

Dr Luisa Orsini PhD

Lecturer in Biosystems and Climate Change

[School of Biosciences \(/schools/biosciences/index.aspx\)](/schools/biosciences/index.aspx)

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About

I am a Lecturer in Biosystems and Environmental Change at the University of Birmingham and building my research group. I have always been at the forefront of multidisciplinary research and work with world class researchers. My research interest is understanding how natural populations adapt and evolve in response to environmental changes. The main objective of my current research is to identify evolutionary causes and effects of population responses to climatic changes and predict their adaptive potential, and hence survival, to future changes. To meet this goal I study the keystone species, the waterflea *Daphnia magna*, which is a keystone species in lentic environments and sentinel species for water quality, as well as key model in evolutionary biology and the study of adaptive responses to environmental change. *D. magna* produces dormant stages which accumulate in sediments of lakes and ponds, resulting in a living history museum of local populations in the form of dormant propagule banks. I use these propagule banks as a fantastic resource to study evolutionary trajectories through time.

Qualifications

- MSc Environmental Sciences
- PhD in Biology

Biography

I joined the faculty of the University of Birmingham, UK in June 2013 as lecturer in Biosystems and Environmental Changes. I am also a free associate researcher of the University of Leuven, Belgium and an active partner of the *Daphnia* Genomics Consortium.

I obtained a Master in Environmental Sciences from the Istituto Universitario Navale, Naples, Italy in 1999 and a PhD in Biology from the University of Messina - Stazione Zoologica "A. Dohrn"; Naples, Italy in 2003. Since March 2003 I has been awarded several postdoctoral fellowships in top University in Europe and the United States:

EDUCATION

2003 - PhD, University of Messina/Stazione Zoologica A. Dohrn Naples, Italy

1999 - Master in Environmental Science, Istituto Universitario Navale, Naples, Italy

CURRENT POSITION

2013 – tenure - Lecturer in BioSystems and Environmental Change, Environmental Genomics Group, School of Biosciences, University of Birmingham.

PREVIOUS POSITIONS

2012 – 2013 -senior postdoc, Laboratory of Aquatic Ecology, Evolution and Conservation, University of Leuven, Belgium

2011 – 2012- visiting scholar, Centre of Genomics and Bioinformatics, Indiana University Bloomington, IN, USA

2008-2011- postdoc, Laboratory of Aquatic Ecology, Evolution and Conservation, University of Leuven, Belgium

2004-2008 - postdoc, Metapopulation Research Group, University of Helsinki, Finland

2003-2004 - postdoc, University of Veterinary Medicine Vienna, Austria

Teaching

I tutor first and second year students and I am responsible for the Erasmus exchange program in Biosciences.

Teaching experience (representative lectures out of >20 invited lectures)

- *October 5th –8th 2009. [Invited lecture](#) (theoretical and practical lecture) at the SZN PhD course in Population genetics and Phylogeny in Marine systems, Stazione Zoologica Anton Dohrn, Napoli, Italy*
- *May 19th-22nd 2010. [Invited lecture series](#) at the University of Parma, Italy. *Lecture for the PhD student of the faculty of Biology: Bottom-up to top-down approaches to study selection, adaptation and evolution. Institute seminar: Ecological genomics in space and time: the signature of natural selection in wild populations of the water flea, *Daphnia magna*.**
- *May25th-26th [Lecture series](#). Genetics and genomics in ecology: concepts and applications. *Course in Evolutionary Ecology* (Master level), University of Leuven.*
- *May 31st -June 1st 2011. [Invited lecture series](#). Approaches and molecular tools to study adaptation in natural populations. _ University of Cologne, Germany*

- *April 14th 2011* [Invited lecture](#) Genomic signature of selection in a geographic mosaic of environmental stressors EAWAG, Switzerland
- *March 31st, 2011* [Invited lecture](#) Genomic signature of selection in a geographic mosaic of environmental stressors, University of Sheffield, UK
- *November 8th and 15th* Practical for first year students: "How Daphnia fitness is affected by chemicals" within the course Call Biology and Physiology (BIO152)
- *February 14th, 2014* [Invited Lecture](#) "Resurrection Biology" in the course "Adaptation to changing environments" (BIO389)

Postgraduate supervision

SUPERVISION

2001 – 2002 - Master student (Alberto Amato) in Environmental Science, Istituto Universitario Navale, Italy

2005-2009 - PhD student (Helena Wirta Koivuletho) in Biology, Metapopulation Research Group, University of Helsinki, Finland.

2010-2013 - PhD student (Daniela D'Esposito) in Biology, The Open University, UK and Stazione Zoologica A. Dohrn, Naples, Italy.

2009-ongoing PhD student (Aurora Geerts) in Biology, Laboratory of Aquatic Ecology, Evolution and Conservation, University of Leuven, Belgium.

2010-ongoing (currently on maternity leave): PhD student (Katina Spanier) Laboratory of Aquatic Ecology, Evolution and Conservation, University of Leuven, Belgium.

2014-2017 PhD student (Maria Cuenca Cambroner) in Biosciences, Environmental Genomics Group, School of Biosciences, University of Birmingham

I am currently recruiting postdoctoral researchers in biostatistics and bioinformatics. Researchers recruited will be working in a highly multidisciplinary research that bridges "omics" technologies, modeling, evolutionary biology and paleogenomics.

If you are interested please contact Dr Luisa Orsini at l.orsini@bham.ac.uk (<mailto:l.orsini@bham.ac.uk>) for more information.

Doctoral research

PhD title Integrated approach to the study of diversity in the genus *Pseudo-nitzschia* (Bacillariophyceae): morphology, life cycles and molecular tools

Research

My research interest is understanding how natural populations adapt and evolve in response to environmental changes. In pursuit of this interest I contributed significantly to the development of science. I recently showcased the paleogenomic approach as the most powerful way to reconstruct evolutionary dynamics in nature and to forecast future adaptive responses to environmental stress, including climate change (Orsini et al, 2013 TREE).

I was the first to apply genomics to resurrected propagules of the waterflea *D. magna* obtained from sediment cores. I used patterns of genomic adaptation from these biological archives to validate patterns in space and experimental evolution trials (Orsini et al. 2012, 2013 Mol Ecol). The outcome of this research provided a template for future investigation in ecological genomics, combining multiple experimental approaches with the genomic investigation of a well-studied ecological model species. I contributed to opening the field of ecological genomics/genetics to non-model species by applying transformative technologies that enable the identification of genetic markers in species with limited genomic resources (e.g. Orsini et al, 2007 NAR).

My ability to work at the interface of many research fields and my ongoing collaborations within and outside the Daphnia Genomics Consortium will ensure the development of a new innovative approach to science.

Researcher ID: <http://www.researcherid.com/rid/B6773> (<http://www.researcherid.com/rid/B6773>)

Lab page of University of Leuven website: <https://bio.kuleuven.be/eeb/laeec/whoiswho/00058905/> (<https://bio.kuleuven.be/eeb/laeec/whoiswho/00058905/>)

ResearchGate profile: http://www.researchgate.net/profile/Luisa_Orsini/?ev=hdr_xprf (http://www.researchgate.net/profile/Luisa_Orsini/?ev=hdr_xprf)

Other activities

Research grants- projects in which I am PI or co-PI:

1. ESF EUROCORES Programme EuroEEFG (Ecological and Evolutionary Functional Genomics, Grant 09-EEFG-FP-040) approved by the ESF and funded by the national research councils. The project is titled: "How to Live in a Mosaic of Stressors – an ecological genomics approach on the water flea Daphnia (STRESSFLEA)". PIs: Prof Luc De Meester, Dr Luisa Orsini (project coordinator), Prof Ellen Decaestecker. This project was approved by the ESF but was nationally supported by a separate research grant of the National Research Council, (FWO) - see #2;
2. Research project on functional genomics awarded for the period 01/01/2011-31/12/2014 by the National Research Council (FWO), Brussels, Belgium (G061411N). The project is titled: "How to live in a mosaic of stressors – an ecological genomics approach on the water flea Daphnia". PIs: Prof Luc De Meester, Dr Luisa Orsini, Prof Ellen Decaestecker;
3. Research project on Paleogenomics awarded for the period 1/1/2010-31/12/2013 by the National Research Council (FWO), Brussels, Belgium (G046810N). The project is titled: "Evolutionary paleogenomics of Daphnia: reconstructing evolutionary responses to environmental change in wild populations". PIs: Prof Luc De Meester, Dr Luisa Orsini, Dr Joachim Mergeay.

International conferences and invited lectures

During my career I attended 52 international conferences: 3 keynote lectures, 10 invited lectures, 27 talks and 12 posters. Among those, most frequently attended with oral presentations: ESEB (European Society of Evolutionary Biology), Evolution, SMBE (Society of Molecular Biology and Evolution), American Genetics Association.

International honorary activities

1) Editorial activities: subject editor and guest editor of *Molecular Ecology* for the special issue on *Evolutionary Ecological Genomics* (published in February 2013). Editors: Dr L. Orsini, Dr C. Eizaguirre and Dr R. Andrew.

2) Reviewer activities: reviewer in the fields of molecular genetics/genomics, evolutionary biology and molecular evolution. Journals: *Molecular Ecology*, *Heredity*, *Functional Ecology*, *Marine Ecology Progress Series*, *Journal of Evolutionary Biology*, *Genetica* and others.

3) Grant evaluation: grant evaluator for the Research Council of Canada (NSERC) and for the Biological Science Research Council (BBSRC), UK.

4) Project coordination: coordinator of the ESF EUROCORES Programme EuroEEFG project STRESSFLEA. This project involves 10 partners, seven European and

three associated partners from UK and US. Coordinator of two national grants: G061411N and G046810N (§Fellowships and Awards).

5) **Master/bachelor and PhD theses evaluator:** master and bachelor thesis at the University of Birmingham. PhD juries: 1) Erika Souche (Laboratory of Animal Diversity and Systematic, University of Leuven, Belgium).2) Mieke Jansen (Laboratory of Aquatic Ecology, Evolution and Conservation, University of Leuven, Belgium).

6) **Evaluator of bachelor and masters** at the University of Birmingham

Publications

REPRESENTATIVE PUBLICATIONS

(out of 32, for a complete list see <http://www.researcherid.com/rid/B-6773-2009> (<http://www.researcherid.com/rid/B-6773-2009>))

(out of 32, for a complete list see)

Orsini L. Vanoverbeke J, Swillen I, Mergeay J. and De Meester (2013) Drivers of population genetic differentiation in the wild: isolation by dispersal limitation, isolation by adaptation and isolation by colonization *Molecular Ecology (Invited review)* 22: 5983-5999 (SCI: 6.3)

Orsini L. Schwenk K., De Meester L. Colbourne J.K. Pfrender M. & Weider L. J The evolutionary time machine: forecasting how populations can adapt to changing environments using dormant propagules. *Trends in ecology and evolution (Invited opinion paper)* 28: 274-282 (SCI: 15.4; cited 6)

Orsini L. Andrew R. & Eizaguirre C. Evolutionary ecological genomics. *Molecular Ecology. (editorial piece for the special issue on Evolutionary Ecological Genomics, eds Orsini, L., Andrew, R. and Eizaguirre, C.)* 22: 527-531 (SCI 6.3)

Orsini L. Mergeay J. Vanoverbeke J. & De Meester L. The role of selection in driving landscape genomic structure of the waterflea *Daphnia magna*. *Molecular Ecology (Invited contribution to the special issue on Evolutionary Ecological Genomics)* 22: 583-601 (SCI 6.3)

Orsini L. Spanier K. I. & De Meester L. (2012) Genomic signature of natural and anthropogenic stress in wild populations of the waterflea *Daphnia magna*: validation in space, time and experimental evolution. *Molecular Ecology* 21: 2160–2175 (SCI 6.3; cited 12). *This paper was highlighted in the perspectives of Molecular Ecology with the following commentary: Pfrender, M.E. "Triangulating the genetic basis of adaptation to multifarious selection" (2012*

Orsini L. Jansen M. Souche E. Geldof S. & De Meester L. (2011) Single nucleotide polymorphism discovery from expressed sequence tags in the waterflea *Daphnia magna*. *BMC Genomics*. 12: 309 (SCI:4.4; cited 9) *This paper has been listed in the F1000 Biology for its innovative approach. It was commented by Van Straalen, N. M. <http://f1000.com/12991956>*

Orsini L. Wheat W. C., Haag R.C., Kvist J. Frilander J. M. & Hanski I. (2009). Fitness differences associated with *Pgi* SNP genotypes in the Glanville fritillary butterfly (*Melitaea cinxia*). *Journal of Evolutionary Biology* 22: 367–375 (SCI:3.5; cited 36)

Orsini L. Corander J. Alasentie A. & Hanski I (2008). Genetic structure in a butterfly metapopulation correlates better with past than present demographic structure. *Molecular Ecology* 217: 2629-2642 (SCI:6.3; cited 43)

Orsini L. Pajunen M. Hanski I. & Savilahti H. (2007). SNP discovery by mismatch targeting of Mu transposition. *Nucleic Acids Research* 35 (6) e44. (SCI: 8.3; cited 7) *This paper was in the research highlights of Nature 2007, vol 4(4) doi:10.1038/nmeth0407-299*

Orsini L. Koivulehto H. & Hanski I. (2007) Molecular Evolution and Radiation of Dung Beetles in Madagascar. *Cladistics* 23: 145-168. (SCI: 5.0; cited 22).

Orsini L. Huttunen S. & Schlötterer C. (2004) A multilocus microsatellite phylogeny of the *Drosophila virilis* group. *Heredity* 93: 161-165. (SCI: 4.1; cited 18)

Procaccini G. **Orsini L.** Ruggiero M.V. & Scardi M. (2001) Spatial patterns of genetic diversity in *Posidonia oceanica*, an endemic Mediterranean seagrass. *Molecular Ecology*, 10: 1413-1421. (SCI: 6.3; cited 34)

