



AYUDAS RAMÓN Y CAJAL CONVOCATORIA 2016

Turno de acceso general

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Título:

The Ecology of Wildlife Diseases: a Multidisciplinary Approach

Resumen de la Memoria:

RESEARCH CAREER: During the first years of my scientific career I focused my research interest on animal ecology and wildlife management. Nowadays I have integrated different skills obtained during my postdoctoral experience to develop innovating, timely and original frameworks around the ecology of infectious diseases combining basic and applied knowledge from different fields such as: Ecology, Parasitology and Veterinary Science. During my initial postdoctoral training period (3 yrs) at the Wildlife Ecology unit (Institut National de la Recherche Agronomique, INRA, France), I gained experience on animal ecology (large mammals) and statistical modelling to cope with the complexity of ecological data. Later, at the Servei de Ecopatologia de la Fauna Salvatge (SEFaS) of the faculty of Veterinary Science (UAB), I started to apply much of the knowledge gained on animal ecology to animal health in several model of disease (e.g., Pestivirus in chamois or bTB in wild boar). Later, I greatly improved my skills on statistical modelling in the department of Mathematics, Statistic and Operational Research area of the University of Lleida (UdL, Spain) for the last two years. Today, at the Universidade de Aveiro (Portugal), my experience in such contrasted institutions provided me a good combination of vision and rigorous statistical skills that together enable me to explore complex multi-disciplinary problems about the impact of infectious diseases in wildlife and humans and to evaluate alternative measures for disease control in natural conditions.

My current research scheme focuses on two lines:

- a) The causes and consequences of multiple infections (co-infection) on wildlife and human health.
- b) Disease control through manipulation of the host population.

Resumen del Currículum Vitae:

I obtained my MSc degree in Wildlife Management (yr 2000), and my PhD with European Mention (yr 2004, mark: Outstanding Cum Laude) at the Universidad de Jaén, Spain. Then, I have been working for 11 years as a postdoctoral research associated: 1 yr at the UJA, 3 yr at the INRA-French National Institute for Agricultural Research, 3 yr at the Autonomous University of Barcelona (Juan de la Cierva action), 2 yr at the Dept of Operational Research and Statistics of the University of Lleida, Spain (Marie Curie-Beatriu de Pinos action), and 2 at the Departamento de Biología & CESAM, Universidade Aveiro, Portugal. To date, I have published 158 scientific works: 103 SCI articles (966 citations, h-index = 16, i-index = 42), 15 papers in peer-reviewed journals, 19 book chapters, 2 books, 3 proceedings, 9 divulgation articles, and 7 technical reports for local environmental agencies. As reflect of my multidisciplinary research I have published in a broad range of journals belonging to different scientific areas such as: Multidisciplinary Science (PLOS ONE), Biology (Biol. Letters), Zoology (Anim. Behav., Behav. Ecol.), Microbiology (Front. Microbiol., Microbiol. Ecol.), Infectious Diseases (Infect. Dis. Poverty, Epidemiol. Infect., Eur. J. Clin. Mic, Infect. Dis.), and Veterinary Sciences (Vet. Mic., Vet. Par., Vet. J.). Eight-eight percent of my SCI articles have been published in journals within the first or second quartile of their respective areas (50% Q1, 38% Q2). I have presented my works (n = 179) in several national and international conferences receiving 11 awards for the best scientific presentation. I have been invited as chairman in fourteen times and served as reviewer of 140 articles in 38 journals. I have also participated in 18 competitive research projects: 11 National (FECYT) and 7 International (2 EU calls, 1 Morris Animal Foundation, 3 Chinese Foundation of Science, 1 founded by the Ireland Agriculture and Food Development Authority), being the principal researcher 5 times. I have served as chairman or as guest speaker for national (12 times) and international (8 times) conferences. Since 2009 I give lectures on Epidemiology and Statistical Modelling and Wildlife Management in three official masters (UMU, UAB, UIB). I have being invited as professor by the by the North West Agriculture & Forestry University, Yangling, China. I have completed the supervision of 4 PhD and 17 MSc students, and I am supervising 6 PhD candidates and 3 MSc students from U. Lisboa, U. de Liege and UAB. I participate in 3 National (Red GECISO, RED Cabra Mallorquina, Grupo Ungulados) and 3 International networks: the Sarcopetes-World Molecular Network, the Stress & Pathogènes & Chevreuils Network (SPAC), and the Rupicapra International Group (RIG). I am associated editor for Plos ONE, Mammalian Biology, Journal of Parasitology Research and the Spanish Journal of Mammalogy (Galemys).



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Título:

Plant ecology: biodiversity, coexistence, global change and ecosystem functioning

Resumen de la Memoria:

My PhD focused on plant-plant interactions with articles selected as Editor's choice in *Oikos* and amongst the most cited of *PerspPlantEcol*. During my post-doctoral stages at the University of New South Wales (Australia) and the University of Alcalá (Spain), I studied the functional consequences of woody encroachment and overgrazing, and adaptation to climatic stressors in Mediterranean plants. Since 2014, I am a research assistant at the University of Bern (Switzerland), working mainly on diversity-ecosystem function relationships, mentoring students and participating in teaching and organization activities. Overall, I have more than 3 years of postdoctoral experience abroad in Australia, Switzerland and USA.

I have published 47 SCI articles, with 1493 citations (H-index = 17). In many of these publications I am either first (20), second (7) or last (7) author, emphasizing my role as a leader of this research. I have participated or acted as co-PI in research projects in Australia, Spain, Switzerland and Germany, and currently have two projects as PI under review; thus I have experience raising funds and managing research projects. I am mentoring a PhD (Spain), 4 undergraduate students and a postdoc (Switzerland) and a bachelor student (Australia). I am Consulting Editor in the *J. Arid Env.* and reviewer of international projects, PhD theses, and journals. I have taught ca. 120 h. in three countries and am credited as "Profesor contratado doctor" by ANECA. My outreach activities include five book chapters on forestry and ecological restoration, 60+ press releases, blog posts and talks to the general public. In addition to continuing with my current research lines, I will focus on more comprehensive assessments of the effects of multiple drivers of global change, multitrophic community assembly and its functional implications, the coupling and comparison between human and ecological systems, and in exploring the evolutionary implications of my work.

Resumen del Currículum Vitae:

I did my Master's thesis with Prof. Jordi Cortina (UA, Spain) on ecological restoration under semiarid conditions. I did my PhD (2006-2010) in the URJC (Spain), supervised by Profs. Fernando Maestre, Adrián Escudero and Fernando Valladares. There I studied the interplay between different drivers of plant-plant interactions and their consequences for plant diversity. The quality of the work done was rewarded by an Editor's choice and two highly cited papers, I also won the "Ecosistemas" award to one of the best PhD thesis summaries. Later on, I led the first global test of the role of facilitation for plant diversity, and developed theoretical advances in the topic. I also led the first empirical multi-species support for the extent of non-hierarchical competition in plants. The latter topic is one of my most successful lines of research, as I am not leading an international coordinated experiment to test the effect of intransitive competition on coexistence experimentally and across 5 taxa, I also organized the first special session in the topic (BES meeting, Liverpool 2016) and I am guest editing a special feature on this topic in *Journal of Ecology* (to be published in April 2018).

In 2011 I did a short postdoc with Prof. David Eldridge (UNSW, Australia). We showed that overgrazing explains the relationship between encroachment and desertification, often invoked as the main reason for shrub removal, and that both diversity and ecosystem functioning peak at average dominance of shrubs. This collaboration produced a project in which we both were co-PIs and a very active collaboration (16 papers together). Then I spent 6 months with Dr. Pedro Villar (UAL, Madrid) enhancing my skills on ecophysiological measurements. From 2012-2014 I worked in the BLOCOM project (PI: Fernando Maestre, URJC), an international network focused on global drylands. There I developed my skills in analyzing meta-databases and actively collaborated in writing, analyses and fieldwork of a very productive international network. This international network produced the first evidence worldwide of a positive relationship between diversity and ecosystem multifunctionality and the drastic changes in ecosystem stoichiometry with increasing aridity. Since 2014, I work at the University of Bern (Switzerland) as a research assistant, focusing mainly on diversity-ecosystem function relationships, but also developing new lines of research, organizing



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academic activities, mentoring students and teaching (ca. 120 h. in three different countries throughout my career).

I have published 47 SCI articles (20 as first author and 7 as last). I am Co-Ordinating Editor of the Journal of Arid Environments since 2012, and have reviewed ~70 papers in 20+ different SCI journals, together with projects for 3 countries and 2 PhD theses. Other research activities include participation in 13 research projects, in Australia, Switzerland, Germany and in Spain. I have participated in 31 conferences in 6 different countries. My outreach activities include five book chapters on forestry and ecological restoration, over 50 press releases and blog posts to transfer scientific knowledge to society and talks to the general public. I am mentoring or have mentored a PhD (URJC, Spain), 4 research practicals and a postdoc (UB, Switzerland), and a bachelor student (UNSW, Australia). I am qualified as Profesor ayudante doctor and Profesor contratado doctor by ANECA.



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Título:

Individual and Population level drivers of Fitness

Resumen de la Memoria:

Ecologists and conservation biologists face the challenge of preventing biodiversity losses and hence of predicting population trends of both native endangered and invasive species. Predicting how environmental change impacts natural populations requires understanding how stochastic and deterministic forces interact to influence selection and population dynamics. A lot of research has been successfully devoted to identifying the main factors involved, and individual-based long-term studies have helped to advance the field. However, we are far from being able to forecast population trends in wild species. Stochastic variation accounts for part of the noise in the models, but my research shows that a large proportion of that noise is just deterministic variation that scientists fail to properly account for. We require understanding the effects of:

- Individual genetic variation phenotypic in phenotypic traits (Physiology, morphology, and behavior),
- Phenotypic traits in demography (survival, reproduction), and other life history traits
- Ecological interactions and of spatial variation in demographic rates.

My research aims to identify fitness-related traits contributing to fecundity or viability selection and ultimately aims to disentangle the relative contributions of individual-, population level, and environmental drivers to population dynamics.

Ultimately, my aim is to understand the pathways through which individual level (genetics, physiology, behavior) and environmental factors influence fitness components to identify life-history trade-offs. I have used mammalian field and lab systems to help address these questions. As a specific contribution, I have set up a monitoring study system for rodents that allows my team to track individual trajectories to test for the effect of phenotypic trait distributions, population level factors and environmental variation on population dynamics. Technology has also made possible the study to be spatially-explicit, a feat rarely accomplished in studies in wild populations. I will continue to use a combination of correlational and experimental field work, and of modeling approaches, such as integral projection models, to continue advancing my research program.

My work has translated into publications in Science, Nature or Proceedings, attracting ~1200 citations, gaining competitive fellowships like the Fulbright and the Marie Curie, setting up an unmatched research infrastructure in the third best UK University, supervising 31 student research projects including 5 PhD and 23 master theses in the area of Ecology, and into holding positions of academic responsibility in the University of Oxford, ranking 2nd best worldwide.

Resumen del Currículum Vitae:

I have worked 4 years at the University of Oxford, as Departmental Lecturer, Senior Research Associate, and College Lecturer at St Hilda's College. I have been a Fulbright research fellow and at The Smithsonian Institution (USA) and a Marie Curie fellow Imperial College London (UK), I have been a visiting scientist at the University of Stanford, University of Edinburgh, the Endangered Wildlife Trust (South Africa). I did my Ph.D. at the National Museum of Natural History (CSIC) in Madrid. My multidisciplinary research program has broadly covered the areas of ecology, genetics, physiology and behavior. My research has been published in major multidisciplinary journals (Science, Nature, Proceedings of the Royal Society, Biology Letters) as well as in top journals in Ecology, Physiology, Behaviour and Conservation (Journal of Animal Ecology, Molecular Ecology, Biology of Reproduction, Behavioral Ecology). My work has received ~1200 citations and I have an h-index of 14, with a mean number citations/paper of 32.6. I am the 1st author of my top cited articles, and 1st, 2nd or senior author in 69.9% of my publications. I have reviewed articles for over 35 different scientific journals, (Proceeding of the Royal Society, American Naturalist, Biology letters, Heredity, Functional Ecology, Oikos, among others). Aware of the importance of transferring knowledge to society, I have also been heavily involved in outreach activities. My Ph.D. research has been featured in more than 30 different media and national TV programs, as well as recently on BBC Nature. I have been invited to give talks in 24 top international universities and research institutions (Cambridge, Oxford, Arizona, Chicago Field Museum, Zurich, Bern, Berlin, Queen Mary London, Nottingham, Lausanne, Smithsonian Institution, Centre for Ecology and Hydrology, Imperial College London, MNCN-CSIC). I am on the editorial board of Frontiers in Ecology and Evolution as a review editor for Population Dynamics. I have supervised 23 Master Thesis at Imperial College London and Oxford, and have supervised 5 Ph.D. Students (3 at Oxford, 1 at Imperial, and 1 at Nottingham) and I am Progress Review Committee member for three other Ph.D. students at Oxford working on predator-prey interactions, population dynamics and Persian leopard conservation. I have been heavily involved in teaching and education with important responsibilities; I am Examiner of Ecology and Evolution at Oxford's Zoology department and have taught on the Applied Ecology course. At Imperial College, I taught life-history evolution, physiological basis of behavior, organismal evolution, and demography. Finally, I have led the installation of a rodent monitoring facility at Silwood Park and set up an ambitious individual-based, spatially explicit, long-term study (>7years) to address questions in population dynamics and evolutionary demography.

Given that I have tackled these questions from different perspectives, scales and disciplines, and in different institutions worldwide, my



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publication record may have suffered more than if I had focused on a single field, and at one single place mostly focused on research. However, I have gained expertise in different fields necessary to tackle future challenges and generate high impact research. It has also given me a broad and solid perspective and vast international experience.



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Título:

Ecología, Evolución y Conservación de Islas

Resumen de la Memoria:

During my first years as a graduate student (2002-2004), I worked as a researcher at the University of La Laguna [ULL, Spain] to investigate the ecological factors that drive bryophyte diversity across laurel forests and high mountain vegetation on the islands of La Gomera and La Palma (Canary Islands), respectively. My MSc and PhD research within the lab of Prof. J.M. González-Mancebo at ULL (2004-2010) focused on the effects of anthropogenic disturbance on species and genetic diversity of laurel forest bryophyte communities. From these studies, practical and implementable conservation actions were proposed for the Macaronesian cloud forest. During this period I contributed to the first red list of bryophytes for an oceanic archipelago, and also collaborated with Prof. R.M. Ros and Dr. O. Werner at Murcia University in projects related to the historical biogeography and systematics of the Macaronesian bryophyte flora.

After completing my PhD, I was a visiting researcher at the University of Las Palmas de Gran Canaria, and I initiated a research line on island macroecology. In January 2011, I moved to A. Vanderpoorten's lab at the University of Liege [ULg, Belgium] as a post-doctoral fellow of the Belgian Science Foundation (FNRS) for a period of almost four years to work on macroecology and biogeography of cryptogams. During this period, from 2012-2013, I was also a visiting researcher at Duke University [US], where I worked with Prof. A.J. Shaw on phylogenetics and population genetics of the North Atlantic bryophyte flora. This period fueled the publication of a series of innovative studies in island biology and biogeography, and the co-supervision of five MSc and two PhD theses. Following that period I was a SNSF Senior Researcher within the research group of Prof. N Alvarez, at the University of Lausanne [Switzerland], where I developed an ecological genomics research program. As of January 2016, I am a "Juan de la Cierva" Incorporación Research Associate of the Island Ecology and Evolution Research Group at Institute of Natural Products and Agrobiology [IPNA-CSIC, Spain], where I am both leading and developing genomic technologies for the study of biodiversity and species origins, applied to both plant and invertebrate systems. I am also an affiliated researcher at the Centre for Ecology, Evolution and Environmental Changes at University of Azores [Portugal], and with the Plant Conservation and Biogeography group at ULL. I am an Associate Editor in Journal of Bryology, The Bryologist, and Frontiers in Ecology and Evolution, and am frequently called upon to review for other journals (e.g. Mol. Ecol., J. Biogeogr.).

Resumen del Currículum Vitae:

I have published 72 scientific articles, with 52 of those papers having been published in journals included in the Scientific Citation Index (SCI). Of the 45 articles registered by Scopus, 32 (71%), with a mean impact factor of 3.7284, were published in the last 4 years, and these are summarized by an h-index of 11 and a total of 347 citations, of which 106 (30%) are from last year alone. My h-index reaches 15 and citations 566 for 63 publications considered by Google Scholar. Complementary information can be found at my Scopus ID: 15923910300; Research-Gate website: https://www.researchgate.net/profile/Jairo_Patino; Google Scholar website: <https://scholar.google.es/citations?user=ZV6BGIAAAAJ&hl=en>; and at my personal website www.jairopatino.com. As evidenced by Scopus and Web of Knowledge, I have published with around 105 different co-authors across 45 articles, and my SCI papers classify in Agricultural and Biological Sciences (43), Environmental Science (12), Biochemistry, Genetics and Molecular Biology (10), Multidisciplinary (3), highlighting my ability in multidisciplinary research. Regarding this publication list, I have participated in 10 R&D projects funded through competitive calls of public entities, being PI in one (15,000 Euros), and in seven non-competitive projects with public entities. I am an Associate Editor of Frontiers in Ecology and Evolution and Journal of Bryology since September and October 2014, respectively, and The Bryologist since August 2015. I have reviewed scientific projects for the ANEP (Spain) and FONDECYT (Chile). I have also reviewed manuscripts for a number of journals including, but not limited to: American Journal of Botany, Annals of Botany, AoB PLANTS, Biological Conservation, Biological Journal of Linnean Society, Biological Journal of Linnean Society, Botanical Journal of Linnean Society, Diversity and Distributions, Ecography, Heredity, Global Ecology and Biogeography, Journal of Applied Ecology, Journal of Biogeography, Molecular Ecology, and Molecular Phylogenetics and Evolution. I have presented ca. 36 contributions at conferences and given 10 invited talks. Finally, I would like to highlight my involvement in teaching and mentoring (2 PhD and 3 MSc students co-supervised



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with Prof. A. Vanderpoorten, and one PhD and one MSc student with Prof. J.M. González-Mancebo), which illustrates my strong commitment to serve in the science community. At the University of La Laguna (Tenerife, Spain), I have been involved and taught lessons in subjects such as Biodiversity from the Master Program called Terrestrial Biodiversity and Island Conservation, as well in subjects for undergraduates such as Botany, Projects in Biology, and Plant Biodiversity, among others.



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Título:

Uncovering patterns and processes of genome evolution responsible for plant diversification

Resumen de la Memoria:

The connecting thread of my research is to uncover patterns and processes of genome evolution responsible for plant diversification, from genes to phenotypes, through an integrated approach including evolutionary-developmental biology (evo-devo), phylogenomics and cytogenetics, with two main research lines: (1) From genes to phenotypes: Origin and diversification of plant reproductive morphologies across angiosperms. The clustering of flowers into inflorescences is a major recurrent evolutionary trend associated with pollinator attraction that has played an important role in the diversification of angiosperms (flowering plants). Inflorescence structure determines the number and arrangement of flowers and fruits, and is thus vital for reproductive fitness and constitutes a key character for plant domestication and crop production. I have been studying three families whose evolutionary histories are tightly linked to shifts in inflorescence complexity and floral symmetry. I started to study inflorescence architecture in Valerianaceae for my Diploma of Advanced Studies (MNHN Paris) and I returned to the topic for my first postdoc (Ohio University, UAS), this time applied to the Papaveraceae. Currently, my research mainly concentrates on the Asteraceae, on which focuses my Marie Skłodowska Curie Action project « CAPITULA: Variation on a theme, evolutionary-developmental insights into the Asteraceae flower head » carried out at the Royal Botanic Gardens, Kew. (2) The evolutionary significance of the extraordinary diversity of plant genomes (i.e. size, organisation, composition and dynamics) in land plants. The 1C-value, the amount of DNA per unreplicated haploid nuclear genome, varies dramatically across eukaryotes from 1C=0.003 pg in the parasitic microsporidian *Encephalitozoon intestinalis* to 1C=152.23 pg in the flowering plant *Paris japonica*. This enormous >50 000-fold range variation is decoupled from organismal complexity, the so-called "C-value paradox", which is mostly explained by the fact that repetitive non-coding sequences are major contributors to the extensive diversity of genome size. Large genomes are considered maladaptive and entailing an evolutionary cost that can make them the target of purifying selection (the large genome constraint hypothesis). However, at the same time, mechanisms increasing genome size such as polyploidy and transposable element activation are exceedingly common and crucial for generating evolutionary novelties and adaptation. Then, genome size is shaped by the interplay between counterbalancing forces, which translates into a dynamics of genome size ups and downs across lineage evolution. I have been and I am still involved in many studies on genome size concerning a wide range of land plants, especially since I was the responsible of the Cytogenetic Lab at the Royal Botanic Gardens Kew (UK). Currently, I contribute to two main projects on genome dynamics. The first is focused on the role of polyploidy and other genomic mechanisms in the colonisation, diversification and adaptation of the Asteraceae in the Alps (I co-supervise a PhD student, Luca Pegoraro, on this project funded by the Kew Foundation). The second concerns the largest genome size holders and what they can tell about the upper limit of C-value and its determinants.

Resumen del Currículum Vitae:

My passion and commitment to evolutionary biology research has only strengthened over time, allowing me to build a strong publication record, a broad set of research skills and experience and a large international collaborative network. Since 2003, my publication record has grown, to reach a total of 45 papers in SCI journals, out of which I am lead (first, last or corresponding) author of 19. Four articles have arisen from the PhD I advised, 21 are from journals of the top quartile category including three from the top decile category (*New Phytologist*, *Nucleic Acids Research*). I also published a book chapter and eight papers, three as lead (first and/or corresponding) author, in non-indexed journals with peer-review process. My publications have already attracted a good number of citations [Google Scholar: 837 citations, h-index of 17; SCOPUS: 565 citations, h-index of 13]. Furthermore, I have given or contributed to 64 presentations at scientific conferences and seminars (16 as speaker, two invited conferences and eight invited institutional seminars). I have made crucial career decisions such as reorienting my research toward the evo-devo field which was completely new for me after my PhD on systematics, and leaving my home country and embarking on research training lasting several months to several years in different countries. I have spent >100 months in postdoctoral research placements abroad, of which 33 in the Ohio University (USA) and 40 in the Royal Botanic Gardens Kew (RBGK, UK) where I am currently carrying on my research as a Marie Skłodowska-Curie Action Fellow. I have been awarded 10 grants or scholarships for research, and have participated as a member in 11 R&D&I projects. I have been the referee for research projects (incl. projects from the Agence National de la Recherche, France, the British Ecological Society, UK, and the National Science Foundation, USA) and scientific journals (incl. *BMC Plant Biology*, *Cytometry part A*, *Taxon*). I have also participated in the supervision and training of a postdoctoral researcher and 22 students (incl. the supervision of two Master and two PhD students), and have been involved in substantial teaching at the undergraduate and post-graduate levels, covering lectures and practical classes in English, French and Spanish. In addition, I contributed to a number of science outreach activities, especially at the Royal Botanic Gardens Kew (e.g. animation at the Science festival summers 2015 & 2016, Kew Science Blog January 2017).



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Título:

Climate change

Resumen de la Memoria:

Soy un ecologista (Marie Curie Fellow; Imperial College) en inicio carrera con (i) una amplia experiencia internacional y una red de colaboradores de clase mundial; (ii) antecedentes multidisciplinarios y publicaciones en revistas de primera línea; (iii) éxito en ganar becas de investigación independientes (Marie Curie) y (iv) éxito en la recaudación de fondos de investigación substanciales (£200k como PI; 500k £ en total). Mi objetivo principal es entender cómo los ecosistemas acuáticos responden al calentamiento global mediante un enfoque multidisciplinario combinando teoría, experimentación y computación. El cambio ambiental a nivel global, junto con impactos antropogénicos sin precedentes son las principales impactos sobre la biodiversidad y sobre los servicios de ecosistemas a la escala mundial. Los científicos están cada vez más presionados para predecir la magnitud de tales cambios y, sobre todo, cómo van a afectar al bienestar humano. Para lograr algún tipo de capacidad de previsión, es esencial desarrollar una comprensión mecanicista de cómo interacciones entre especies median respuestas a los cambios en el medio ambiente. En concreto, pretendo: (1) Modelar padrones de gran escala en la biodiversidad acuática y funcionamiento de los ecosistemas; (2) Cuantificar respuestas a un cambio climático simulado utilizando una instalación experimental innovadora (<http://miguelmatias.com/iberianpondproject/>). (3) Integrar datos fisiológicos, experimentales y computacionales para producir previsiones mecanicistas de cambios en la biodiversidad y servicios de ecosistemas acuáticos. Este proyecto innova mediante la introducción de un sistema experimental multiregión en combinación con técnicas moleculares de cuantificación de ADN ambiental en muestras de agua, permitiendo medir respuestas desde de los genes a los servicios del ecosistema. Esta línea de investigación tiene el potencial de hacer una contribución significativa a la mejora de nuestra capacidad de predecir los posibles cambios en los servicios del ecosistema, allanando el camino para medidas realistas de mitigación y / o prevención de los desastres ambientales.

Resumen del Currículum Vitae:

I am an independent early-career ecologist (Marie Curie Fellow; Imperial College London) with (i) extensive international experience; (ii) multidisciplinary track record of publications in leading journals; (iii) track-record in securing competitive research fellowships (i.e. Marie Curie) and research grants (£200k as PI; >£800k in total); (iv) teaching and supervision experience at leading Universities; and (v) a world-class network of collaborators. My main research goal is to develop a comprehensive understanding of how natural ecosystems respond to global warming using a multidisciplinary approach that combines theoretical, experimental and computational techniques. Global environmental change together with unprecedented anthropogenic impacts have cause major impacts on biodiversity and their associated ecosystem goods and services from regional to global scales. As scientists, we are increasingly pressed to predict the magnitude of such changes and, particularly, how they will affect human welfare. To achieve that forecasting ability, one must develop a mechanistic understanding of how species interactions mediate ecosystem-level responses to changes in the environment. I am addressing this object by (1) Modelling large-scale empirical patterns in aquatic food-webs and ecosystem functioning across the Iberian Peninsula; (2) Quantifying responses to simulated climate change using a brand new multi-region experimental facility (sites in Arid, Mediterranean, Temperate and Alpine environments; see <http://miguelmatias.com/iberian-pond-project/>). (3) Integrating acquired knowledge to produce improved forecasts of potential impacts on ecosystem services under predicted environmental change. My research line innovates by combining a unique multi-region experimental system distributed with state of art Environmental DNA biodiversity surveys to measure responses from genes to ecosystem services. This research has the potential to make a significant contribution towards enhancing our ability to forecast potential changes in ecosystem services under global environmental change, paving the way for realistic measures of mitigation and/or prevention of major environmental disasters.



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Título:

Diversity and Evolution in Marine Annelida

Resumen de la Memoria:

My main research line is the documentation of the biodiversity in the oceans from an evolutionary perspective. I am interested in accounting for the current life-forms and life-modes of marine invertebrates (with special emphasis on annelids) and also understanding the evolutionary and biogeographic origins that have allowed such diversity and shaped current distributions. I am currently working on three main research lines: 1) accounting for the species diversity in particular marine habitats and geographic regions, 2) systematics of marine annelids, 3) understanding the evolution of particular organ systems and their function.

1) Taxonomy and biodiversity revisions are topics of high relevance but often neglected. I have been devoted to scrutinise museum collections and participated in collecting surveys to report on the faunas of Easter Tropical Pacific, Indopacific, and North Atlantic among others geographic regions. I have described over 50 new species of annelids and, in most cases, descriptions have been accompanied with analyses to assess relationships with close related taxa or revision of genera. I am particularly interested in addressing cases complex of species or of cryptic speciation employing a variety of theoretical frameworks and analytical methodologies to establish the species boundaries and revealing the genetic structure in populations of wide spread species. In this line, I find of great value the discovery and assessment of the status of pest and introduced species and its impacts in the environment.

2) I have followed an integrative approach and employed a variety of sources of data (including morphological, biological, ecological and molecular) and analytical methodologies to assess evolutionary relationships of annelids at different hierarchical levels. Some of these studies represent the first phylogenetic hypothesis proposed at family level (e.g. Sphaerodoridae, Sabellariidae and Oweniidae).

3) I am interested in understanding how morphological form and specific physical structures (e.g. muscular and nervous systems, sensory organs) is related to their function and their evolution along the evolutionary radiation of taxa. I study the internal and external structures with an array of different microscopical methods (e.g. histology, transmission and scanning electronic microscopy (TEM and SEM), and immunostaining and confocal laser microscopy (CLSM) and aim to infer function from structure. Analyses of this structural information in an evolutionary context, often accompanied by the analyses of the genetic information responsible for this morphological diversity offers a powerful tool to unveil evolutionary relationships of organisms and specific organs.

Resumen del Currículum Vitae:

Summary of my research career: Education: 1997 BSc in Biological Sciences (Environmental Biology), Universidad Autónoma de Madrid (UAM), 2004 PhD in Evolutionary Biology and Biodiversity, UAM, Suma Cum Laude. Academic Employment: 2004-2005. Lecturer, Department of Biology, UAM; 2005-2007: Fulbright/MEC Postdoctoral Fellowship in Australian Museum (AM), Sydney; 2008-2011: Postdoctoral Researcher, Australian Museum; 2012-2015; Postdoctoral Researcher, Norwegian University of Sciences and Technology (NTNU), Trondheim; 2015-ongoing, Researcher at NTNU and Coordinator of Nordic Research School in Biosystematics (ForBio). Over 8 years of international postdoctoral experience. Research Projects: Participant in 10 research projects, 6 international (5 as a PI or co-PI), overall granted with more than 600.000€. Scientific Contributions: 51 scientific publications, including 40 papers in SCI journals (e.g. Cladistics, PLoS ONE; Integr. Comp. Biol; Zool. Scripta; Front. Mar. Sci; Zool. J. Linn. Soc; Org. Divers. Evol; J. Morph; Hydrobiologia; Invert. Syst; JMBA; J. Nat. Hist; Zootaxa; etc.), 1 book and 10 invited chapters in books including (4) in the Handbook of Zoology (De Gruyter) and (1) in the Tree of Life (Sinauer), among others. In over 54% of the publications I am leading author, and in over 8% the single author; 27 contributions in international conferences. Bibliometrics (Google Scholar): Total SCI citations: 344; Index H: 10. Academic Experience: Co-supervisor of 1 PhD thesis, 2 MSc thesis and 2 degree projects. Lecturer in undergraduate and postgraduate courses: Biosystematics and Biogeography (NTNU), Annelids in the Norwegian Sea (NTNU), Zoology (UAM), Non-Arthropods Invertebrates (UAM), Terrestrial Ecosystems (UAM) and Physic Oceanography (European Social Fund). Organizer and coordinator of over 12 postgraduate courses as part of ForBio and Nordic Research School in Biosystematics. Organiser of the ForBio Annual meeting, Trondheim, April 2016 (75 international attendees), Member of the Organising Committee of the XI International Polychaete Conference, Sydney, August 2013 (150 international attendees). Reviewer Editor of Frontiers of Marine Sciences; Reviewer of more than 45 manuscripts in 23 SCI journals. Professional Membership/Certification: Honorary Research Associate of the Australian Museum, Member of the International Invertebrate Morphology Association, Member of the Systematics Association.



AYUDAS RAMÓN Y CAJAL CONVOCATORIA 2016

Turno de acceso general

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Título:

Eco-evolutionary impact of environmental stress in amphibians

Resumen de la Memoria:

I am an evolutionary ecologist interested in understanding the processes and mechanisms that allow organisms to cope with environmental stress. I have developed this research program following three main topics:

I) Evolutionary ecology and physiology in response to time-constraints

This research line examines the impact of phenological variation on life history strategies in amphibians. In particular, I have examined the extent, costs and limits of plastic growth and development in amphibian larvae in a context of increasing phenological fluctuation. Main achievements of this line include the identification of the first unequivocal evidence for transgenerational plasticity in response to changes in breeding phenology in vertebrates; the identification of costs paid in offspring exhibiting fast development in response to delayed breeding phenology (reduced immune response and antipredator defences), and the impact that intra-specific priority effects had on the generalization of these responses.

At present, I am paying particular attention to the impact of time-constraints on the amphibian skin microbiome, and how this can be related to disease susceptibility. In particular, I am examining the variation in the amphibian skin microbiome across environmental gradients that lead to very different levels of temporal stress (e.g. latitudinal and altitudinal gradients). Within this framework, I am also trying to identify probiotic microorganisms in the amphibian skin microbiome (i.e. the skin bacteria that kill fungus pathogens most effectively). I am also investigating the patterns of skin microbiome acquisition in amphibians due to its impact on the implementation of captive breeding programs effective at maintaining microbial diversity and, thus, health in amphibians.

II) Eco-evolutionary effects of invasive species

During my PhD, I examined the ecological consequences of biological invasions, revealing the strong negative effects of introduced fish predators on the distribution, behaviour and larval ecology of amphibians. In a recent development of this research line, I examined the evolution of antipredator responses against an invasive crayfish in an entire community of amphibians. These studies highlighted the destabilizing role that exotic species can have on natural communities, and suggested that strong selection by invasive predators may drive rapid evolutionary change in invaded communities.

III) Effects and adaptation patterns to low-dose radiation

I have recently started to examine the impact of chronic exposure to low-dose ionizing radiation in wildlife. Specifically, this research line investigates the effects of chronic exposure to human-released radiation on natural populations of amphibians in Chernobyl. Examining how amphibians cope with the chronic exposure to low-dose ionizing radiation can shed light on the debate over the effects of, and possible adaptive responses to, chronic exposure to low-dose radiation in nature. I am using the European treefrog (*Hyla arborea*) living in the Chernobyl Exclusion Zone as the study model, analysing how treefrogs respond to biological damage as a consequence of living in areas contaminated by radiation. I am comparing different aspects of the genetics, physiology and ecology of frogs living inside and outside areas affected by radioactive fallout from the Chernobyl accident in 1986.

Resumen del Currículum Vitae:

After graduating in Biology (Zoology) Univ. Oviedo, I conducted my PhD with a MEC-FPI grant, supervised by Dr. Florentino Braña. I did my post-doc with Dr. Anssi Laurila, Population and Conservation Biology Unit, Uppsala Univ. (May 2005-November 2010), supported by 3 postdoctoral contracts funded by the Spanish Ministry of Education and Science, Fundación Caja Madrid, and Fundación Ramón Areces.

Since December 2010, I work as Junior Researcher in Animal Ecology, Dept. Ecology and Genetics, Uppsala Univ., developing an independently funded research program. I was on parental leave during 2011-2013 (60% leave). I worked as visiting researcher at the Stockholm Univ., Sweden, April-May 2016. I have spent my entire post-PhD career in international research institutions.

I have published 32 papers in SCI journals, including top-ranked ones e.g. Science, Ecology (4), Journal of Animal Ecology (2), Ecography, Oikos (3), Evolutionary Applications, Oecologia (2) and Journal of Evolutionary Biology. I am the first or senior author in 72% of my papers. Since 2010, 67% of these papers (14/21) were published in top-tier (Q1) journals (85%, 18/21, in top 30% journals). I have an h-index=15.

I have been principal investigator in 23 research projects accounting for >450.000 EUR and funded by highly competitive calls by



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Turno de acceso general

international institutions. I have been recently granted with projects to expand my lab and continue my research by Swedish Radiation Protection Agency (January 2017, ca. 120.000 EUR) and Carl Tryggers Foundation (December 2016, ca. 40.000 EUR).

I have participated in other 16 projects. Among them, I am currently involved in the EU-FP7 funded COMET project COOrdination and iMplementation of a pan-Europe instrumENt for radioecology (ca. 5.5M EUR, 2013-2017), and the BBVA Foundation SKINPRO project on the ecology of amphibian skin microbiome (ca. 90K EUR, 2017-2018). I maintain active collaborations with researchers in France, Sweden, Ukraine, Peru, India and Spain.

I have supervised 1 PhD, 2 MSc thesis and 2 BSc projects. I have been granted funds in December 2016 to hire a postdoctoral researcher within the project examining the impact of Chernobyl radiation in frogs.

I have contributed to 26 national and international conferences, including 19 oral presentations. I have been invited to give talks at Doñana Biological Station-Spain (2015), Swedish Agricultural Univ. (2016) and Jyväskylä Univ.-Finland (2017).

I have accumulated ca. 450 hours of teaching at the Uppsala Univ. in courses on Vertebrate Faunistics, Introduction to Scientific Research, and Science Communication. I obtained my Docent certification by the Spanish National Agency for Quality Assessment and Accreditation in 2011. I am the coordinator of Science communication activities at the Animal Ecology Unit, Uppsala Univ.

Since January 2017, I am Subject Editor at the journal Oikos, and since 2005 member of the Amphibia-Reptilia Advisory Editorial Board. I regularly review manuscripts for top-tier journals such as Proc R Soc B, Biol Lett, Evolution, J Animal Ecol, Funct Ecol or Oikos. I act as external reviewer for funding agencies: Fonds National de la Recherche Scientifique, Belgium, Portuguese Foundation for Science and Technology. I am a member of the British Ecological Society Review College since 2013. I have been member of one PhD and 2 MSc thesis tribunals.



AYUDAS RAMÓN Y CAJAL CONVOCATORIA 2016

Turno de acceso general

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Título:

Phylogenomic approaches in the sequencing era

Resumen de la Memoria:

I obtained my degree in Biological Sciences in 2003 from the Universidad Complutense de Madrid, including a collaboration period of 2 years at the Applied Mathematics department. I did my PhD as part of the Dopazo's functional genomics group at CNIO and CIPF (Madrid, Valencia, 2004-2008), and had my first postdoc position at the Gabaldón lab for comparative genomics at CRG (Barcelona, 2009-2013). In that period, I was awarded with the European Science Foundation fellowship for short-term stays (4 months, The Netherlands), Juan de la Cierva fellowship (3 years) and Jose Castillejo mobility program (6 months, EMBL, Germany). During 2014 and 2015 I worked as a senior postdoc in the Bork group at the computational biology unit of EMBL (Heidelberg Germany), being involved in several international metagenomics projects. Since 2016 I hold a staff Research Scientist position at EMBL.

My past and current research lines include i) studying the phylogenetic variability among gene families and its impact on species taxonomy and the reconstruction of the Tree of Life ii) studying the role of gene duplication on the acquisition of novel gene functions through the use of phylogenetic and phylostratigraphic techniques iii) predicting orthology relationships iv) studying horizontal gene transfer events in prokaryotes and other microbial organisms v) characterizing the genetic variability within and between microbial communities in environmental and gut metagenomic samples vi) discovering and characterizing novel gene functions and unknown organisms out of massive metagenomic data, with a focus on the discovery of novel enzymes.

Resumen del Currículum Vitae:

To date, I have published 36 papers in peer reviewed (Q1) journals such as Science, Nature Methods, PLOS Biology, Molecular Biology and Evolution and Genome Biology (11 as first author). I have also co-authored 2 book chapters, 1 conference proceeding and 1 popular science article. My current H-Index is 26, with more than 3750 citations since 2006. I am a regular reviewer for journals such as Nucleic Acid Research, Bioinformatics, BMC series and Evolutionary Bioinformatics. My first author papers have been selected for oral presentations in 12 international and national conferences (i.e. SMBE, ISMB, ECCB, GRME). I have participated in 11 national and international R&D projects, including explicit coordination and network actions (FP7, International Human Microbiome Standard). Currently, I am responsible of a Work Package in the H2020 DD-DeCAF project (www.dd-decaf.eu).

I have lectured and organized 2 international courses on phylogenomics (Oeiras, 2010; Barcelona, 2011) and taught over 180 hours as invited lecturer in international courses and university. I co-supervised two Master thesis (University of York, and Ruprecht-Karls-Universität, Germany), mentored and supervised one student under the Google Summer of Code program, and tutorized many bioinformatic projects for bachelor students (UPF, Barcelona).

Finally, I have large experience handling High Performance Computing environments for genomics: I co-administrated the functional genomics cluster at CIPF (2005-2008), was fully responsible for the Comparative Genomics cluster at CRG (2009-2014), and currently work as external scientific consultant for several companies and research institutes (ETH, Zurich; BioByte GmbH; Vall d'Hebron Institut de Recerca; Fundación IVI; Igenomix Spain).