 BSc Zoology with Conservation (Hons), Bangor University

Professional activities

Associate Editor: Remote Sensing in Ecology and Conservation

Peer reviewer: African Journal of Ecology; Austral Ecology; Biological Conservation; Bird Study; Canadian Journal of Zoology; Diversity and Distributions; Global Change Biology; Journal of Natural History; Journal of Zoology; Mammal Communications; Mammal Research; Mammal Review; PeerJ; PLOS One; Remote Sensing in Ecology and Conservation; Ringing and Migration; The European Zoological Journal; Zoo Biology.

Funding review: British Ecological Society Grant Review College; Croatian Science Foundation.

Consultant: The Hen Harrier Reintroduction Project (University of Exeter and Natural England).

Research

I employ field and laboratory-based experiments, along with archival data, to answer specific questions relating to the ecology of species and communities to inform conservation, management and policy-related processes. My current work includes an analysis of mammal activity patterns, landscape-scale habitat and distribution modelling, quantification of the impacts of non-native rodents on insular seabirds and an assessment of wildlife management practises.

Research interests; Conservation biology; urban ecology; invasive species; population & community ecology; movement & spatial ecology; rare and endangered species; sustainability; rewilding; citizen science; remote sensing.

Peer-Reviewed Publications

2019

Hayward MW, Scanlon RJ, Callen A, *et al.* including **Caravaggi A.** Reintroducing rewilding to restoration - Rejecting the search for novelty. *Biological Conservation*. 233:255-259.

2018 **Caravaggi A**, Vallely M-C, Hogg K, Freeman M, Fadaei E, Reid N, Tosh D. Seasonal and predator-prey effects on circadian activity of free-ranging mammals revealed by camera traps. *PeerJ*. 6:e5827. doi: 10.7717/peerj.5827

Caravaggi A, Cuthbert RJ, Ryan RG, Cooper J, Bond AL. The cumulative impacts of introduced house mice on the breeding success of nesting seabirds on Gough Island. *Ibis*. doi: 10.1111/ibi.12664

Caravaggi A, Plowman A, Wright D, Bishop C. The composition of captive ruffed lemur (*Varecia* spp.) diets in UK zoological collections, with reference to the problems of obesity and iron storage disease. *Journal of Zoo Animal Research*. 6: 41-49. doi: 10.19227/jzar.v6i2.301

Havlin P, **Caravaggi A**, Montgomery WI. The diet and abundance of an introduced insular population of Red-Necked Wallabies, *Macropus rufogriseus*. *Canadian Journal of Zoology*. 96: 357-365. doi: 10.1139/cjz-2017-0090

2017

O'Halloran J, Kelly TC, Quinn JL, Irwin S, Fernandez-Bellon D, **Caravaggi A**, Smiddy P. Current ornithological research in Ireland: seventh Ornithological Research Conference, UCC, November 2017. *Irish Birds*. 10: 598-638.

Caravaggi A, Montgomery WI, Reid N. Management and control of invasive brown hares (*Lepus europaeus*): contrasting attitudes of selected environmental stakeholders and the wider rural community. *Proceedings of the Royal Irish Academy: Biology & Environment*. 117B: 1-11. doi: 10.3318/bioe.2017.08

Tennant JP, Graziotin D, Jacques DC, *et al.* including **Caravaggi A**. A multi-disciplinary perspective on emergent and future innovations in peer review. *F1000Research*. 6:1151. doi: 10.12688/f1000research.12037.3

Caravaggi A, Banks P, Burton C, Finlay CMV, Hayward M, Haswell, PM, Rowcliffe JM, Wood M. A review of camera trapping for conservation behaviour research. *Remote Sensing in Ecology and Conservation*. doi: 10.1002/rse2.48

Caravaggi A. remBoot: An R package for Random Encounter Modelling. *Journal of Open Source Software*. 2(10). doi: 10.21105/joss.00176

Caravaggi A, Leach K, Santilli F, Rintala J, Helle P, Tiainen J, Bisi F, Martinoli A, Montgomery WI, Reid N. Niche overlap of mountain hare subspecies and the vulnerability of their ranges to invasion by the European hare; the (bad) luck of the Irish. *Biological Invasions*. 19(2): 655-674. doi: 10.1007/s10530-016-1330-z

2016

Caravaggi A, Zaccaroni M, Riga F, Schai-Braun SC, Dick JTA, Montgomery WI, Reid N (2016) An invasive-native mammalian species replacement process captured by camera trap survey Random Encounter Models. *Remote Sensing in Ecology and Conservation*. 2: 45-58. doi: 10.1002/rse2.11

2015

Caravaggi A, Montgomery WI, Reid N et al. (2015) Range expansion and comparative habitat use of insular, congeneric lagomorphs: invasive European hares *Lepus europaeus* and endemic Irish hares *Lepus timidus hibernicus*. *Biological Invasions*. 17(2): 687-698. doi: 10.1007/s10530-014-0759-1

In review

Caravaggi A, Irwin S, Lusby J, Ruddock M, O'Toole L, Mee A, Nagle T, O'Neill S, Tierney D, O'Halloran J. Factors affecting territory site selection and breeding parameters of Hen Harriers, *Circus cyaneus*, in Ireland. *Bird Study*.

Caravaggi A, Irwin S, Lusby J, Ruddock M, O'Toole L, Mee A, Nagle T, O'Neill S, Tierney D, O'Halloran J. Anthropogenic pressures on Hen Harrier breeding habitat. *Bird Study*.

Book chapters

2018

Caravaggi A. Lagomorpha Life History. In: *Encyclopedia of Animal Cognition and Behavior*, Vonk J, Shackelford TK (eds.) doi: 10.1007/978-3-319-47829-6_1206-1

Caravaggi A. Lagomorpha Navigation. In: *Encyclopedia of Animal Cognition and Behavior*, Vonk J, Shackelford TK (eds.) doi: https://doi.org/10.1007/978-3-319-47829-6_1164-1

Technical reports

2018

McGowan N, Dingerkus K, Stone R, **Caravaggi A**, et al. Hare Survey of Ireland 2018/2019: Interim Report (June) 2018. Report produced for the Department of Arts, Heritage and the Gaeltacht.

Other publications

2017 **Caravaggi A**, James K. Twittersphere: Conferencing in 140 characters. *Nature* [Correspondence] 549: 458. doi: doi:10.1038/549458d

Teaching

As a teacher I aim to provide my students with skills, knowledge and confidence critical to their academic and personal development. I take an inclusive approach, developing strong relationships and encouraging discussion.

Qualifications

2018

Postgraduate Certificate in Teaching and Learning in Higher Education (*ongoing*).

Module development

2017

BL6024 Quantitative skills for biologists using R

Quantitative skills required by postgraduate students to successfully conduct and publish their research, with a focus on data analysis and graphing, statistics, and basic modelling, as generally implemented by zoologists and ecologists. Supported by a new R Peer Group mailing list and pop-up clinics.

Teaching

2018- GE0S04 - Foundation in Natural History

GE1S008 - Observational Fieldwork

GE1S010 - Natural History

GE2S008 - Biodiversity & Biogeography

GE2S017 - Research Methods in Natural History

ES4H001 - Environmental Management and Legislation

ES4S009 - Restoration Ecology

ES4S010 - Terrestrial and Aquatic Conservation

ES4T001 - MSc Research Projects

2017 BL6024 Quantitative skills for biologists using R.

2015 Introduction to GIS (*Teaching Assistant*).

Animal Biology (*Teaching Assistant*).

Undergraduate residential field course.

2014 Undergraduate residential field course.

Field-based teaching

2018- Biotope mapping

Field skills (Botswana)

NVC habitat classification

Seabird surveys and identification

Phase 1 habitat survey

2016 South American rainforest biodiversity and conservation (Ecuador). 2015 Undergraduate residential field course, Northern Ireland 2014 Undergraduate residential field course, Northern Ireland Bird survey techniques

Project supervision

2019-23

PhD. Alan McCarthy, *Wintering ecology of Hen Harriers*, University College Cork.

2019

MSc. Laura Brooks, *Temporal variability in nestbox selection by Pied Flycatchers*, University of South Wales.

MSc. Maja Hudej, *Spatial ecology of reintroduced pine marten in Wales*, University of South Wales.

MSc. Ayashi Majumder, *Assessing site suitability for translocated dormice*, University of South Wales.

MSc. Trisha Kallya, *Predicting the distribution of three UK deer species using citizen science data*, University of South Wales.

2018

PhD. Samantha Ball, *Managing hares at Dublin airport*. University College Cork.

Erasmus+. Enrique Da Paz, *Hen Harrier distribution under a changing climate*, University College Cork/University of Barcelona.

2017-19

MRes. Alan McCarthy, *Top-down and bottom-up processes and Hen Harriers in Ireland*. University College Cork.

2017

BSc. Chloe O'Mahoney, *Regional variation in Hen Harrier chick growth rates*. University College Cork.

2015

MSc. Ashley Irwin, *Surveying otters along an urban-rural gradient using camera traps*. Queen's University Belfast.

MSc. Lauren Finley, *Estimating hare population densities using camera traps*. Queen's University Belfast.

BSc. Paige Havlin, *Population size, habitat associations and diet of wallabies on the Isle of Man*. Queen's University Belfast.

Scientists Without Borders. Lazaro Silva, *Camera trapping for hares*. Queen's University Belfast.

2014

BSc. Mengyi Liu, *Behaviour and stress in sympatric hare species*. Queen's University Belfast.

BSc. Claire Molloy, *Ethology of hares in Ireland*. Queen's University Belfast.

2013

BSc. Ashley Irwin, *The nutritional composition of vegetation associated with hares*. Queen's University Belfast.

Instruction and demonstration

2016-17 Course tutor: ornithology, camera traps, social media. Eco-Explore, Cardiff

Developed materials and taught courses on UK bird identification, the use of camera traps in ecology, and social media for scientists

2016 Lecturer and field ornithologist. Operation Wallacea, Ecuador

Co-developed and delivered a 5-part series of lectures focussing on rainforest biodiversity and conservation, and conducted bird ringing studies including demonstrating techniques and training students in biometric data gathering. Also trained an assistant on mist nest extraction and data recording

2015 Otter surveys, MSc, Queen's University Belfast

Trained a Master's student in otter survey techniques and field signs, and advised on camera trap survey methodology

Fieldwork experience

2018 Camera trapping, small mammal trapping, bird point counts. Upland areas.

2017 Hen Harrier nest surveys. Upland areas.

Breeding Bird Survey (BTO). Upland areas; windfarm-adjacent.

2016 Bird, bat and reptile surveys and camera trapping. South American rainforest.

2015 Camera trapping for otters. Rivers and riparian areas.

2014 Badger sett surveys. Broadleaved woodlands.

2012-15 Hare surveys (distance sampling, camera traps, fecal). Uplands and agricultural.
 2013 Coastal biodiversity surveys. Tidal pools.
 2012 Wader and gull surveys. Tidal flats.
 2011 Small mammal trapping. Agricultural fields.
 Reptile surveys. Clearfell areas in coniferous forests.
 Bird point count, reptile, mammal and invertebrate surveys. Marsh and fen.
 Bat roost surveys (visual and detector). Urban areas.
 Great crested newt surveys. Agricultural areas.
 Bird surveys. Broadleaved woodland.
 2009-11 Breeding Bird Surveys (BTO). Upland areas.
 2007-18 Bird ringing (mist, whoosh and cannon nets and traps). Woodland, fen, marsh, grassland, coastal and agricultural areas.
 2007-09 Pine marten surveys. Coniferous woodland.
 2007 Passerine bird and invertebrate surveys. Shrub and broadleaved woodland.
 Moth trapping. Treborth Botanic gardens.
 2006-08 Bird surveys and nestbox monitoring. Broadleaved woodland.

Fellowships, funding and Awards

2018 Funded postgraduate programme (PhD), €96,000, Irish Research Council
 2017 Project tender, €174,000, National Parks and Wildlife Service
 2015 Emily Sarah Montgomery Travel Scholarship, £200, Queen's University Belfast
 2015 Training and Travel grant, £500, British Ecological Society
 2012 Research grant, £2,000, People's Trust for Endangered Species
 2012 NIEA funded PhD studentship, £82,720, Queen's University Belfast
 2010 NERC Master's scholarship, £7,500, University of Leeds

Presentations

Conferences (*oral presentations*)

- 13 McCarthy A, Caravaggi A, Irwin S, O'Halloran J (2019) Factors affecting ground-nesting Hen Harriers in Ireland. Environ, Ireland
- 12 **Caravaggi A**, Montgomery WI, Reid N (2017) An invasion in progress: Impacts of the non-native European hare on the native Irish hare. International Congress for Conservation Biology, Cartagena
- 11 **Caravaggi A** (2017) The changing face of UK conservation. Mammal Society Student Conference (*invited keynote*)
- 10 **Caravaggi A** (2017) University Mammal Challenge: distributed mammal surveys with student scientists. Mammal Society Spring Conference, Cambridge
- 9 **Caravaggi A**, Montgomery WI, Reid N (2016) Invasion ecology: quantifying the impact of non-native European hares on the endemic Irish hare. British Ecological Society Annual Meeting, Liverpool
- 8 **Caravaggi A**, Hayward M (2016) People and hedgehogs in Wales. North Wales Mammal Symposium, Bangor
- 7 **Caravaggi A**, Montgomery WI, Reid N (2016) Invasion ecology: quantifying the impact of non-native European hares on the endemic Irish hare. Mammal Society Spring Conference, Yarnfield
- 6 **Caravaggi A** 2015 Quantifying endemic uniqueness and ecological equivalency between native and invasive leporids. 7th European Congress of Mammalogy, Stockholm, Sweden
- 5 **Caravaggi A**, Leach K, Santilli F, Rintala J, Helle P, Tiainen J, Bisi F, Martinoli A, Montgomery WI, Reid N (2015) Democratisation of invasive species interventions: assessing attitudes towards lethal control of mammalian invaders. Mammal Society Spring Conference, Lancaster

- 4 **Caravaggi A**, Zaccaroni M, Riga F, Schai-Braun SC, Dick JTA, Montgomery WI, Reid N (2015) Using the Random Encounter Model to estimate spatial patterns in invasive and native hare densities in allopatry and sympatry. Mammal Society Student Conference, Lancaster
- 3 **Caravaggi A**, Montgomery WI, Reid N (2014) Using the Random Encounter Model to estimate spatial patterns in invasive and native hare densities in allopatry and sympatry. Mammal Society Spring Conference, Birmingham
- 2 **Caravaggi A**, Montgomery WI, Reid N (2013) Distribution and differential habitat associations of invasive European and endemic Irish hares. 11th International Mammal Congress, Belfast
- 1 **Caravaggi A**, Montgomery WI, Reid N (2013) Invasion ecology: quantifying the impact of non-native European hares on the endemic Irish hare. Mammal Society Student Conference, Staffordshire

Conferences (*posters*)

- 9 **Caravaggi A**, Vallely M-C, Hogg K, Freeman M, Fadaei E, Reid N, Tosh D (2017) Activity and temporal relationships of free-ranging mammals revealed by camera traps. Mammal Society Spring Conference, Cambridge
- 8 **Caravaggi A**, Montgomery WI, Reid N (2015) The democratisation of conservation: public attitudes towards lethal control of invasive leporids and implications for species management. 7th European Congress of Mammalogy, Stockholm, Sweden
- 7 **Caravaggi A**, Zaccaroni M, Riga F, Schai-Braun SC, Dick JTA, Montgomery WI, Reid N (2015) Optimising camera trap Random Encounter Model survey effort: A case study using an invasive-native species replacement process. Vth International Wildlife Management Congress, Sapporo, Japan
- 6 Beresford NA, Wood MD, Gaschack S, Gulyaichenko EA, **Caravaggi A** (2015) Use of wildlife camera traps to within the Chernobyl Exclusion Zone. Mammal Society Spring Conference, Lancaster
- 5 **Caravaggi A**, Montgomery WI, Reid N (2013) Estimating hare numbers using camera trapping and the Random Encounter Model. 11th International Mammal Congress, Belfast
- 4 **Caravaggi A**, Montgomery WI, Reid N (2012) Invasion ecology: quantifying the impact of non-native European hares on the endemic Irish hare. 2nd All Ireland Mammal Symposium (AIMS), Dublin
- 3 **Caravaggi A**, Montgomery WI, Reid N (2012) Invasion ecology: quantifying the impact of non-native European hares on the endemic Irish hare. 4th World Lagomorph Conference, BOKU, Vienna
- 2 **Caravaggi A**, Hughes W (2011) Patrilineal inheritance of grooming behaviour and parasite resistance in leaf-cutting ants (*Acromyrmex* sp.). Postgraduate Student Forum, University of Leeds
- 1 **Caravaggi A**, Bishop, C (2009) Dietary and faecal iron levels in captive black-and-white ruffed lemurs (*Varecia* spp.). 11th BIAZA Research Symposium, Blackpool

Invited seminars

- 2014 Distribution and differential habitat associations of invasive European and endemic Irish hares. Bangor University

Conference organisation

- 2018 2nd Biotweeps Twitter Conference, #BTCon18 (*principal organiser*).
- 2017 7th Irish Ornithological Research Conference (*scientific committee*).
- 2017 Biotweeps Twitter Conference, #BTCon17 (*conception and organisation*).
- 2014-18 Mammal Society Student Conference (*principal organiser*).

Personal development

Training and workshops

2018 Postgraduate Certificate in Teaching and Learning in Higher Education.
 Unconscious bias awareness.
 Developing Horizon 2020 grant applications.
 2017 Postgraduate Certificate in Teaching and Learning in Higher Education, University College Cork.
 NERC Advanced Training, Systematic Review and Meta-Analysis, University of East Anglia.
 Level 3 Teaching Assistant, E-Training Hub.
 Public Outreach, Science Made Simple.
 2016 Mentor Training, British Ecological Society.
 Conservation Ecology Special Interest Group workshop, British Ecological Society Annual Meeting.
 Acoustic Analysis, North Wales Mammal Symposium.
 2014 Using R, Queen's University Belfast.
 2012 Lagomorph Systematics, 4th World Lagomorph Conference.

Licenses and Certifications

2018 LAST Ireland (animal welfare in research; License no: 09-2018)
 2014 ASPA laboratory animal handling license (TSA/47/14)
 2014 Emergency first aid; field first aid
 2009 Bird ringing 'C' license holder, British Trust for Ornithology
 2008 Marine mammal medic, British Divers Marine Life Rescue
 2002 Full manual UK driving license, held without incident or penalty

Societal memberships

(since)
 2017 British Ornithologist's Union
 2015 South Wales Mammal Group; Welsh Ornithological Society
 2013 Society of Conservation Biology (SCB)
 2012 The Mammal Society; British Ecological Society
 2011 Royal Society of Biology
 2009 The British Trust for Ornithology

Organisational and Working Groups

(since)
 2017 SCB Participatory and Citizen Science
 2016 South Wales Mammal Group (*committee*)
 2016 British Ecological Society Review College
 2013 SCB Urban Ecology

Additional roles

2018-19 UCC BEES Education and Public Engagement Committee.
 2016-18 University Mammal Challenge, The Mammal Society (coordinator).
 2016 Community Ecology session chair, British Ecological Society Annual Meeting.
 Advisor to National Geographic on red fox ecology.
 British Ecological Society Women in Ecology (WIE) mentor.
 Mammal (hares) consultant for The Mammal Society.
 2013 Wildlife consultant, Biological records for the North East of Scotland (NESBReC).
 2013-17 UK STEM Ambassador.
 2012-15 EBEE postgraduate representative, Queen's University Belfast.
 2012-15 SBS Athena SWAN committee, Queen's University Belfast.
 2007-09 Undergraduate student representative, Bangor University Biological Sciences.
 Founding committee & publicity officer, Bangor University Zoological Society.

Science communication

I am a strong supporter of science communication and outreach. I believe that it is important to encourage an interest in science and the natural world in people of all ages. Moreover, the success or failure of many

modern conservation objectives increasingly require a connection with and understanding of the public. I have given talks to over 20 school, local interest, community and natural history groups in the UK, USA and Canada, in-person and via video calls.

Contributions

2018 UCC BEES Committee for Education and Public Engagement.
BBC Wildlife magazine feature on wallabies (*invited expert*).
I'm a Scientist Get Me Out of Here! Careers Zone expert.
2017 Sanger Institute 25 Genomes (*species champion* - *St. Kilda wren*).
Culture Night, University College Cork.
Blog post - A brief history of an Early Career Researcher, Errant Science.
Conservation & ecology expert on the sub-reddit /r/AskScience.
Blog post - Rejected by the Rainforest, I F-ing Love Conservation.
Science communication article, CBS (*#bestcarcass, contributor*).
Rabaiotti D, Caruso N 2017. Quercus books, ISBN: 9781786488275 (*contributor*).
Student Science Partnerships, USA.
Bird song workshop and ringing demonstration, Parc Slip Nature Reserve, Wales.
2016-18 Skype a Scientist (*5 classrooms across the US*).
2016 Blog post - Camera traps reveal a hare-raising situation, RSEC blog, ZSL.
Blog post - On closer inspection, it looks like a hare transplant, QUBio.
Magazine article - Is there intelligent life on Earth? Save our Souls magazine (*author*).
Letters to a Pre-scientist (*correspondent*).
2015 Blog post - Putting wildlife in the frame, QUBio.
Blog post - Communities and conservation in developing countries, QUBio.
Nature News (*invited comment*).
Bird ringing demonstration, Parc Slip Nature Reserve, Wales.
Blog post - Dear Alice, the hare might be sane after all, QUBio.
Blog post - What's in a name? QUBio.
2014-16 Various Local Mammal Group newsletters (*invited author*).
Created @Biotweeps, a science communication Twitter project (>16.5k followers).
Multi-school careers advice and speed-networking event (*invited expert*).
2013-18 I'm a Scientist Get Me Out of Here! Enquiry Zone & Careers Zone.
2013-17 UK STEM Ambassador.
2013 Science outreach event, Techniquet, Cardiff (*presenter for RSPB*).

Media engagements

Radio

2018 BBC Radio Wales, UK.
BBC Radio Derby, UK.
MostlyScience live (*podcast*).
2017 BBC Coventry & Warwickshire, Wallabies in the UK.
The Edgar Ortega Radio Show, North America (*podcast*).
2016 SciComm with Dr. Mike (*podcast, 2 shows*).
2015 BBC Radio Ulster, Hares at Belfast airport.
BBC News School Report for St. Pius X, Magherafelt's Biodiversity Club.
BBC Radio Ulster, *Good Morning Ulster*, Invasive species.
2013 RTE Radio 1, *Mooney Goes Wild*, Hares in Ireland.

Television

2015 Countryfile, BBC
2013 River Bann, RTE Television

Other media

2018 BBC Wildlife (invited article).

2017 The Washington Post (*interview*).
2016 National Geographic advisor (*mammal expert*).
Biotechn.asia (*interview*).
2015 Media battle highlights importance of scientific credit. ScienceNews (*interview*).
Astrotweeps and Biotweeps: rotating Twitter accounts. Crastina.se (*interview*).
BBC News (*interview and featured article*).
A call for beautiful prose in papers. Nature News (*Interview*).
2014 Species profiles: Mountain hare and Irish hare, The Mammal Society.
2013 'Hare' raising project in Mid-Ulster, Mid Ulster Mail (*Interview*).

Skills

Analytical software

R, SPSS, Minitab, Distance, MARK, ArcGIS, QGIS, MaxEnt, NetLogo, MAVIS NVC, Patch Analyst, GeneMapper, bespoke software.

Additional tools

Microsoft Office, GitHub, RMarkdown, graphics packages (e.g. Adobe creative suite), website creation.

Statistical

General linear and mixed-effects models, Principal Components Analysis, Species Distribution Modelling, Discriminant Function Analysis, diversity indices, Mahalanobis and Euclidean distance, cross-correlation functions, model averaging, Random Encounter Models, meta-analysis, other parametric and non-parametric tests

Field

Off-road driving (4x4), multi-taxa (mammal, bird, invertebrate, reptile, amphibian; UK coastal, marine and terrestrial) surveys (e.g. mark and recapture, distance sampling, camera traps, quadrats, scan/focal sampling;) and identification, habitat surveys, animal handling (amphibians, reptiles, invertebrates, and small-to-large birds and mammals), orienteering

Laboratory

Multi-taxa dissection (mammal, bird, amphibian, invertebrate), species identification via microscopy, ethological studies, tissue sampling, DNA manipulation, electrophoresis, atomic absorption and colourimetric spectroscopy, specimen preparation, soil chemical and biological analysis

Referees

Prof. John O'Halloran

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