

PERSONAL DETAILS

Name: Sara Nunes Lança de Carvalho
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RESEARCH INTERESTS

My main research motivation is to contribute to the understanding of the process of adaptive evolution in multicellular, sexual organisms. I am mainly interested in a) the relative contributions of mutation and of recombination of standing genetic variation to adaptation, b) how genomic and phenotypic complexity can affect adaptation, c) how life-history traits can be shaped by natural selection and how this proceeds differently in different sexes. In this context, I find the relationship between reproduction and lifespan particularly interesting.

EDUCATION

- 2007-2012 **PhD in Evolutionary Biology. Instituto Gulbenkian de Ciência, Oeiras, Portugal**
 Supervisor: Dr. Henrique Teotónio
 PhD thesis entitled: "Adaptation from standing genetic variation and from mutation: experimental evolution of populations of *Caenorhabditis elegans*".
- 2006 **IGC PhD Programme graduate student. Instituto Gulbenkian de Ciência and Instituto de Tecnologia Química e Biológica, Oeiras, Portugal.** Accepted into the Programme which includes a semester of lectures and workshops in basic and applied biology research.
- 2001 – 2005 **Licenciatura (equivalent to M.Sc.) in Biology. Faculty of Sciences, University of Lisbon, Portugal.** Four years degree.

PROFESSIONAL EXPERIENCE

- 2011-2013 **Postdoctoral researcher. Evolutionary Genetics Group, Instituto Gulbenkian de Ciência, Oeiras, Portugal**
 Supervisor: Dr. Henrique Teotónio
 Project: "A study on the interaction among natural selection, mutation and recombination, with *Caenorhabditis* experimental evolution" (ERC Starting Grant awarded to Dr. Henrique Teotónio).
- 2007-2011 **PhD student. Instituto Gulbenkian de Ciência, Oeiras, Portugal**
- 2005 – 2006 **Research Technician. Evolutionary Genetics Group, Instituto Gulbenkian de Ciência, Portugal**
 Supervisor: Dr. Henrique Teotónio (Evolutionary Genetics Research Group)
 Projects: "Phenotypic and molecular characterization of hybrid *C. elegans* wild isolates: the first step in experimental evolution", "The cost of dioecy under different mutational loads in *C. elegans*".
 Responsibilities: maintenance of populations of *C. elegans*, phenotyping of *C. elegans* strains, chemical mutagenesis of populations of *C. elegans*.
- 2004 – 2005 **Research Technician. Faculty of Sciences, University of Lisbon, Portugal**
 Supervisor: Prof. Dr. Octávio Paulo
 Project: "Microsatellite analysis of populations and morphs of Iberian Rock lizards (*Lacerta Monticola*)".
 Responsibilities: extraction of genomic DNA of samples of Iberian rock lizards,

microsatellite genotyping.

- 2003 **Volunteer. Mammal Research Institute, Polish Academy of Sciences, Bialowieza, Poland**
 Supervisor: Dr. Leszek Rychlick
 Project: "Competition and coexistence in the community of small mammals from wet habitats of Bialowieza Forest".
 Responsibilities: capture, tracking and maintenance of shrew species (family *Soricidae*).
- 2003 **Volunteer. Faculty of Sciences, University of Lisbon, Portugal**
 Supervisor: Dr. Ana Carla Nunes
 Project: "Study of *Mus Spretus* and the impact of some contaminants in its morphology and physiology".
 Responsibilities: dissection of small rodents (*Mus spretus*) and morphometric characterization of different organs.

TEACHING EXPERIENCE

- 2011 Invited lecturer on the biology of the model organism *Caenorhabditis elegans*. IGC PhD Programme, Portugal.
- 2008 Invited lecturer. Workshop on model organisms, Núcleo de Biologia do Instituto Superior de Agronomia, Lisbon, Portugal.
- 2007 Invited lecturer. Workshop on model organisms, Núcleo de Biologia do Instituto Superior de Agronomia, Lisbon, Portugal.
- 2005 Invited lecturer: "*Caenorhabditis elegans* as model organism", including seminar, practical class and paper discussion. Developmental Biology course (4th year undergraduate students) of Lusófona University, Lisbon, Portugal.

HONORS AND AWARDS

- 2010 Best Presentation at the Annual Meeting of PhD Students of the Instituto Gulbenkian de Ciência (AMeeGuS).
- 2008 International Travel Awards for Young Scholars (Society for the Study of Evolution).
- 2007 Doctoral Fellow, Fundação para a Ciência e a Tecnologia.
- 2006 VolkswagenStiftung by the Organizing Committee of the 12th EMPSEB (European Meeting of PhD Students of Evolutionary Biology).

POSITIONS OF RESPONSIBILITY

- 2012 Organizer of the VIII National Meeting for Evolutionary Biology, Instituto Gulbenkian de Ciência, Portugal.
- 2007 Delegate of the PhD students of Instituto Gulbenkian de Ciência and organizer of the 2nd Annual Meeting of Gulbenkian PhD students.

ADVANCED COURSES

- 2013 The Molecular Biology of Aging, Woods Hole, MA, USA.
- 2010 Summer School in Statistical Genetics, University of Washington, USA.
- 2009 Bioentrepreneurship, Faculty of Economy of the New University of Lisbon, Lisbon, Portugal.
- 2009 Microarray Data Analysis using R and Bioconductor, Instituto Gulbenkian de Ciencia, Oeiras, Portugal.
- 2007 Guarda Workshop in Evolutionary Biology, Guarda, Switzerland.
- 2006 2nd International Postgraduate Course in Genomics, Universitat Autònoma de Barcelona, Spain.
- 2006 The Gulbenkian Training Programme in Bioinformatics, Instituto Gulbenkian de Ciencia, Oeiras, Portugal.
- 2005 Theory of Evolution and Population Genetics (by Prof. Brian Charlesworth), Instituto Gulbenkian de Ciencia, Oeiras, Portugal.
- 1999 Master Windows Computer Course (by Tecliform), Cascais, Portugal.

EXPERTISE AND KEY SKILLS

General laboratory procedures: maintenance of populations of nematodes, preparation of media, plates and solutions, growth of bacterial colonies, confocal microscopy.

Molecular biology: DNA and RNA extraction, PCR, real-time qPCR.

Informatics: General computer use in Mac and Windows environment (Excel, Powerpoint, Word); knowledge of script development in R language.

Data analysis: design of experiments, descriptive statistics, parametric and non-parametric statistical tests, ANOVA, linear models.

Languages: Fluent English (8.0 out of 9 in IELTS General Training Test), Rudimentary Spanish and French.

PUBLICATIONS

B. Afonso, **S. Carvalho**, I. Theologidis, H. Teotónio. Outcrossing maintains higher genetic loads than selfing. (*in prep*).

S. Carvalho, I. M. Chelo, H. Teotónio. Evolutionary transitions in mating systems. (*in prep*).

S. Carvalho, H. Teotónio. The evolution of male aging in experimental populations of *Caenorhabditis elegans*. (*in prep*).

S. Carvalho, P. C. Phillips, H. Teotónio. Hermaphrodite life-history evolution, sex allocation and the maintenance of selfing in experimental populations of *Caenorhabditis elegans*. (under revision in the Journal of Evolutionary Biology).

S. Carvalho, C. Goy, I. M. Chelo, H. Teotónio. Male fitness prevails over hermaphrodite fitness during the adaptive evolution of outcrossing. (under revision in Proceedings of the Royal Society of London B).

I. M. Chelo, **S. Carvalho**, M. Roque, H. Teotónio. The genetic basis and experimental evolution of inbreeding depression in *Caenorhabditis elegans* populations with two mating systems. *Heredity* (*in press*).

H. Teotónio, **S. Carvalho**, D. Manoel, M. Roque, I. M. Chelo. Evolution of outcrossing in experimental populations of *C. elegans*. *PLoS One* 7(4): e35811 (2012).

S. Carvalho and L. Perfeito. "Adaptação e Aptidão" In "Evolução – Conceitos e Debates, Série Fundamentos e desafios do evolucionismo", Esfera do Caos Editores Lda., Lisboa (2009).

D. Manoel, **S. Carvalho**, P. C. Phillips and H. Teotónio. Selection against males in *Caenorhabditis elegans* under two mutational treatments. *Proceedings of the Royal Society B: Biological Sciences* 274 (1608): 417-424 (2007).

S. Carvalho, A. Barrière and A. Pires-da-Silva. The world of a worm: a framework for *Caenorhabditis* evolution. *EMBO reports* 7(10): 981–984 (2006).

CONTRIBUTED PRESENTATIONS AT CONFERENCES

2013 20 years' Celebration of the Fundação Calouste Gulbenkian/Instituto Gulbenkian de Ciência PhD Programmes, Curia, Portugal (talk, first author).

2013 14th Congress of the European Society for Evolutionary Biology, Lisbon, Portugal (talk, first author).

2011 13th Congress of the European Society for Evolutionary Biology, Tuebingen, Germany (poster, first author).

2011 17th European Meeting of PhD students in Evolutionary Biology, Seia, Portugal (talk, first author).

2010 6th National Meeting for Evolutionary Biology, Lisbon, Portugal (talk, first author).

2010 Workshop on the Biology of the *C. elegans* Male, Madison, Wisconsin, USA (talk, first author).

2010 Evolution, Portland, Oregon, USA (talk, first author).

2010 Evolutionary Biology of *Caenorhabditis* and other nematodes, Cambridge, UK (poster, first author).

2009 XII Congress of the European Society for Evolutionary Biology, Turin, Italy (poster, first author).

2008 Evolution, Minneapolis, Minnesota, USA and *C. elegans* Development & Evolution, Madison, Wisconsin, USA (talk, first author).

2007 1st Portuguese Meeting of *C. elegans* Researchers, University of Lisbon, Portugal (talk, first author).

2006 II National Meeting for Evolutionary Biology, Vairão, Portugal (poster, first author).

2006 12th Annual European Meeting of PhD students in Evolutionary Biology, St Andrews, Scotland

(talk, first author).

2005 10th Congress of the European Society for Evolutionary Biology, Krakow, Poland (poster, first author).

OTHER ACTIVITIES AND INTERESTS

- Dance: several certificates in Classical Ballet by the Royal Academy of Dancing; education in Contemporary Dancing, Lindy Hop and Vintage Jazz
- Music (piano)
- Drama
- Diploma as Summer Camp Tutor (2000)

REFERENCES

Upon request.