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## AYUDAS RAMÓN Y CAJAL CONVOCATORIA 2014

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**Nombre:** BLEIDORN , CHRISTOPH  
**Referencia:** RYC-2014-15615  
**Área Científica:** Biología Vegetal, Animal y Ecología  
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### Título:

Evolutionary biodiversity genomics

### Resumen de la Memoria:

My research focuses on different topics related to biodiversity, evolution and genomics of different organisms using the same methodological approaches. I am currently developing three different research lines: (I) Deep phylogeny of Annelida; (II) Evolution of venom systems; (III) Evolution of arthropod endosymbiont relationships.

(I) During my scientific career I integrated techniques from multiple scientific areas to understand the evolution of annelids. Using a transcriptomic approach based on next generation sequencing data we were able to resolve a well-supported backbone tree of Annelida. Currently, I am investigating the evolution of organ systems of this group, with focus on the muscle- and nervous system based on immunohistochemical analysis coupled with cLSM microscopy. This will help to elucidate the ground pattern of the last common ancestor of annelids, but also supports the interpretation of data currently accumulated in the field of evolutionary developmental research with the focus on a few model annelids.

(II) Using an array of different techniques I have been also working on the evolution of venom systems in annelids. Complex venoms have evolved convergently in many animals, as e.g., snakes, spiders and cone snails. Individual venoms show a wide range of physiological effects depending on their specific composition. The diverse bioactivities of venom cocktails do not only play a central role in the ecological and evolutionary success of venomous taxa, they are also being exploited for important applied uses, such as the development of new drugs and insect-resistant crops. Within annelids, the glycerids (bloodworms) use venom for catching prey. In a collaborative effort, we analysed the venom gland transcriptome composition of three glycerid species. Several interesting neurotoxins have been identified in the venom cocktail of bloodworms based on protein work. Especially one neurotoxin of *Glycera tridactyla*, which is called glycerotoxin, acts selectively on calcium channels (N-type Ca<sup>2+</sup> channels) of the motorneural plate and is able to stimulate an increase in miniature potentials that is fully reversible. Due to its properties, glycerotoxin has been used as a research tool in several recent studies. Using genomic and transcriptomic approaches the evolution of this and other selected toxins shall be elucidated.

(III) Besides research on annelid evolution, I am addressing topics about the evolution of arthropod endosymbiont relationships, with a focus on *Wolbachia* bacteria. Many strains have the ability to alter the reproduction of its hosts, which often induces cytoplasmic incompatibility, which may trigger speciation events. Other strains show evolved dependencies with their hosts, which might lead to obligate mutualism, as found in nematode infecting *Wolbachia*. Based on complete genome sequencing, we were able to publish the first solid backbone of *Wolbachia* phylogeny. Using this hypothesis, I aim to use comparative genomic approaches to understand the genomic basis of major evolutionary transitions in *Wolbachia* evolution.

### Resumen del Currículum Vitae:

After receiving my diploma in Biology at the University of Bielefeld (Germany), I started my PhD under the supervision of Prof. Thomas Bartolomaeus and finished my degree in 2004 at the Free University of Berlin. In my thesis I included several chapters analysing the phylogenetic relationships of annelids using molecular methods, but also including morphological data. After a short stay (2 months) at Auburn University (USA) in the lab of Prof. Ken Halanych, I worked for 2 years as a postdoc on a project funded by the German Science Foundation in Potsdam (Germany) (2005-2007). I was able to attract funding for my own position by the German Science Foundation to work two additional years in the same lab (2007-2009). In October 2009 I moved to Leipzig, where I became Akademischer Assistent (equal to assistant professorship) in the group of Molecular Evolution and Systematics of Animals (Prof. Martin Schlegel), where I build up my own research group. Currently, my group includes 4 PhD-students (which will finish in the next 12 months), 1 Postdoc and 6 Master students. Altogether, I supervised 1 completed PhD-thesis, 16 master- or diploma theses and 22 bachelor thesis. Besides supervising students, I am teaching courses on evolutionary genomics as well as an entomological and a marine field course. In December 2014 I finished my habilitation (German accreditation to be a full professor) in the field of zoology. I am a regular teacher in international courses for Programming in Evolutionary Biology which so far took place in Leipzig (Germany) and Bogota (Colombia). Building up on this experience, I am currently under contract for Springer to write a textbook on phylogenomic methods (Phylogenomics an introduction to be finished December 2015).

Till now I have published 55 peer-reviewed publications in ISI listed journals, where I am first author of 14 publications and senior (or in one case shared senior) author in 22 cases. This includes publications in the highly ranked journals Nature, Nature Communications and Molecular Biology and Evolution, which all have an impact factor above 10. In total 18 publications are in journals with an impact factor above 4. The number of citations listed in ISI web of knowledge is 886 and the h-index is calculated as 16 (January 2015). Additionally, I



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contributed 6 book chapters and several invited lectures. I am PI (5 projects) and Co-PI (2 projects) of 7 major grant applications, totaling a sum of around 750000€. I am a reviewer for many journals from my field of expertise and I reviewed several grant applications for the German Science Foundation. Moreover, I am editor for Systematics and Biodiversity and Frontiers in Marine Science. From 2009 till 2014 I was speaker of the section Systematic Zoology for the German Zoological Society, and during this time I organized graduate meetings and acted as reviewer for the submitted contributions for annual meetings. Besides being member of the several societies in my field, I am a founding member of the German Centre for Integrative Biodiversity research.



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**Nombre:** PEREZ ORTEGA, SERGIO  
**Referencia:** RYC-2014-16784  
**Área Científica:** Biología Vegetal, Animal y Ecología  
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### Título:

Diversity and taxonomy of lichen-forming fungi

### Resumen de la Memoria:

My research focuses on the diversity of lichen-forming fungi, their photobionts and a group of highly specialized fungi growing on lichens called lichenicolous fungi. The approach is eminently multidisciplinary as it combines classical mycological field work and large de visu knowledge with molecular genetics and microbiological analyses. Several inventory projects (lichen-forming and lichenicolous fungi) have been carried out in temperate, boreal and austral areas of the world with remarkable success (more than 30 new species for science, and species/area richness record). Diversity has also been approached using the framework of molecular systematics, with detailed studies of several lichen-forming and lichenicolous groups, describing several high rank taxa in the last years. Lichen biology has been multidisciplinary studied using approaches from ecophysiology, electron and fluorescence microscopy and population genetics. Since 2013 I am collaborating in the Global Fungal Red List Initiative as member of the IUCN Lichen Specialist group. I have been also interested in the role of lichens in bioweathering, collaborating in several projects (public and private funding) in which cleaning methodologies have been evaluated in order to preserve monumental building stone.

During the last years I have been interested in the patterns of interactions between myco- and photobionts in communities (both phyco- and cyanobionts). Through molecular ecology techniques I have shed light on the diversity of photobionts in lichen communities and the selectivity patterns shown by the mycobiont. In this field, I have been pioneer in the study of whole communities, with current studies using the theoretical framework of the mutualistic bipartite networks.

In the near future I would like to continue with the study of patterns in biont relationships in more complex communities by means of using next generation sequencing, which I am mastering in my current position, as well as the study of pattern of lichen diversification in model radiations.

### Resumen del Currículum Vitae:

Since the beginning of my scientific career I have been devoted to the study of lichen diversity, including molecular systematics of lichen-forming fungi, their associated fungi (lichenicolous fungi), and the diversity of their photobionts. I have produced more than 80 scientific contributions gathering a total of 520 citations (Google Scholar, accessed Jan 14th 2015). Part of my research has been focused on the taxonomy of lichens and associated fungi, describing 37 new taxa to science (1 class submitted-, 2 orders, 1 family, 2 genera and 31 species). In the last years my research interest has been extended to the understanding the interaction patterns in myco-photobiont interactions, the role of lichens in monumental stone bioweathering and speciation processes. I have been PI in 4 projects, two of them funded by international agencies (DFG and National Park Service, USA).

In 2011 I was appointed secretary of the Spanish Lichen Society and in 2012 secretary of the International Association for Lichenology.

Further, since 2012 I am Associate Editor of The Lichenologist, and since Jan 2015 I am Associate Editor of Fungal Diversity, the most renowned journal in mycology. Since 2013 I am member of the IUCN lichen specialist group, and I am working in the Global Fungal Red List Initiative.

I have supervised 4 PhD theses (2 finished and 2 in process), 3 master theses and 1 degree theses.

I have 58 contributions to national and international scientific meetings, highlighting the invited plenary talk given at the last XIX Symposium in Cryptogamic Botany.

I have collaborated with many international researchers; one of these collaborations, the inventory of Klondike National Park (U.S.A) was honored with the Edward Tuckerman award in 2011 to the best contribution to lichenology by the American Bryological and Lichenological Society.



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**Nombre:** CUEVAS TORRIJOS, JOSE MANUEL  
**Referencia:** RYC-2014-15373  
**Área Científica:** Biología Vegetal, Animal y Ecología  
**Correo Electrónico:** cuevast@uv.es

### Título:

Phylogeography, molecular evolution and experimental evolution of RNA viruses

### Resumen de la Memoria:

The population structure of RNA viruses is determined by their high mutation rates, fast replication and huge population sizes. Due to their high variability, the RNA virus genomes are always considered at the population level. During my research trajectory, I have sought to analyse RNA virus adaptation mechanisms from a population-genetics point of view. Using an experimental approach, I have analysed the evolution of the Vesicular stomatitis virus (VSV) under different demographical and ecological conditions, such as the population size, migration, coinfection, or antiviral treatments. We have also shown that the evolution of viral populations can be governed by their quasispecies structure, such that selection is determined by the ability of the virus to withstand genetic variation (genetic robustness). In addition, we have performed experiments with bacteriophages to analyse potential differences in robustness between RNA and DNA phages, as well as the effect of the mutation rate on population structure. I also have employed molecular evolution computational tools to perform genetic variability and population structure analyses in Hepatitis C virus and in the plant virus family Bromoviridae. More recently, I have been involved in projects analysing the evolutionary dynamics of plant viruses using omic technologies, such as massive sequencing and microarrays. Also, we are currently involved in a consortium which seeks to analyse worldwide diversity of Potato virus Y (PVY), and more than two hundred and fifty natural isolates of this virus have been sequenced to date. We are using this huge dataset to establish the phylogeographic relationships for PVY by performing population structure, epidemiological dynamics and evolution rates analyses. I am currently working as Postdoctoral Researcher in the laboratory of Dr. Rafael Sanjuán (University of Valencia, UV) into a project from the European Research Council (ERC). The main goals of this project consist of estimating *in vitro* and *in vivo* mutation rates from different human and animal viruses and their association with the molecular ecology of viral populations.

### Resumen del Currículum Vitae:

I have been involved in eighteen research projects and three R&D&I contracts focused on the evolutionary biology area, and more particularly in the field of viral evolution. In fact, I have used different virus models (from humans, animals, plants and bacteria) to explore their adaptive abilities under changing conditions. From the forty-six publications I have on my CV (nine of them as corresponding author), thirty-nine are indexed, and three correspond to book chapters. For instance, I could stress the relevance of articles published in *Molecular Biology and Evolution* (two publications), *Plos Genetics* (3), *Evolution* (1), *Philosophical Transactions of the Royal Society of London Series B-Biological Sciences* (1), *Journal of Evolutionary Biology* (2), *Genetics* (4), *Journal of Virology* (2), *Plos One* (2) and *BMC Evol Biol* (1). Besides, I have interacted with other colleagues from my field in several national and international meetings, where I have presented thirty-nine communications (twenty-one of them as oral presentations), acting as first or last author in eighteen and five of them, respectively.



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**Nombre:** HENDRIKS , IRIS  
**Referencia:** RYC-2014-15147  
**Área Científica:** Biología Vegetal, Animal y Ecología  
**Correo Electrónico:** iris@imedea.uib-csic.es

### Título:

Marine ecosystem services in a changing ocean

### Resumen de la Memoria:

Currently I am a post-doc at the University of the Balearic Islands (UIB) with a temporal contract since 2013. I obtained my Ph.D. in 2004 at NIOO-KNAW, the Netherlands, with research focussed on hydrodynamics and larval dispersal (fish larvae, STRI and bivalve larvae). I continued working with hydrodynamics during my first post-doc at the UIB where I investigated particle retention in seagrass meadows (physical ecosystem engineering).

In 2006 I obtained a Juan de la Cierva fellowship (CSIC) at the IMEDEA (CSIC-UIB) where I connected habitat state (seagrass meadows) and larval dispersal of an endangered bivalve species investigating a possible mismatch in recruitment processes caused by changes in environmental covariates. In 2010, within the EU FP7 project MedSeA I assessed the role of seagrass in modifying the carbonate system (chemical ecosystem engineering), mitigating the negative effect of ocean acidification (OA) for associated bivalve species.

At present I am investigating the role of seagrass meadows in beach protection, broadening my field of interest in ecosystem engineering to include socio economic aspects and comparisons of cost effective approaches (using marine vegetation) for coastal protection as well as mitigation of the effects of global change (increased storm frequency, OA by anthropogenic CO<sub>2</sub>).

The inter-related subjects of hydrodynamics, larval dispersal, ecosystem engineers, and global change have shaped my present highly interdisciplinary research line on marine ecosystem services in a changing ocean.

In parallel to my research activity I actively participated in planning, managing and executing two large EU-Network of Excellence projects, MarBEF (executive committee) and EUR-OCEANS (assistant WP). I have three funded regional projects as PI, and an excellent track record in divulgation and transfer of knowledge with 22 oral contributions at international conferences, and 2 sessions at ASLO as a chair. I currently direct one doctorate thesis (defence March 2015) and 2 Master theses. I have published 2 book chapters and 33 articles in SCI journals including Science and Nature Climate Change, most as first author (52%) and some highly cited (218 cites from one article in 2010, 910 cites total). My average impact factor for first author papers is 4.3 and my h-score is 16 (google scholar). I have ample research experience abroad (i.e. France, Portugal, the Netherlands, Greenland, Australia) and a broad network with international contacts. Recently my expertise has been recognised by the (international) community through invitations as speaker (FBBVA Madrid; PICES, Corea) and as expert in panel evaluations of projects (EU Marie Curie and NOAA, USA).

### Resumen del Currículum Vitae:

Participation in funded R+D projects from public calls

Principal Investigator (PI) in 3 National projects (MATER, HIDROLAB, E/BOS). Participation in 18 (national and international) projects; in two as work package manager (MarBEF, EUR-OCEANS). Active participation in writing funded EU projects (MedSeA, FP7 no. 265103; ATP, C-envir/0626-226248) and funded national Spanish projects (EstresX, MEDEICG, PN Pinna nobilis).

Implication in international projects: OPERAs (Ecosystem management; Anthropogenic impact on ecosystems, EU FP7), DANCEA (pH and the possible buffering role of the expanding marine vegetation against ocean acidification in coastal waters of Greenland); European Free Ocean Carbon dioxide Enrichment Experiment (eFOCE, Villefrance); Impact of ocean acidification in the Mediterranean in a changing climate (EU FP7, MedSeA); Climate Change Impacts on the Marine Environment: Research Results And Public Perception (EU FP7, CLAMER); Arctic Tipping Points, (EU FP7 ATP); Consortium for European Research on Ocean Ecosystems under Anthropogenic and Natural forcing (EU FP6, EUR-OCEANS); Marine Biodiversity and Ecosystem Function, Network of Excellence (EU FP6, MARBEF); Creating a long term infrastructure for MARine Biodiversity research in the European economic area and the Newly Associated states (EU FP6, MARBENA); FLume facility cO-operation netWork for BIOlogical benthic boundary layer research (EU FP5, BIOFLOW); Sustainable Use and Conservation of Marine Living Resources (SUSUSE, Theme 2, NWO)

Publications

33 Papers in peer reviewed journals (72% 1st Quartile) of which 17 as first author. 2 book chapters. H-index 16; 910 citations in total (Google Scholar, January 2015). Highest Impact factor (\*in year of publication): 30.028 (Science, 1st author). Total Impact factor calculated with IF at year of publication: 106.9.

Conferences

Participation in 32 conferences (22 speaker + 2 invited speaker), Session chair - 040 (Biophysical coupling) ASLO Nice, France 2009 and GS



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07 Benthos Biology And Ecology in ASLO Lake Biwako, Japan 2012

### Teaching & Tribunals

Direction of 1 Doctorate thesis (L. Basso, defence March 2015), 6 Master theses, 2 Degree theses. Yearly module in Master Global Change UIMP. Occasional teaching degree course UIB. Member tribunal 22 Master theses, 2 Doctorate theses.

### Other Achievements

Executive Committee member (EC) of MarBEF, NoE EU FP6. 2004-2006

DIALOG VII, Dauphin Island Sea Lab, AL, USA workshop by invitation for recent PhDs November 2005

Organization workshops and congresses; i.e. Organisation World Conference of Marine Biodiversity (WCMB 2008) Valencia, Spain.

Reviewer research proposals for NOAA, The Israel Science Foundation, NSF (National Science Foundation, USA), Sea Grant Program Woods Hole (USA), Expert evaluator PEOPLE IEF/IOF/IIF European Research Council 2012.

Reviewer for many journals i.e. Marine Ecology Progress Series, Ecosystems, Frontiers in Ecology and the Environment, Limnology & Oceanography etc.

### Time spent in other research centres after doctorate:

17 Months (12 visits), 15 Months (10 visits) in non-Spanish centres

### Prizes, scholarships and awards

2001 Smithsonian Tropical Research Institute. Research Fellowship

2005 DIALOG V travel award for doctoral thesis

2012 Top cited author in YECSS for the paper **Vulnerability of marine biodiversity to ocean acidification: a meta-analysis** (218 cites January 2015).



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**Nombre:** MATESANZ GARCIA, SILVIA  
**Referencia:** RYC-2014-15971  
**Área Científica:** Biología Vegetal, Animal y Ecología  
**Correo Electrónico:** silvia.matesanzgarcia@gmail.com

### Título:

Ecological and evolutionary responses of plants to global change

### Resumen de la Memoria:

I am a plant evolutionary ecologist with a focus on the ecological and evolutionary effects of global change, drawing on ideas and methods from plant ecophysiology as well as developmental, quantitative, and population genetics. During my PhD, I used a novel, interdisciplinary approach to study the combined effects of different global change drivers such as habitat fragmentation and climate change on plant populations from Mediterranean gypsum soils. The results of my research revealed synergistic interactions among drivers and highlighted the need to use an integrative approach in global change studies. As a Marie Curie postdoctoral researcher, I was able to develop an independent, original research project to understand the evolutionary effects of global change, with a strong emphasis on plants' evolutionary potential and phenotypic plasticity. I used invasive species as study system, as they offer some of the best models for studying microevolutionary processes such as rapid evolution and the phenotypic effects of new genetic combinations. A conventional understanding of the evolutionary process rests on the simplifying assumption that genetic differences rigidly determine the success of plants in their environments. However, the plants' capacity to respond to its environment -phenotypic plasticity- lends an important element of flexibility to this process, since their adaptive responses will affect the outcome of natural selection. Therefore, phenotypic plasticity can be a major mode of adaptation to global change for plants, invasive as well as native species.

Currently I am integrating the research lines developed in my predoctoral stage and my early postdoctoral experience to study the effects of habitat fragmentation not only on plant fitness but also in their ability to adapt to climate change. I designed an approach combining classical habitat fragmentation studies with quantitative and neutral genetics to assess the evolutionary potential of plant species in simulated climate change scenarios, since there is virtually no information on whether habitat fragmentation may limit the amount of quantitative genetic variation (i.e. evolutionary potential) of plant species to adapt to climate change. I also plan to incorporate a new, exciting avenue of research by studying epigenetic processes. There is now mounting evidence that heritable variation in ecologically relevant traits can be generated through a suite of epigenetic mechanisms, even in the absence of genetic variation. These processes may increase the evolutionary potential of organisms in response to abiotic stress, which could potentially be highly relevant in the context of global environmental change. Furthermore, because there is also a growing need to understand whether commercially-used species (such as crops) will be able to adapt to warming and aridity, increasing our understanding on the process of plant adaptation and their limitations will have obvious relevance for applied science. Accordingly, in collaboration with other experts, I am developing a complementary line on the effects of plant domestication on phenotypic plasticity and adaptation, using commercial crops and their wild relatives. The goals of my current research lines are timely given the urgent need to understand whether plants will be able to adapt to climate change.

### Resumen del Currículum Vitae:

I graduated in Env. Sci. in 2002 (UAM Madrid). After a 1-year postgraduate fellowship, I did my PhD at the CCMA-CSIC (including research stays in Scotland and Estonia), graduating with honors and European Doctorate Mention (Rey Juan Carlos University, URJC; 2008). I engaged as a postdoctoral researcher at Wesleyan University (USA; Prof. Sultan lab) and the MNCN (CSIC), funded by a prestigious 3-year Marie Curie postdoctoral International Outgoing Fellowship (7th FP European Commission). Since May 2012 I am a research fellow at the Biodiversity and Conservation area at URJC, funded by the Juan de la Cierva programme (maternity leave in 2013). All the positions I have enjoyed in my scientific career have been awarded by competitive programs.

My career achievements include 28 papers published in SCI journals (plus 3 currently under review), of which 75% are included in top-tier (Q1) journals (and 8 of them in top 10% journals), including Ecology Letters (1), Ecology (2), Journal of Ecology (2), Conservation Biology (2) and Annals of Botany (2) (average impact factor &#8776;4). I am first author in 60% of my publications and first or second author in 80%; two of them are invited review articles. Up to date, my work accumulates 467 citations, with an h-index of 10 (WOS; h=13 and 689 cites in Scholar). I have also co-authored two book chapters, one technical report and I have published several articles in other peer-reviewed and popular science journals. I have contributed to 15 national and international conferences with 10 oral presentations and 10 posters, and I have been invited to present my research in several worldwide institutions. I also organized the Evolutionary Ecology symposia at a major international conference (12th EEF meeting 2011).

I am the principal investigator of four projects funded by the British Ecological Society, the European Commission, the Spanish Association for Terrestrial Ecology (AEET) and the URJC, and I have participated in 13 additional national- and European-funded research projects (total 17). My leadership and mentoring skills are well reflected by my supervision of one PhD student (Nov. 14 with honors), one Master's



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thesis (Sep 14, with honors) and 3 B.Sc. degree thesis that obtained the highest qualification (plus 3 more scheduled along 2015). Since 2012, I have accumulated ca. 200 hours of teaching experience at URJC at undergraduate and Master levels, where I teach various courses including population genetics and evolutionary biology.

Since 2013 I am editor of *Frontiers in Ecology and Evolution*. I regularly review papers for 17 top-tier SCI journals including *GCB*, *J. of Ecology* and *Annals of Botany* and in total I have reviewed more than 30 articles. I am often requested to participate as an external expert in international panels for the National Science Foundation (USA), the Spanish National Evaluation and Foresight Agency (ANEP), the regional government of Andalucía and the AEET, and I have been a member in a PhD evaluation committee.

I am actively involved in the dissemination of scientific research, contributing to science fairs and outreach activities with high-school students. Since Jan 2015, I am also the AEET delegate for the International Network of Next Generation Ecologists, to contribute to the enrichment of international networking among young researchers. I have also established long-term collaborations with researchers from USA, UK, Australia, Chile, Estonia, and Germany.





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**Nombre:** CAUT, STEPHANE  
**Referencia:** RYC-2014-15430  
**Área Científica:** Biología Vegetal, Animal y Ecología  
**Correo Electrónico:** stephanecaut@gmail.com

### Título:

Biología Animal, Vegetal Y Ecología

### Resumen de la Memoria:

During my first research experience in Guiana to study the conservation of leatherback turtles, I understood the importance to use different approaches in ecological studies. I realized difference experiments in situ or in the hatchery to estimate: (1) the importance of the nesting site in the hatchling success (distance to the wave vs to the vegetation), (2) the effect recovery nests by the sea in the embryonic development, in reflection to the future impact of global warming, and (3) the importance of density-dependence on the dynamics of the nesting beach.

I continued my research experiment in the topic of conservation, with the invasive species. I studied with a long-term perspective the impact of rodents in an oceanic island. In this case, the research was increase to the entire trophic web. I made four years of a pre-eradication study to understand the impact of rats and their indirect and indirect interactions on different communities to define the optimum strategy for eradication. After the eradication, I compared the trophic web after and before the eradication to identify modification in the ecosystem functioning. Thus, using the synergy "field-laboratory-modeling," I interested in the better comprehension and calibration of the use of biomarkers in trophic ecology and food web studies, especially stable isotopes. I have developed methods for determining the isotopic incorporation according to various parameters, such as taxa, tissues or type of diet consumed. This reflection been fruitful, resulting in a big amount of scientific literature on different applications of isotopes, from methodological experiments to reviews and applications to invasive species or endangered species.

I used this methodology during my various post-docs and personal scientific projects (as PI, Principal Investigator), to study other species (isopods, marine mammals, amphibians crocodiles, sharks, ants) in all types of environments (terrestrials, marine or freshwater) to develop ecological questions with a multi-trophic perspective. Currently, I continued to use these different approaches to resolve: (1) ecological processes at the individual species level (diet, migration, species interaction), (2) and more recently focusing in more global scale ecosystem function (nutrient cycling, biovectors, phenotypic and genetic adaptation, key role of invasive species), by comparing opposite ecosystem situations.

### Resumen del Currículum Vitae:

I started my first research work with an experience of 6 months in the tropics (Master 2001, French Guiana, Director Marc Girondot, University Paris XI, France) to study the influence of nesting site on the hatchling success of leatherback turtles (*Dermochelys coriacea*). These results provide important elements of reflection for the future conservation in sea turtles.

Subsequently, my proposed DEA (2002) and PhD (2003-2006: University Paris XI, France, Director Franck Courchamp) concerned the establishment of a methodology for rational analysis of the role of introduced species in food webs Island to predict and thus avoid any chain reactions resulting from their sudden elimination. This methodology was based on a combination of empirical field and laboratory studies using mathematical modeling. For this, I studied the functioning of a small and isolated and unknown island in the north of New Caledonia, invaded by the black rat (*Rattus rattus*). I made four years of a pre-eradication study to understand the impact of rats on different communities and defined the optimum strategy for eradication. Finally, I eradicated the island and followed up post-eradication studies of several years, to ensure the success of the eradication and the absence of the chain reactions (my last third year of PhD 2006 and 1 year of assistant professor in the University Paris XI 2006). Moreover, I interested to use and develop different applications of isotopes, from methodological experiments to reviews and applications to invasive species or endangered species.

After this experiment in terrestrial species, I continued my isotopic approach in marine ecosystem with a Post-doctorat contract in the laboratory of Oceanography in Belgium (1 year in 2007, Director Krishna Das). I applied stable isotopic analysis to study the trophic ecology and ecosystemic key role of different species (isopods, sea turtles, cetaceans and sharks).

Last, since 5 years (Contract JAE 2008-2011 and Juan de la Cierva 2011-2014) in CSIC station biological de Doñana I explore now invasive ant species, (i.e. the Argentine ant, at Doñana National Park with Xim Cerdá and Raphael Boulay. Linking the study of ant communities, natural and invaded, with the whole ecosystem, using stable isotopes techniques. Through the combination of multidisciplinary approaches (controlled laboratory studies, field diet supplementation or comparison of different habitat conditions due to natural perturbation), I study different role of ant trophic ecology in sex allocation, nutrients transferred to the brood, the Myrmecochory interaction, ecosystem functioning, success of invasion

Simultaneously, I develop and manage (PI, Principal Investigator) different scientific projects in conservation with public and private financials; e.g. (1) Lost species ♦ The endemic snake ♦ La course de Martinique ♦ (CSIC grant) and recently (2) CROC ♦ Conservation



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research Of Caiman; black caiman in Guiana (National Geographic and Lacoste grants).



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**Nombre:** DELGADO SANCHEZ, MARIA DEL MAR

**Referencia:** RYC-2014-16263

**Área Científica:** Biología Vegetal, Animal y Ecología

**Correo Electrónico:** mmdelgado@ebd.csic.es

### Título:

Ecology and Evolution: individuals, populations, communities and climate change

### Resumen de la Memoria:

I am interested on a wide array of issues within behavioural and evolutionary ecology, biodiversity and conservation biology. My main goal is to carry out multidisciplinary, synthetic ecological and evolutionary research with a strong collaborative basis. Ecology and evolution are fundamentally transdisciplinary areas, and thus I have always faced up to them by combining experimental, theoretical, and observational approaches. Indeed, the main focus of my research is on gaining an integrated understanding of the structure and dynamics of natural populations and communities by combining rigorous statistical analyses and modelling with long-term population monitoring data and experiments in field conditions.

My first specific aim includes the study of how individual movement strategies during dispersal influence the demographic and evolutionary dynamics of spatially structured populations, and conversely how ecological and evolutionary dynamics provide the context against which individuals make their dispersal decisions. This feedback becomes especially important when considering evolutionary questions, as evolutionary changes in the individual's motivation and ability to move are set by the fitness consequences of these traits, which in turn are set by the ecological context provided by population dynamics. Much research has focused on the dispersal process itself and on its evolutionary causes, but less remains known about the two-sided link between dispersal and population dynamics. Understanding the interplay between these two processes is central not only for basic research, but has important implications for conservation. I use a solid base of field work to study this general but fundamental question, together with theoretical models which examine very general patterns at the level of individuals and analyze the population-level consequences for them. This bridges individual behavior with the outcome of population dynamic and persistence in landscapes that differ in their levels of complexity.

My second specific focus is on the understanding of the spatial and temporal variability of community-level phenological responses to climate change and thus focuses on a major challenge in environmental research. It is based on acquiring an existing but unpublished long-term (1930-2013) and spatially extensive (including reserves in Russia, Ukraine, Belorussia, Baltic countries and Siberia) data set which is unique in its breadth and depth worldwide. The rich nature of these data is enabling me to address pertinent questions that have so far remained unanswered. In particular, I aim to quantitatively bridge two different scales of phenological responses, levels of biological organization and spatial scale, to illustrate how a multidimensional change in the physical environment is translated into a community-level change in phenology. The need to bridge the levels of biological organization with spatial and temporal scales is widely recognised to be very difficult due to the complexity of processes linking them, and thus remains as a necessary step to improve our understanding of, and forecasting, phenological variability within and among communities. This research aim is carried out by taking advantage of an extensive network of international collaboration.

### Resumen del Currículum Vitae:

I have 50 papers published in ISI Journals, out of which 26 (52%) are in Journals in the top 25%. I am co-author of two books. The first one, **Integrating theory and data in ecology and evolution** (to be published this year by Oxford University Press), covers both mathematical and statistical approaches, and it has sections on movement ecology, population ecology, community ecology, and genetics and evolutionary biology. The second one (in preparation), **The Eagle owl** (to be published by Poyser), is a monograph that covers the most important biological and ecological aspects of the species I have mostly used in my studies as a biological model. I have presented the results of my studies in 21 national/international meetings, and I have actively collaborated in 9 projects funded in competitive calls and in 2 non-competitive ones. If one puts weight on numeric indices of success, it should be also added that my h-index currently equal 16. This number is positive outlier for someone at the age of 35 who has completed the PhD thesis less than 7 years ago.

I believe that having good aptitudes to set up stimulating discuss and collaborations is a crucial step in the scientific career. I have had numerous collaborators from many different nationalities, and I have organized international meetings in relation to different aspects of dispersal (one of my main lines of research) with key dispersal researchers mainly from Europe. I have published many papers out of these collaborations. This is the main reason why the number of publications as a first author is moderate (20%). Yet, it is important to note that I have been always very active in all of them, participating in the discussions, analyzing the data and writing the manuscripts. This is reflected in the fact that I am usually the second author of those papers I am not the first author.



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During my PhD studies I already moved abroad. Further, since I completed my PhD studies I have been working (for the last 7 years) at the University of Helsinki in. Ecology at Helsinki University is widely known to be at the cutting edge of scientific progress. In one field ♦ metapopulation biology ♦ it is the world leader and moreover the main driving force for the whole field, which has become a ♦hot topic♦ in science in large part through their own efforts. This is reflected not only in diverse publications in high impact Journals but also in a number of highly influential books and edited volumes (by staff members). My host group there (Metapopulation Researcher Group, MRG; Leader: Ilkka Hanski) is a big player in keeping the Evolutionary Biology & Ecology major in Europe and worldwide. Within MRG, I have largely been benefited to learn the strength of my subgroup (Mathematical Biology Group, MBG; Leader: Otso Ovaskainen), which is to combine theoretical tools with complicated data analysis problems, to yield more power to either side than would be possible working with these in isolation.

Finally, I am also involved in many other scientific activities, including supervising students (master, undergraduates and PhD students) and having editorial responsibilities. I am currently acting as a reviewer for many important international journals (e.g. Ecology Letters, Ecology), and I am Associated Editor of two journals (Movement Ecology and Ardeola).



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PARA LA INVESTIGACIÓN

**Nombre:** MORALES FERNAZ, JUDITH  
**Referencia:** RYC-2014-15145  
**Área Científica:** Biología Vegetal, Animal y Ecología  
**Correo Electrónico:** jmorales@mncn.csic.es

### Título:

Animal Communication and Social Evolution

### Resumen de la Memoria:

During my research career, I have pursued a major and independent line of research on Animal Communication and Social Evolution. Essentially, I am interested in unresolved questions such as how flexible are decision rules in social conflict and which are the mechanisms underlying their plasticity. Social behaviour evolves embedded in the context of life-history, and thus I am also interested in how the strength and resolution of conflicts depends upon the strength of life-history trade-offs, like current vs. future reproduction. These are study questions that remain unanswered in most animal communication systems studied to date. To resolve these questions, I combine an understanding of the origin of animal signals in social interactions with how they modulate the outcome of conflicts. I focus on animal families as models of transient societies in miniature. Their simple structure makes them ideal for analyzing the evolution of conflict and cooperation between kin and non-kin. The novelty of my research stems from an integrative view of social interactions (concretely, of intra-family interactions) as a dynamic network environment, where the expression of signals simultaneously affects the behavioural rules of numerous individuals. I specifically analyze the informative or manipulative function of signals in this social network as a mechanism for multiple conflict resolution. This represents a pioneering approach to conflict and negotiation in social groups. The strengths of this line also include an interdisciplinary perspective, where I combine viewpoints and tools of ecology, behaviour, physiology and quantitative genetics. The contributions I have led in this line have provided results of high value and impact to the scientific community, as well as to the general public (additional coverage in top ranking journals like Science, Nature and Proceedings B, and in international media like BBC News and New York Times). I consider myself the leader in this research. I am chiefly responsible for the original ideas behind all my contributions as first author, which of course have been enhanced in fruitful discussions with co-authors. I am also the main responsible for experimental design, intensive field and laboratory work, and for further statistics and manuscript writing.

Five top relevant achievements of my research: 1) Review on the role of signals in family conflicts, which conceptualizes my contribution to the idea that parental investment reflects the simultaneous resolution of multiple conflicts (Morales & Velando 2013 Anim Behav). 2) Empirical demonstration that parental decision rules can be fixed or flexible (can be negotiated) according to the expression and interaction of multiple signals (Morales et al. 2009 Proc R Soc Lond B). 3) First evidence for the theoretical trade-off between fecundity and female ornamentation, providing hints on the underlying physiological mechanisms (Morales, Velando & Torres 2009 Behav Ecol). 4) First evidence that eggshell colour reflects female quality and is heritable in an avian species: demonstration of assumptions of a recent controversial hypothesis (Morales et al. 2010 J Evol Biol; Morales, Sanz, Moreno 2006 Biol Lett). 5) Evidence for a trade-off between two physiological defence mechanisms (immunity and stress responses) underlying life-history decisions (Morales et al. 2006 Funct Ecol)

### Resumen del Currículum Vitae:

I received my B. Sc. in Biology from Universidad Complutense de Madrid (2001). I started my research activity during my last year degree, when I obtained a grant from Basel University and UCM to join the Ecological Research Unit at the Swiss Ornithological Institute, Switzerland (2000). I collaborated with Dr. Luc Schifferli and participated in the EURING Swallow Project. My interest in avian life-histories and eco-physiology profoundly shaped my career, and I continued on to a PhD thesis supervised by Dr. Juan Moreno at Museo Nacional de Ciencias Naturales-CSIC, Spain (2002-2006). I was recipient of a FPI grant from MEC. I defended the thesis with honours and won the Extraordinary Doctorate Award (UCM) and the Award to the Best Doctoral Thesis in Ornithology (SEO-BirdLife). After winning a Marie Curie PhD Fellowship I joined Dr. Rauno Alatalo's team at Jyväskylä University, Finland (2003) for three months. Soon after completing my doctorate, I received a MEC Post-doctoral Fellowship to collaborate with Dr. Roxana Torres at Universidad Nacional Autónoma de México (2007-2008). I performed my own project as PI, funded by the Association for the Study of Animal Behaviour, UK. Thereafter, I won a Juan de la Cierva contract from MICINN to work with Dr. Alberto Velando at Universidade de Vigo, Spain (2008-2011), a fruitful collaboration that continues at present. Next, I gained a JAE-Doc contract from CSIC and ESF to work at Museo Nacional de Ciencias Naturales-CSIC (2011-2014). I have enjoyed two maternity leaves (2013 and 2015).

During my research career, I have pursued a major and independent line of research on animal Communication and Social Evolution. The interdisciplinary approach of my work has motivated me to collaborate with researchers from a variety of fields and to perform different stays at institutions of recognized international prestige. As a result, I have also participated in various international projects (ASAB, Synthesys, Academy of Finland, EURING), as well as in national ones (5 I+D MEC projects and 1 from Parques Nacionales). I have published 56 SCI articles (20 H-index, 1000 citations, 66% in the first quartile; 77% IF>2; 66% IF>3). In the last five years, I was first author in 35% of my publications (100% in the first quartile; 100% IF>2; 78% IF>3). Some of the contributions I have led as first author have provided results



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of high value and impact to the scientific community, as well as to the general public (additional coverage in top ranking journals like Science, Nature and Proceedings B, and in international media like BBC News and New York Times). Most of my contributions have been presented in conferences (27 contributions), invited seminars or published in non-SCI journals. I have supervised one PhD student (FPI) that defended his thesis with honours in July 2014 (Universidade de Vigo), one master and two BSc students. I have performed referee tasks for various research agencies (National Science Foundation US, Research Foundation Flanders Belgium, CSIC). I have been reviewer or been asked my view in opinion articles for leading journals such as Nature, Proceedings B, Biology Letters, Biological Conservation, Functional Ecology, Behavioral Ecology, PLoS ONE and Journal of Animal Ecology.