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AYUDAS RAMÓN Y CAJAL CONVOCATORIA 2014

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SUBDIRECCIÓN GENERAL
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Nombre: GUERRERO CASTILLEJO, ANTONIO

Referencia: RYC-2014-16809

Área Científica: Ciencia y Tecnología de Materiales

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Título:

Beyond Organic Photovoltaics: Organic Photoelectrochemical cells for fuel generation

Resumen de la Memoria:

Educated in Chemistry Antonio Guerrero completed a PhD funded by Bayer in Organometallic Chemistry at the University of East Anglia (UK, 2006). The research topic involved the synthesis of new synthetic polymers and organometallic catalysts. This work was disseminated by the publication of 6 articles in scientific journals (i.e. *Angewandte Chemie Int. Ed.*), one complete book and one patent. Subsequently, he worked during 4 years at Cambridge Display Technology where he learnt the operation principles of Organic Light Emitting Diodes. He was in charge of the design and synthesis of different structural units to produce efficient OLEDs and one of his ideas was patented.

In 2010 Antonio joined the group directed by Prof. Juan Bisquert at Universitat Jaume I. In his role Antonio Guerrero co-leads one research line on Organic Photovoltaics. The main contribution to the field has been to highlight to the scientific community the commonly forgotten role of the active layer/contact interfaces. In particular, the electrical field is commonly confined at the vicinity of the contacts enabling effective charge extraction and being the diffusion of carriers the main transport mechanism in the bulk of the active layer. The origin of this electrical field was ascribed to the energy stabilization process that produced electrostatic charges in the form of dipoles and the band bending of the energy levels in the organic semiconductor layer (ACS 2012). This knowledge has been further developed subsequently to provide a physical technique to measure the concentration of fullerene molecules at the cathode contact which ultimately determine the selectivity of the contact and leakage current (ACS 2013). The contact may be the responsible of the S-Shape commonly observed in the current-density curves in degraded devices (*Adv. Funct. Mat.* 2014). Indeed, providing more understanding on the degradation processes of organic photovoltaics has been one of the topics of research. Recent findings suggest that evolution of the vertical concentration of donor and acceptor molecules is one of the main degradation pathways (*Org. Electronics* 2014). In addition, generation of a charge transfer complex between donor and acceptor has always been proposed to be beneficial for the device performance. However, he has shown that tightly bound charge transfer complex may be detrimental to the device performance (*Adv. Energy Mat.* 2014).

Recently, Dr. Antonio Guerrero has focused on the development of a totally innovative line of research in which he combines his knowledge in organometallic chemistry and organic photovoltaics for the production of fuels by using solar energy (EES 2014). The photoelectrochemical cell relies on the use of an organic photovoltaic device covered by a organometallic catalyst, the device is immerse into a solution and the desired chemical reaction can be driven by the catalyst. This is the line of research that he would like to develop in the following years.

Overall, Dr. Guerrero is the author of 34 research articles, one complete book and he is the inventor of two patents, both currently under exploitation. With 12 papers published in 2014 his career is impressively progressing: in 5 of these papers he was the first author, 4 of these articles where published in high impact journals (IP=10-16) and in another 3 articles he was the corresponding author.

Resumen del Currículum Vitae:

Antonio Guerrero is a chemist specialized in the synthesis and use of organic semiconducting materials for its implementation in a variety of electrical devices. Over the last few years his work has been mainly focused in different lines of research but all related with energy applications. His scientific contribution has been quite remarkable in the field of organic photovoltaics. Antonio Guerrero is the author of 35 scientific papers, one complete book and the inventor of two patents, both currently under exploitation. With 12 papers published in 2014 his career is impressively progressing: in 5 of these papers he was the first author and 4 of these articles where published in high impact journals (IP=10-16, Thomson Reuters 2013).

Dr. Guerrero has shown high abilities to lead research lines and to manage projects in both industry and academia. During the last 4 years he has been the co-leader of a research line on Organic Photovoltaics at the University Jaume I (Castellón). He is the head of the fabrication lab and usually manages an average of 3-5 people at a time including students, post-docs and visiting researchers. He has been corresponding author in a number of published research articles confirming his involvement as co-leader. In the same line he has co-directed the Masters and PhD thesis of a student. The PhD thesis was defended on 16/07/2014 and she was awarded a **◆ Sobresaliente Cum Laude◆**. During the whole period of research the student has been the co-author of 13 papers being first author of 5 of them. These numbers can be taken as an indicator of the good direction capabilities of Dr. Antonio Guerrero. Remarkably his leading abilities are manifested by the trust deposited by the current group leader letting him to represent the research group at two different EU FP7 projects.



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Dr. Guerrero attends to all meetings to defend the interests of the research group.

The ability to attract funding and to manage Projects has been manifested over the last few years and he has participated in the preparation process of several projects since 2010. Amongst other successful research applications, Antonio has been the principal investigator coordinating the Spanish research group into a bilateral collaborative project France-Spain funded with 10,000 euros by the French government (PHC NANO ESPAGNE 2013).

Dr. Guerrero has shown an adequate participation in activities at international level by contributing in a number of European projects, research stays and conferences. His international recognition in the field is slowly gaining weight and Dr. Guerrero has lately been offered internationally to give invited talks in conferences and in research centres. One of the most important roles of Dr. Guerrero role has been to establish new collaborations with international partners. A number of international collaborations are included in the publications.

Finally, Dr. Guerrero holds wide industrial experience by closely working with Bayer and Cambridge Display Technology during 8 years. This asset has developed a sense in Dr. Guerrero to carry out research in highly applied science.



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Nombre: GARCIA GIMENEZ, SONIA
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Título:

Plant genome evolution and organisation: from the sequence to the chromosome

Resumen de la Memoria:

This document summarises the research career of Sònia Garcia, a Juan de la Cierva post-doctoral researcher at the Faculty of Pharmacy of the University of Barcelona (UB). The applicant finished her degree in Pharmacy at the UB in 2002. She started PhD in the same university in 2004 thanks to a FPU grant of the government of Spain. During the PhD, she spent research periods to the CNRS-Université Paris Sud (France) and to the Queen Mary University of London (UK) under the supervision of world leaders in their research areas. By 2007 she had already presented her dissertation which contained eight articles, obtaining the highest qualification (excellent cum laude) and the Extraordinary PhD Award. From 2008 to 2011 she obtained her first post-doctoral position at the Institut Botànic de Barcelona (CSIC), thanks to the JAE Doc program of the CSIC, during which she spent eight months at the Academy of Sciences of the Czech Republic. In early 2011 she obtained a six-month part-time adjunct position at the UB. By November 2011 she started her second post-doctoral contract at the UB, supported by the Beatriu de Pinós program of the Agència de Gestió d'Ajuts Universitaris i de Recerca of the government of Catalonia, continuing until December 2012, when she joined her current post-doctoral position. In total, she has spent 20 months of research time abroad and 36 months in a scientific institution different than the present one. Indicators of the national and international impact of the applicant's research are the collaborations maintained with numerous internationally recognised institutions. Additionally, from the beginning of her PhD to the present, the aspirant has combined the scientific research with teaching duties, both for undergraduate and post-graduate students.

The candidate's research line is mainly addressed towards understanding the processes involved in plant genome evolution and organisation.

Research focuses on three areas:

1. Structure, organisation and function of ribosomal RNA genes in plants. The applicant is especially interested in plants with unusual rRNA genes since their discovery of linked rDNA in species from genus *Artemisia* and other Asteraceae. They were also able to demonstrate the expression and epigenetic modification of 5S genes in some linked type Asteraceae. The quest for alternative rDNAs was expanded to gymnosperms and a fascinating range of rDNA arrangements was found. In addition the global analysis of ribosomal DNA distribution in plant chromosomes is being performed, for which a database compiling this information was constructed (www.plantrdnadatabase.com).
2. Evolution of plant genome size (C-value). Much of the candidate's research has been focused on diploid and polyploid Asteraceae although other groups have been and are being investigated. Additionally, global and evolutionary analyses of genome size variation in the family have been carried out, for which a publicly available database has been conceived (www.asteraceae-genomesize.com).
3. Role of transposable elements (TE) in plant genomes. It is aimed to resolve the possible role of TEs as vehicles of 5S genes in plants. She has also been participating in the conception of a joint project interested in the broad impact of TE on plant genomes, analysing the composition, organisation, evolutionary dynamics and contribution to global genome size.

Resumen del Currículum Vitae:

As a result of her intense scientific activity, since 2004 the applicant has published a total of 38 articles (two of them in press) in journals indexed in the JCR databases (17 as first author and 10 as corresponding author), receiving 465 citations, with an h-index of 15; one third of the articles belong to journals from the first quartile in category. The candidate has also published ten articles in other journals, and presented 46 contributions to conferences at the international or national level (being the first author in 15 and invited in six). She has also presented seven conferences, workshops or seminars invited by relevant scientific institutions.

She has taken part in several research initiatives, some with international participation and funding. She has been a member of seven national R&D&I projects since 2005, the latter active until the end of 2016. In one of these projects, from the EXPLORA call of the MINECO (2012), she could not be the Principal Investigator for administrative reasons (not holding a permanent position) although she was the main responsible de facto. She has been an official external collaborator in two projects of the Czech Science Foundation since 2011 and until 2016. She has also obtained two short-term projects from the European agency EMBO (European Molecular Biology Organization) in 2011 and in 2013. Recently, the applicant has submitted a project proposal for the Horizon 2020 program of the European Commission, based on the high evolutionary dynamism of 5S rDNA across the tree of life in collaboration with scientists from her national and international research network.

She has spent 20 months in research placements abroad in different countries (Czech Republic, France, UK, USA) and 36 months in



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scientific institutions different from the current host institution (IBB-CSIC, Barcelona).

The applicant has already obtained three post doctoral contracts, all of them participating in competitive calls. The last one, the current position, is a **Juan de la Cierva** post-doctoral contract of the MINECO, at the Faculty of Pharmacy, University of Barcelona (since 2012). In 2011 she also got a six month part-time adjunct position at the same institution.

The applicant has also been the recipient of several grants, including the general grant for degree studies (Beca general, Ministerio de Educación 1997-2002); the FPU grant (Formación de Profesorado Universitario, government of Spain, 2004-2008) and the mobility fellowships related to this one for short-time period visits to international institutions (2005, 2006, 2007); several grants for research stays abroad (**José Castillejo** of the MICINN, 2008-2009; **Acciones del CSIC para la movilidad internacional**, 2008; **Beques per a estades de recerca a l'estranger** of the AGAUR, 2012) and travel grants for activities related to research (from the UB, in the years 2004, 2005, 2007, 2011 and 2013).

The following credit her professional quality: accreditation of the figure of **Profesor Ayudante Doctor** (ANECA, 2009), **Professor Lector** (AQU, 2009), and recently that of "Professor Agregat" (AQU, 2014). She was also granted the PhD extraordinary award (2008) and the award of the **Societat Catalana de Biologia** (2005).

She has experience in training and supervising the research work of undergraduate and postgraduate national and international students (nine students) and has recently started the co-supervision of a PhD student.



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Título:

Immunology of lentiviral infections

Resumen de la Memoria:

My pre-doctoral research at the IdAB was focused in the identification of host and pathogen-associated factors involved in the reduction or enhancement of infectious processes through different immunization strategies (gene gun bombardment, nebulization of DNA plasmids conjugated to microparticles or administration of recombinant/attenuated viruses) assessing immune activation and protection against lentiviral infection. Co-administration of immunological adjuvants (B7 costimulatory molecules) previously identified as markers of immunosuppression in SRLV clinically affected sheep, prevented viral infection in half of the vaccinees.

From the virological point of view we have isolated and characterized phylogenetically the first Spanish and Turkish SRLV strains and the presence of recombination in Mexican SRLV. We completely sequenced Spanish strains causing two unusual outbreaks of arthritis and encephalitis in sheep.

The two-year post-doc stay introduced me into the description of a novel SRLV genotype with deep impact in the molecular epidemiology, evolution, diagnosis and vaccination. Bayesian methods based on phylogeography showed tissue compartmentalization of env sequences involved in the neurological outbreak.

Beyond T cells, immune system inhibits lentiviruses through restriction factors of the innate immunity. Back in the IdAB, I co-directed two doctoral theses describing ovine/caprine TRIM5 α restriction of lentiviruses and the ovine mannose receptor and its role on SRLV infection and pathogenesis. We also elucidated the ability of ruminant macrophages to differentiate into proinflammatory/anti-inflammatory (M1/M2) cells and the flow from one state to another.

Practical approaches of my research include the detection of seminal anti-SRLV antibodies, the low epidemiological risk of using semen from seropositive males and the development of genotype A, B and E-specific ELISAs, leading to a licensed patent on SRLV diagnosis. National and international collaborations help me along with the description of lesion patterns in neurologically affected animals, the certification of the first SRLV-free flocks in Spain and the association of Scrapie with SRLV.

Current researches analyze through the supervision of three doctoral theses, the ovine transcriptome after SRLV infection, the innate immune response against SRLV and heterologous lentiviruses (HIV, SIV), the presence of lentiviruses in wild ruminants and the viral tropism associated to the adaptative immune response after experimental infection with two different genotypes.

Next-coming research activities are related to the autoimmune syndrome induced by adjuvants (ASIA), by which sheep (and also humans) repeatedly inoculated with aluminum-based vaccines develop a proinflammatory disease. A Master thesis I have co-directed, preliminarily suggests an M1 profile in Al(OH)₃ treated macrophages potentially leading to an autoinflammatory process. Finally, we are exploring a new strategy to prime the immune system with fungal beta-glucans in order to face pathogens with the consequent reduction in antibiotic treatment.

Resumen del Currículum Vitae:

The main objectives of my pre-doctoral research (2002-2006) were to explore DNA vaccines against small ruminant lentiviruses (SRLV); detect, isolate and characterize phylogenetically and phenotypically new SRLV strains and to determine immunological correlates of protection. This was achieved under the supervision of Drs. B. Amorena and D. de Andrés, after my graduation in Biology (2000) and Biochemistry (2001) at the University of Navarra. During this period I contributed to the establishment of the Animal Health Group of CITA in Aragón (2001-2002) and later at the Institute of Agrobiotechnology (IdAB, CSIC-UPNA), through the participation in research projects which allowed me to visit Dr. D. Klein's group (Institute of Virology, Vienna) where I learned real-time PCR technology to quantify gene expression and viral load. European projects gave me the opportunity to visit Dr. B. Blacklaws' lab (Univ. of Cambridge) to apply T-cell proliferation and cytotoxicity assays for evaluation of immune responses upon vaccination.

My post-doctoral work, first performed in the laboratory of Prof. S. Rosati (Univ. of Turin, 2007-2009), was focused on the characterization of the new genotype E within SRLV, isolation of the respective strains, full genome determination, molecular epidemiology studies and development of new diagnostic tests and vaccination strategies. During my second postdoc at the IdAB (2009-2012), I personally introduced innovative strategies/approaches in the group related to innate immunity, host-pathogen interactions and diagnosis contributing to the scientific and experimental progress of the group in the frame of different projects. In this second post-doc I co-



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directed of 2 doctoral theses with Cum Laude qualification, focused on the identification and characterization of innate immunity restriction factors exploring alternative strategies to control lentiviral infections. Another three doctoral theses I am co-supervising, aim at exploring APOBEC3 role on lentiviral infection, presence of lentiviruses in wild ungulates and the ovine transcriptome upon SRLV infection.

Since 2002, I have participated in 6 projects funded by CICYT, 1 by INIA, 3 by Government of Navarra, 5 by Italian Government and 3 by the EU. I am author in 37 SCI publications in the Veterinary and Virology areas (>75% Q1), inventor of a Spanish patent based on synthetic peptides to diagnose SRLV infection, and have contributed to 34 international and 47 national conferences.

I enjoyed an FPI grant (2002-2006), a research contract (I3P post) involving ITG ganadero of Navarra, a post-doc grant by the University of Turin (2007-2009), a JAE-post contract of the CSIC (2009-2013) and different sub-contracts with private enterprises through CSIC.

My course-teaching has been on: Host-pathogen interaction in the Master in Biotechnology at the IdAB; Virology in a Veterinary Science practical module (3rd year students, Univ. of Turin); and Small Ruminant Lentiviruses in the Master of Veterinary Medicine (Univ. of Zaragoza).

I have also a degree on Professional Category B for experimental animal management (Spanish Ministry of Agriculture).

I have been contacted to review several papers for the following journals: Viruses, J. of Virological Methods, Pharmaceutical Sciences, J. of Visualized Experiments and Research in Veterinary Sciences.



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Referencia: RYC-2014-16735

Área Científica: Ganadería y Pesca

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Título:

Diagnosis and Immunopathogenesis of Swine Diseases

Resumen de la Memoria:

As Fellow from Research Initiation Programme of Cordoba University (UCO) (2003) I started studying the pathogenesis of livestock diseases and collaborating in analyzing the clinics and lesions of different ASFV strains (project KBBE-211691, FP7). From my Master in Porcine Farming (2007) my research line focused on ♦Diagnosis and Immunopathogenesis of Swine Diseases♦, awarded as the best Research in the Agrifood Area by Caja Rural Foundation. I carried out my End of Course Project studying the immunosuppressive role of PRRSV through apoptosis phenomena in lymphoid organs (project FONDECYT-1020217). In my PhD Thesis I deepen on PRRSV immunopathogenesis determining the role of cytokines and acute phase proteins (APPs) in the modulation of the immune response (project AGL2006-04146/GAN continued with AGL2009-12438GAN). These results led us to outline a model of how PRRSV interacts with host immune response at lung level favouring the infection with secondary pathogens, which allowed me publishing a review article in The Veterinary Journal (ranking:11/129;IF:2.17) and to be awarded with the Special Doctorate Award from UCO. I was invited to present these results at the EuroPRRSnet Workshop (Barcelona, Spain; COST Action, FP7). I was invited to participate in a NADIR project (FP7), in collaboration with the DTU National Veterinary Institute (Denmark), being the responsible of evaluating the immune response of a recombinant protein vaccine candidate against *S. suis*, as well as in the FONDECYT-1111045 project in collaboration with UdeC (Chile), leading the studies to decipher the role of cytokines and APPs in the early inflammatory response of a *A. pleuropneumoniae* infection.

At my entry at CICAP, I started new research lines in swine zoonotic pathogens, developing a specific protocol to track Salmonella in the pig production chain from farm to slaughterhouse, which is being implemented to other zoonotic pathogens. We have systematized the sampling at the slaughterhouse to identify Salmonella clones from different epidemiological sources by PFGE determining critical control points for cross-contamination of pig carcasses. These studies were developed within two research contracts with private industries of the pig industry funded by European Regional Development Fund (ERDF), being the Head Researcher in one of them.

Besides, I have developed and validated both classic PCR and qPCR for the diagnosis of porcine tuberculosis from fresh and FFPE tissues coordinating as Head Researcher a research contract with two big business of the free-range pig industry in Spain (supported by ERDF) and two competitive research projects. These researches are focused on detecting the main pathogens involved in lymphadenitis in free-range pigs and on developing immunoprophylactic strategies and new rapid and sensitive diagnostic tools to control associated lesions and condemnation at the slaughterhouse.

I have coordinated the teamwork with renowned researchers on the study of the immune response against swine diseases (Dr.K.Van Reeth, Ghent University; Dr.A.Summerfield, IVI, Switzerland; Dr.A.Saalmüller, Vetmeduni Vienna; Dr.F.J. Salguero, AHVLA, UK; Dr.E.Mateu, UAB-CReSA; Dr.F.J.Pallarés, Murcia University). Finally, I have been invited as scientific reviewer of several research programs (such as H2020 by the European Commission) and numerous peer-review journals

Resumen del Currículum Vitae:

Started in 2003 as undergraduate student awarded with a Fellowship from Research Initiation Programme of Cordoba University (UCO) and with a 3 month-stay at Helsinki University. I got my degree in Veterinary Medicine in 2004. From 2005 to 2009 I was awarded with a competitive PhD Fellowship from the Spanish Ministry of Education and Science (FPU), to study PRRS immunopathogenesis. In 2005, I defended my End of Course Project (ECP) focused on apoptosis phenomena in PRRSV-infected pigs (TBED; ranking:2/129;IF:3.12), as researcher of the international project FONDECYT-1020217. I did a post-graduate stay at TiHo Hannover, supervised by Dr.W.Baumgärtner. In 2007 and 2008, I attended specialization courses on Veterinary Pathology funded by Marie Curie Actions (FP6). In 2007, I did a 1-month stay at CISA-INIA (Madrid) and a 2.5 months-stay at Ghent University (Belgium), supervised by Dr.K.Van Reeth, to carry out the experimental studies of my PhD Thesis which led to a publication in CIMID (ranking:2/145;IF:3.61). In 2007 I did a Master on Porcine Farming from Murcia University (UM), with my Master Thesis published in JVDI (Q1). In 2009 I did a short stay at CReSA (Barcelona) with Dr.E.Mateu, and then I defended my PhD Thesis (European mention) at UCO, with ♦Cum Laude♦ qualification and the Special Doctorate Award (SDA). I was Post-doc researcher at UCO from 2009 to 2010. From 2010 to date I am Responsible for Primary Production Research at CICAP. In 2013, I did a guest post-doc stay at Concepcion University (Chile). Awarded with the José Castillejo Mobility Fellowship to perform a 3 months post-doc research stay at Surrey University, supervised by Dr.R.La Ragione, in 2015. I have participated in 9 national (Head Researcher and/or Coordinator in 4 of them) and 4 international (2 funded by FP7, KBBE and NADIR calls; and 2 funded by FONDECYT,



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Chile) competitive research projects. I also coordinate a EUROSTARS proposal with partners from Spain, France and The Netherlands to be presented in March 2015. I have participated in 7 R&D contracts with the private industry (2 awarded as the best Research in the Agrifood Area), being Head Researcher in 5 of them. Co-author of 70 scientific publications (43 peer-review papers, 23 articles of general interest, 2 books and 2 chapters of book). First, second or last author in 32/43 peer-review papers, 37/43 published in journals from Q1 and 18/43 with co-authors from foreign institutions. Co-author of a monographic published in the journal SUIIS awarded as the best article of the year. Co-author of 119 communications (45 in national and 74 in international meetings). Invited speaker in 6 national and 3 international workshops. Supervisor of 2 International PhD Theses on PRRS (1 awarded with the SDA) and 1 on Salmonella in pigs, 1 ECP and 4 Master Theses on pig pathogens and of other 4 PhD Theses in process. Member of the Editorial Boards of Frontiers in Veterinary Science and World J. Virology. Scientific Reviewer for the EC (H2020) (2014), NSC ♦ Poland (2014), Alberta Livestock and Meat Agency (Canada) (2013) and the National Pork Board ♦ PRRS Call for Research ♦ (USA) (2013) and for more than 15 peer-review journals. Invited lecturer in Masters of UM and UCO from 2009. Accredited with Class B and C for Laboratory Animal Housing Facilities and by ANECA as PhD Lecturer and ECPHM Resident from 2011.



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Área Científica: Matemáticas
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Título:

Influence of critical potentials in Elliptic, Parabolic, Wave, Nonlocal and Schrödinger Equations

Resumen de la Memoria:

I study Partial Differential Equations. My research covers five different areas:

1. Quasi-linear elliptic and parabolic problems with an interaction between a lower order term with critical natural growth and the Hardy potential.

These models are given by the Hamilton-Jacobi Equations in the optimum control, the study of roughening surfaces (Kardar-Parisi-Zhang model) and the flames propagation study (Berestycki, Kamin, Sivashinsky). I started this research line during my PhD with an European Mention Thesis: "Influence of the Hardy potential in Elliptic and Parabolic problems", UAM, 2008, supervisor Ireneo Peral. All the results are published in research journals (some of them with very high level): \diamond Advances in Mathematics \diamond , \diamond Journal of Differential Equations \diamond , \diamond Journal of Functional Analysis \diamond , \diamond Annales de l'institut Henri Poincaré \diamond , \diamond Nonlinear Analysis \diamond

2. Elliptic and parabolic partial equations with singular potentials. The perturbed wave equation.

The interest in studying equations with singular potentials arises in several physical fields, such as quantum mechanics, cosmology, and molecular physics. For example, in non-relativistic molecular physics, the interaction between a charged particle and the dipole moment of a molecule is described by a potential which is the product of a radial singular term (inverse square of the distance from the singularity) and of an angular term given by the projection on the unit vector giving the orientation of the dipole. This research line starts with a Postdoctoral Italian contract in Università Milano Bicocca. By combining a parabolic Almgren type monotonicity formula with blow-up methods, we study the asymptotic behaviour of solutions to equations with spatially singular inverse-square potentials. (See the article in \diamond Discrete and Continuous Dynamical System \diamond , 2011).

3. Electromagnetic Schrödinger Equation. We obtain a representation formula for solutions to Schrödinger equations with a class of homogeneous, scaling-critical electromagnetic potentials. These equations describe the dynamics of a particle under the action of a fixed external electromagnetic field. We are able to write the solution as the convolution, in some sense, with a kernel. If this kernel is bounded, then we obtain some sharp time decay estimates. These inequalities play a fundamental role in many different fields, including scattering theory, harmonic analysis and nonlinear analysis. The results are published in two articles in \diamond Communications in Mathematical Physics \diamond . This research line starts in Milan and continues with a JdIC grant in CSIC.

4. Nonlinear operators: Bilaplacian operator. The Kirchhoff-Love model with Navier conditions corresponds to the hinged plate model for the vertical deflection of a thin elastic plate. We study semilinear biharmonic problems with critical terms (a published paper in JDE).

5. Nonlocal operators (as the fractional Laplacian). The motivation are models in many applied areas, elasticity, thin obstacle, phase transition, flames propagation, crystal dislocation, stratified materials, water waves fluid mechanics, mathematical finances, etc. We study basic estimates for solutions to elliptic and parabolic equations and some perturbed critical cases (a published article, an accepted paper and a submitted paper). The research lines 4 and 5 are being developed at present in UAM, Madrid

Resumen del Currículum Vitae:

I got my Mathematics Bachelor in Salamanca, 2002 (the last year with a Collaboration Grant in the Department).

- Research:

With FPU-MEC grant and several mobility grants (2 months in SISSA, Trieste; 6 months in Università di Roma), I got the PhD with European mention in UAM (Madrid, 2008, supervisor Ireneo Peral). The main research line of my thesis was the influence of the Hardy potential in Elliptic and Parabolic Problems. In particular, we studied the interaction between a lower order term with critical natural growth and singular terms. These models are given by the Hamilton-Jacobi Equations in the optimum control, the study of roughening surfaces (Kardar-Parisi-Zhang model) and the flames propagation study (Berestycki, Kamin, Sivashinsky). All the results are published in research journals (some of them with very high level): \diamond Advances in Mathematics \diamond , \diamond Journal of Differential Equations \diamond , \diamond Journal of Functional Analysis \diamond , \diamond Annales de l'institut Henri Poincaré \diamond , \diamond Nonlinear Analysis \diamond

With an Italian Postdoctoral contract (2 years) in Università Milano Bicocca, I started a new research line, learning new techniques (Almgren monotonicity formula, blow-up methods), to study asymptotic behaviour of solutions for singular equations. See for example the article in \diamond Discrete and Continuous Dynamical System \diamond , 2011.



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Taking advantage of these techniques and returning to Spain with a JdIC-grant (with J. Velazquez-M. Fontelos) in CSIC, we obtained a representation formula for solutions to Schrödinger equations with a class of homogeneous, scaling-critical electromagnetic potentials. This implies a family of Strichartz estimates. This kind of results have been studied by renowned international researches (Segal, Strichartz, Ginibre, Velo, Yajima, Keel, Terence Tao..). The results are published in **Communications in Mathematical Physics**.

Nowadays, I am Doctor assistant in UAM, where I have started two new lines of research. The first about nonlinear operators, as the Bilaplacian (a published article in JDE) and the second one about nonlocal operators, as the fractional Laplacian (a published article, an accepted paper to appear and a submitted paper).

During all my research career I have 20 published papers, 2 accepted papers to appear, 2 submitted papers, 2 preprints and several preceedings. I have attended several national, international congresses and schools. I was plenary speaker in Belgium in "Spring school in Nonlinear partial differential equations".

I have participated in 16 different projects: two of them Italian, an Italian-Spanish action grant, a collaboration project with African universities, a project with Latinoamerican universities and participation in EU-USA Atlantis Programme.

- Teaching:

Since obtaining D.E.A., I have taught lessons of several subjects (and in different careers), making teaching material (partially available on my website). I have participated in several popular scientific activities and in a teaching innovation project in UAM. I passed the training to teach in High School (C.A.P) in 2002. I have participated in another University activities as proofreader in exams for the access to the University.

I got Spanish accreditation: **Titular de Universidad** by ANECA in 2011.



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Título:

Geographic Information Science

Resumen de la Memoria:

After completion of my degree on Computer Engineering at the Universitat Jaume I de Castellón (UJI) in 2000, I worked as a programmer in small and medium enterprises in Castellón and as a programmer-analyst in an IT consulting company in Valencia. In 2002 I began my PhD at UJI, which was funded one year later with a 3 years FPI fellowship in the realm of the Geospatial Technologies (GEOTEC) research group at UJI. My research during the doctoral period was focused on web services and business process modelling languages to generate service-based and reusable workflows for geospatial applications. In July 2006, I received my Ph.D. degree in Computer Science, being awarded with the distinction Cum Laude.

After I finished my PhD, I continued working in GEOTEC for 5 years (2006-2010). I actively participated and took management roles in various European-funded research projects (FP5, FP6, and FP7), national projects, and also collaborated in writing several project proposals for the FP7 programme. My research activities were focused on geospatial web service technologies and data integration to support environmental modelling and applications on the Web, in close collaboration with international colleagues. Besides doing research, I carried out teaching activities such as supervising PhD thesis and Master final projects, and lecturing in postgraduate and undergraduate official courses at UJI and UOC (Universitat Oberta de Catalunya).

In early 2011, I moved to the Digital Earth and Reference Data Unit of the European Commission, Joint Research Center (Ispra, Italy) as a postdoctoral researcher. During the following 3 years, I worked as scientific responsible and work package leader to coordinate the EC-JRC contribution to the FP7 ENVIROFI European project. My tasks in that project were to investigate the client needs and required technical components of the Environmental domain/sector for the development of Future Internet enabled Environmental applications. I re-joined GEOTEC in March 2014 but working from Italy until December 2014, when I returned to Spain. During this last period, I am involved in the FP7 ERMES project to investigating new ways to apply and combine geo-spatial data and technologies to agriculture monitoring applications, as well as to writing project proposals for H2020.

My main research lines are articulated around three main pillars: Spatial Data Analysis and Geoprocessing Services (e.g. web services composition and reuse, service-oriented architectures), Model Web for Environmental Sciences (e.g. scientific workflows, geospatial and environmental information infrastructures), and Volunteered Geographic Information for Situational Awareness services (data integration and interoperability, real-time streaming processing, context-based services, and data-rich web mapping applications), complemented by other research and dissemination activities to leverage GIS to Social Sciences and to foster science communication to the public.

I have studied and/or held academic positions in five countries in Europe. I began my academic career in Spain, did research visits at the Department of Cooperative and Trusted Systems at SINTEF in Norway, and the Faculty of Geo-Information Science and Earth Observation of the University of Twente in The Netherlands as a predoctoral researcher, and at the Centre for Geospatial Science at the U

Resumen del Currículum Vitae:

I work as a postdoctoral researcher in the Geospatial Technologies research group (GEOTEC) at UJI (University Jaume I of Castellón) since March 2014. Prior to joining to GEOTEC, I worked three years as a postdoctoral researcher at the Digital Earth and Reference Data Unit, European Commission Joint Research Centre (EC-JRC), Ispra (Italy), a globally renowned research institute for Spatial Data Infrastructures, Digital Earth and Environmental Sciences. My research expertise covers GIS where the **SSSSS** in GIS may stand for Systems, Software, Services, Standards, Science, Sensemaking, Social Sciences, and Society, data integration and interoperability, geoprocessing services, model web, scientific workflows, geospatial and environmental information infrastructures, and more recently, real-time streaming processing and data-rich web mapping applications. Before joining EC-JRC in March 2011, I was a postdoc researcher in GEOTEC from 2006 to 2010. I graduated in Computer Engineering (2000), was granted with a FPI scholarship for pursuing doctoral studies (2003-2006), and received my doctorate in Computer Science (2006) from UJI.

Over the course of my pre-doctoral and post-doctoral periods, I always conducted research in an international context. I actively participated in various multi-institutional public research projects funded by the European Commission (6), the central and regional governments in Spain (5), and private companies and institutions. From the projects I have been involved in, I would remarkably highlight



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the FP5 STREP ACE-GIS project (Adaptable and Composable E-commerce and Geographic Information Services), the FP6 STREP AWARE project (A tool for monitoring and forecasting available water resources in mountain environment), the FP7 IP EuroGEOSS project (An European Approach to GEOSS), España Virtual (CENIT project), the FP7 IP ENVIROFI project (The Environmental Observation Web and its Service Applications within the Future Internet), and the FP7 ERMES project (An Earth Observation Model based Riced Information Service). I carried out research stages at SINTEF (Norway) in 2004, at the Faculty of Geo-Information Science and Earth Observation of the University of Twente (The Netherlands) in 2005, at the University of Nottingham (UK) in 2009, and at the University of Milano  Bicocca (Italy), in 2014.

My scientific publication encompasses more than 30 peer-reviewed journal articles and over 80 conference papers, along with 18 book chapters and more than 10 edited/authored books and guest editors in journal special issues. My publication record includes 20 articles listed in WoS JCR, from which 12 have been published in well-renowned international journals with high impact factor (with the 25% top in their categories) such as Environmental Modelling & Software, Future Generation Computer Systems, International Journal of Geographic Information Science, MDPI Sensors, Computing, GeoInformatica, Applied Geography, and IEEE Internet Computing. Jointly, they have been cited 260 times (H=7) in Scopus and 800 times (H=14) in Google Scholar.

During my scientific career, I was awarded with 4 competitive fellowships and 2 scientific prizes. Moreover I have presented my scientific work in several international conferences and workshops. I serve on the editorial board of various international journals, participate in program committees of several major conferences, and regularly act as a reviewer of high impact factor journals fro



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Área Científica: Ciencias Sociales

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Título:

Identity Politics, Institutions, and Development

Resumen de la Memoria:

A political sociologist by training, I am an assistant professor (tenure-track) at the Institut Barcelona d'Estudis Internacionals (IBEI). I have a PhD from Brown University (2007) and previously held a postdoctoral fellowship at the University of Manchester (2007-2010). In my research I am centrally concerned with the relationship between identity politics, institutions, and development, with a regional focus on Latin America. I pursue three distinct but interrelated lines of work.

My primary research is on nationalism and ethnic politics. I have published widely, including in *Theory and Society*, *Latin American Research Review (LARR)*, *Journal of Ethnic and Migration Studies (JEMS)* and *Nations and Nationalism*, on how states construct a sense of national belonging, how civil society actors negotiate and contest official nationalisms, and the extent to which ordinary citizens subscribe to official and counter-state identity projects.

The focus on nationalism is closely linked to my interest in states and development. I have published, including in the *American Journal of Sociology (AJS)*, on distinct patterns of colonial state formation and long-run development in Latin America, as well as recent geopolitical transformations and their impact on development. I have also written, including in *Studies in Comparative International Development (SCID)*, on how different theoretical traditions conceptualize state capacity, and the relationship between state strength and legitimacy.

My most recent line of work brings together ethnic politics, state capacity and development. Based on a comparative analysis of indigenous movements and their impact on water provision and land rights I explore the developmental implications of ethnic mobilization. Against this backdrop I have also launched a research initiative that seeks to revisit and pose a challenge to one of the most powerful hypotheses in the political economy scholarship: the supposedly negative relationship between ethnic diversity and public goods provision.

Resumen del Currículum Vitae:

My research has been published in internationally recognized, peer-reviewed journals. In all three lines of work I have also been able to obtain external funding through competitive grants.

So far, a key publication in my research on nationalism has been an article in *Theory and Society*, which shows why Latin America is particularly well suited for exploring the negotiation of national inclusion between states and social movements. Another crucial contribution is a recent article in *Nations and Nationalism*, which challenges the frequently made argument that the absence of major international wars led to little nationalism in Latin America. It shows that the limited wars in the region nonetheless were absolutely central to the memory work of Latin American states.

◆ José Itzigsohn and Matthias vom Hau (equal co-authors), ◆ *Unfinished Imagined Communities: States, Social Movements, and Nationalism in Latin America*, ◆ *Theory and Society* 35 (April 2006), pp. 193-212.

◆ Matthias vom Hau, ◆ *Nationalism and War Commemoration* ◆ *A Latin American Exceptionalism?* ◆ *Nations and Nationalism* 19: 1 (January 2013), 146-166.

In my work on states and development I have published a paper in the *American Journal of Sociology* about the causes of different forms of British and Spanish colonialism, and their consequences for postcolonial development. In a co-edited special issue published with *Studies in Comparative International Development (SCID)* I discuss the advantages of Michael Mann's concept of infrastructural power since it highlights the spatial and relational nature of state capacity. My sole-authored contribution to this issue examines the nexus between state capacity and legitimacy.

◆ Matthew Lange, James Mahoney, and Matthias vom Hau (equal co-authors), ◆ *Colonialism and Development: A Comparative Analysis of Spanish and British Colonies*, ◆ *American Journal of Sociology* 111: 5 (March 2006), pp. 1412-1462.

◆ Matthias vom Hau, ◆ *State Infrastructural Power and Nationalism: Comparative Lessons from Mexico and Argentina*. ◆ *Studies in Comparative International Development* 43: 3-4 (December 2008), pp. 334-354.



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In my third line of research I pose a challenge to the established ethnic diversity-development deficit hypothesis while investigating how and when ethnic mobilization affects the capabilities of states to provide public goods. I have been successful in obtaining external funding from the Ministerio de Ciencia e Innovación (MICINN). A first article based on the research has been published with the Journal of Development Studies (JDS). I have also been invited to contribute two book chapters. Recently, this work has provided a springboard for an externally-funded workshop series on the impact of ethnicity on state capacity at Harvard University and at IBEI, and a special issue, which is currently under review with Comparative Political Studies (CPS).

◆ Matthias vom Hau and Guillermo Wilde (equal co-authors), ◆◆ We Have Always Lived Here ◆: Indigenous Movements, Citizenship, and Poverty in Argentina. ◆ Journal of Development Studies 46: 7 (October 2010), pp. 1283-1303.



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Título:

Promoting plasticity of reticulospinal axons to recover skilled hand function after spinal cord injury

Resumen de la Memoria:

Las lesiones traumáticas en la médula espinal desconectan el cerebro de los circuitos neuronales caudales a la lesión, dando lugar a la pérdida del control motor voluntario, la sensibilidad y la regulación autonómica de las partes del cuerpo por debajo de la lesión. Desafortunadamente, debido a las limitaciones del sistema nervioso central para la auto-repararse, así como la falta de tratamientos fiables que promuevan la regeneración medular, los efectos de la lesión persisten a lo largo de la vida de los pacientes. Se calcula que en España, entre 2000 y 2009, 10.274 pacientes sufrieron una lesión medular traumática. Y a pesar de que la incidencia es más baja que la de otras enfermedades neurológicas, la parálisis corporal parcial o total producida por la lesión reduce drásticamente la calidad de vida de los pacientes, que reclaman el desarrollo de terapias eficientes que restauren la función de la médula espinal.

Las estrategias diseñadas para promover la reparación de la médula espinal están dirigidas en favorecer la regeneración axonal, ya sea aumentando las capacidades de crecimiento intrínsecas de las neuronas, o y a sea mediante la modificación del entorno inhibitorio que rodea la lesión. De forma alternativa, otras estrategias se centran en activar las redes neuronales caudales a la lesión por medio de la aplicación de descargas eléctricas, la aplicación de fármacos o por medio de mecanismos dependientes de la actividad, como por ejemplo la rehabilitación. Los experimentos que se han llevado a término, han logrado un progreso sustancial para mejorar la postura y la función locomotora tanto en modelos animales como recientemente en pacientes parapléjicos. No obstante, existen diferencias notorias en la anatomía y fisiología de la médula espinal que controla los miembros inferiores de la que controla los miembros superiores. Por ejemplo, patrones de locomoción pueden activarse de forma independiente del control por parte de estructuras suprespinales, mientras que las actividad manual requiere del control voluntario y de la conectividad entre la corteza motora y la médula espinal. Estas diferencias residen en parte, en las vías motoras descendentes, que activan las redes espinales que controlan diferentes movimientos de brazos y piernas. Mientras que los tractos reticulospinal y vestibuloespinales juegan un papel preponderante en el control de la locomoción y la postura, los tractos corticoespinal y rubrospinal están involucrados en la dexteridad manual.

Mi objetivo es promover la recuperación de la dexteridad manual por medio de la remodelación funcional de las conexiones reticuloespinales. Quiero probar si en ausencia de los tractos corticoespinal y rubrospinal, los axones reticulospinales pueden ser maleables para compensar por la pérdida de las vías dañadas, y así facilitar la recuperación del control de la función manual. Para lograr este objetivo voy a trabajar con dos enfoques diferentes. Por un lado, mediante la aplicación de la enzima condroitinasa en la médula espinal cervical, que facilita la formación de brotes axonales del tracto reticulospinal. Por el otro lado, mediante la aplicación de estimulación eléctrica la corteza motora, con el objetivo de reforzar las conexiones sinápticas entre la corteza y la formación reticular, y subsecuentemente, entre la formación reticular y la médula espinal.

Resumen del Currículum Vitae:

Mi trabajo de investigación está encaminado en la búsqueda de terapias experimentales que promuevan la plasticidad y la reparación de la médula espinal lesionada. En los últimos años, he ido perfilando mi hipótesis de trabajo como una intersección entre los paradigmas de biología regenerativa y los mecanismos neurofisiológicos de control motor.

Obtuve el doctorado en la Universitat Autònoma de Barcelona, en el laboratorio del Prof. Xavier Navarro. Mi tesis se centró en el estudio de los efectos del trasplante de células olfativas en la médula espinal y en la recuperación funcional de ratas con lesión medular. Los resultados mostraron nuevas funciones neuroprotectoras de estas células, que promovían la mejora en las habilidades motrices y sensoriales de las extremidades inferiores. Antes de doctorarme, la Generalitat me concedieron una beca para estudiar en el laboratorio del Prof. Bertram Payne, en la Universidad de Boston (EE.UU.), el papel de la función del tracto corticoespinal en la locomoción de los gatos. Mi interés por la función y plasticidad de los axones corticoespinal sobre la coordinación de los movimientos finos, me condujo a desarrollar mi estancia postdoctoral en el laboratorio del Prof. James Fawcett en la Universidad de Cambridge (Reino Unido). Utilizamos la enzima condroitinasa para modificar la matriz extracelular de la médula espinal, así creando un ambiente permisivo para la regeneración de los axones corticoespinales. Los resultados mostraron la necesidad de aplicar tanto terapias promotoras de plasticidad anatómica como otras que promuevan la plasticidad inducida por la actividad rehabilitadora. Recibí una beca de la Fundación Christopher y Dana Reeve para trabajar laboratorio del Prof. Lorne Mendell en la Universidad Estatal de Nueva York en Stony Brook (EEUU). Los estudios mostraron



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que después de aplicar una terapia combinatoria focalizándose en la plasticidad axonal y la remodelación de la médula espinal, promovieron que axones descendente fueran capaces de "hacer un Detour " por la lesión y hacer conexiones con neuronas propioespinales caudales a la lesión. Como resultados de esta reorganización, los animales recuperaron la coordinación motora. Con el objetivo de entender los procesos neurofisiológicos que determinan la recuperación funcional , en 2010, me uní laboratorio Prof. Reggie Edgerton , en UCLA, como investigador senior, donde estudio la recuperación de la función manual en roedores con lesión medular y evaluó la eficiencia de terapias farmacológicas, rehabilitadoras , y / o de intervenciones de estimulación eléctrica en la recuperación de las habilidades manuales finas.

Hasta la fecha, mis estudios han dado lugar a 23 publicaciones en revistas de alto factor de impacto.



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Área Científica: Biomedicina

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Título:

Structural characterization of viral systems for the deep understanding of essential viral processes for the development of new biotechnological and biomedical tools, and new antiviral drugs

Resumen de la Memoria:

Since the very early steps of my scientific career I have been focused on the study the molecular determinants that rule the essential processes of viral assembly, host recognition, replication and transcription. Processes carried out by viral proteins and nucleic acids. I had the opportunity to work on diverse viral systems as Parvovirus, Coronavirus, Arenavirus and Bunyavirus in different laboratories. In all cases the result has been the achievement of valuable findings published in high profile journals. The combination of Structural biology techniques as X ray crystallography and Cryo electron microscopy and a broad spectrum of biochemical, biophysical and molecular biology techniques allowed me to characterize different aspects of the viral needs as the protein \diamond protein and protein \diamond DNA interactions that rule the assembly and flexibility of parvoviral capsids, the structural characterization of receptor recognition by coronavirus and its neutralization by antibodies or the biochemical and structural characterization of the Bunyavirus nucleoproteins, multifunctional polymerases and their relationship with the viral RNA. All these are essential aspects of viral infection which complete understanding will certainly lead in the medium \diamond long term to the development of new therapeutic strategies for the treatment of these severe human pathogens.

My later research has been focused on the characterization of both transcription and replication mechanisms of Bunyavirus and Arenavirus carried out by ribonucleoprotein assemblies composed of viral RNA, nucleoproteins and the very large multifunctional RNA dependent RNA polymerases. From the complete lack of structural information we have found, during the last five years of work, essential domains for viral transcription, the structure of the RNA \diamond nucleoprotein assemblies and more recently the structure of the RdRpol in complex with the viral RNA promoters. All together these results represent a breakthrough for the understanding segmented negative stranded virus replication and transcription mechanisms leading to structure based \diamond in vivo \diamond and \diamond in vitro \diamond biochemical experiments and providing a new framework for the understanding of these fundamental viral processes and the development of new antiviral drugs.

Resumen del Currículum Vitae:

EDUCATION AND PROFESSIONAL QUALIFICATIONS

2000-2004- PhD in biochemistry and molecular biology (UAM) \diamond cum laude \diamond

1996-2000- B.A. in biological sciences by the UAM. Madrid, Spain.

EMPLOYMENT HISTORY

2013-now- Research Scientist EMBL-CNRS Grenoble. France.

2009-2013- EMBO Fellow EMBL-CNRS Grenoble. France.

2005-2008- Post Doctoral fellow \diamond Juan de la Cierva \diamond (CNB-CSIC), Madrid. Spain.

2004-2005- Post Doctoral fellow (CNB-CSIC). Madrid. Spain.

2000-2004- PhD on biochemistry and molecular biology; CBM-SO, CSIC-UAM. Madrid. Spain.

PUBLICATIONS

1. A structural view of coronavirus receptor interactions. Juan Reguera, Gaurav Mudgal, Cesar Santiago, Jose M. Casanovas. 2014
2. Segmented negative strand RNA virus nucleoprotein structure. Juan Reguera, Stephen Cusack, Daniel Kolakofsky. Curr Opin Virol. 2014.
3. Systems To Establish Bunyavirus Genome Replication in the Absence of Transcription. Carolin Klemm, Juan Reguera, Stephen Cusack, Friedemann Weber. Journal of Virology. 2013.
4. Structural basis for packaging of genomic RNA by La Crosse orthobunyavirus N protein. Juan Reguera, Hélène Malet, Friedemann Weber and Stephen Cusack. Proc Natl Acad Sci U S A. 2013.
5. Structural bases of coronavirus attachment to host aminopeptidase N and its inhibition by neutralizing antibodies. Reguera J, Santiago C, Mudgal G, Ordoño D, Enjuanes L, Casanovas JM. PLoS Pathog. 2012.
6. Antigenic modules in the N-terminal S1 region of the Transmissible Gastroenteritis Virus spike protein. Reguera J, Ordoño D, Santiago C, Enjuanes L, Casanovas JM. J Gen Virol. 2011.
7. Bunyaviridae RNA polymerases (L-protein) have an N-terminal, influenza-like endonuclease domain, essential for viral cap-dependent transcription. Reguera J, Weber F and Cusack S. Plos Pathogens. 2010.



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8. Biochemical aspects of coronavirus replication. Enjuanes L, Almazán F, Sola I, Zúñiga S, Alvarez E, Reguera J, Capiscol C. *Adv Exp Med Biol.* 2006.
9. Nuclear transport of trimeric assembly intermediates exerts a morphogenetic control on the icosahedral parvovirus capsid. Riobobos L, Reguera J, Mateu MG, Almendral JM. *J Mol Biol.* 2006.
10. Functional relevance of amino acid residues involved in interactions with ordered nucleic acid in a spherical virus. Reguera J, Grueso E, Carreira A, Sánchez-Martínez C, Almendral JM, Mateu MG. *J Biol Chem.* 2005.
11. Role of interfacial amino acid residues in assembly, stability, and conformation of a spherical virus capsid. Reguera J, Carreira A, Riobobos L, Almendral JM, Mateu MG. *Proc Natl Acad Sci U S A.* 2004.
12. In vitro disassembly of a parvovirus capsid and effect on capsid stability of heterologous peptide insertions in surface loops. Carreira A, Menéndez M, Reguera J, Almendral JM, Mateu MG. *J Biol Chem.* 2004.

ORAL PRESENTATIONS IN INTERNATIONAL MEETINGS OR SEMINARS

18th June 2013- XV Negative Stranded Virus International Conference. Granada

19th September 2011- Seminar. CNRS- Aix Marseille University. Marseille.

18th June 2011- Talk, EMBO fellows meeting. Heidelberg

6th September 2005- Seminar SFB 455. Genezentrum. Munchen

POSTERS

2012- The EMBO Meeting 2010, Barcelona

2010- XIV Negative Stranded Virus International Conference, Bruges

2004- II European Virology Congress. Madrid

2003- VIII Congreso Nacional de Virología. Barcelona

TRAINING

EMBL courses: Media training, The effective Team Leader, Becoming a successful Interviewee

2007- EMBO Practical course on High-throughput Protein Production



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Nombre: BLANCO BENAVENTE, SANDRA

Referencia: RYC-2014-16550

Área Científica: Biomedicina

Correo Electrónico: sb674@cam.ac.uk

Título:

RNA covalent post-transcriptional modifications as stem cell regulators in homeostasis and disease

Resumen de la Memoria:

Stem cells have the potential to maintain tissue homeostasis and replenish tissues throughout life, by replacing themselves through self-renewal, while generating progeny by differentiation. During self-renewal stem cells have to avoid cell cycle exit and differentiation; whereas during differentiation stem cells must evade uncontrolled proliferation. Dissecting the regulatory pathways controlling the balance between these two states is fundamental to understand how mis-regulation of this process causes human diseases such as cancer. Although transcriptional regulation of stem cells is increasingly understood, virtually nothing is known about how post-transcriptional mechanisms can influence stem cell maintenance.

Cytosine-5 (m5C) is a widespread modification in both DNA and RNAs. Whereas the functions of m5C in DNA have been extensively studied, the cellular and molecular functions of the same modified nucleobase in RNA remained unclear. In my previous studies I have (1) globally identified m5C in several RNA species; (2) functionally analysed the role of methylated RNAs in epidermal stem cells and neurons; (3) determined cytosine-5 methylation as a novel mechanism regulating stem cell fate; (4) determined how aberrant m5C modifications can cause intellectual disability disorders in humans.

Currently, my efforts are focused on understanding the molecular mechanisms by which cytosine-5 methylation of RNA regulate stem fate both in homeostasis and in cancer. I have identified that site-specific m5C methylation of transfer RNA serves as an upstream regulator to activate or inhibit defined translational programmes that are required to maintain cancer stem cell functions. I have also established that m5C also mediate cellular survival of cancer stem cells after genotoxic insults, including cancer drug treatment regimes.

In summary, by applying a comprehensive analysis base on system-wide approaches, mouse models and in vitro differentiation assays, I have identified how a covalent RNA post-transcriptional modification control stem cell fate in homeostasis or disease. Several covalent RNA post-transcriptional modifications, other than m5C, are commonly found in RNA species, yet the biological function is unknown. Identifying the function of novel RNA modifications might lead to the discovery of novel therapeutic strategies for human disease such as neurological disorders and cancer.

Resumen del Currículum Vitae:

EDUCATION:

2001-2006: Ph.D. (Hons), Molecular Biology, at the Cancer Research Institute, University of Salamanca (Spain), under Prof. P.A. Lazo supervision.

1995-2000: B.Sc. (Hons.) Biochemistry, University of Salamanca (Spain). Highest mark in overall 5 years score, scoring 3.7/4.

RESEARCH EXPERIENCE

2010-present

Research Associate, University of Cambridge, at the Wellcome Trust-Medical Research Council Cambridge Stem Cell Institute (University of Cambridge), under Dr. Michaela Frye mentoring. Project: Role of cytosine-5 RNA methylation in neuro-development and cancer

◆ Published first report in the literature showing the role of RNA m5C-methylation in neuro-development in humans, and how its loss contributes to human cognitive disorders, found also potential drugs to improve cell survival in patients with mutations in the RNA-methyltransferase NSun2. first-author publication in EMBO J.

◆ identified that tissue stem cells in homeostasis and cancer translate less protein than their immediate committed progenitors. Furthermore reduced protein translation induced by loss of RNA m5C-methylation in cancer stem cells promoted stem cell functions and tumour development at expenses of stress pathways activation, rendering those cells hypersensitive to genotoxic stress (under revision in Nature).

◆ learnt NGS techniques; RNA-seq, ChIP-seq, iCLIP, Ribo-seq

◆ developed novel NGS methods to enable transcriptome-wide tRNA and Bisulphite-converted RNA sequencing to identify RNA m5C-methylation genome-wide.

◆ developed novel methods to measure global protein synthesis in vivo in specific cell populations in tissues during development,



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homeostasis or disease.

2007-2010

Post-doctoral Research Fellow, at the Wellcome Trust-Medical Research Council Cambridge Stem Cell Institute (University of Cambridge), with Dr. Michaela Frye. Project: Role of cytosine-5 RNA methylation in stem cells

◆ first report in the literature showing the role post-transcriptional modifications, specifically RNA m5C- in stem cells, published in PLoS Genetics.

◆ worked with mouse genetics and primary cultures and employed molecular biology, cell biology techniques and identified that cytosine-5 RNA methylation poises stem cells to differentiate

◆ worked with other postdoctoral researches and PhD students examining the role of NSun2 in cell division, and germ cell differentiation, and role of the transcriptional repressor Sin3A and histone methyltransferase Set8 in skin stem cells, leading to publications in JCB, MCB, Nature Cell Biology and EMBO J.

2001-2007

PhD researcher and Research assistant, at the Cancer Research Institute-University of Salamanca, under Prof. P.A. Lazo supervision. Project: Functional characterization of VRK2 kinase in signalling pathways deregulated in cancer

◆ identified regulatory function of a new human kinase Vrk2 in the p53 pathway in cancer, leading to a 1st author publication in FEBS J.

◆ identified regulatory function of a new human kinase Vrk2 in stress response pathways and in cancer, leading to 1st author publications in Mol Cell Biol and PLoS One.

2000

CSIC (Scientific Research Council) Research Initiation Intern, at the Cancer Research Institute-University of Salamanca (Spain), under Prof. P.A. Lazo supervision. I worked with yeasts and learnt molecular and cellular biology techniques leading to a 1st author publication in FEMS Microbiology letters.



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Nombre: OLMEDO LOPEZ, MARIA
Referencia: RYC-2014-15551
Área Científica: Biología Fundamental y de Sistemas
Correo Electrónico: maria.olm@gmail.com

Título:

Control of biological timing in *C. elegans*

Resumen de la Memoria:

During my PhD I studied the regulation of gene expression by light in the filamentous fungus *Neurospora crassa*. Light regulates various aspects of fungal development and behaviour. Photoreceptor proteins are activated by light and modulate gene expression, leading to responses that allow biosynthesis of protective pigments, formation of resistance spore and entrainment of the circadian clock, among others. My PhD work covered several aspects of this process. First, we uncovered a role of secondary photoreceptors and a repressor complex in the response to light of *N. crassa*. Furthermore, I focused on the regulation by light of the gene necessary and sufficient for conidiation, the developmental program that leads to the formation of asexual spores.

After my PhD I have focused on biological timing in the model organism *C. elegans*. Most processes in life are structured around temporal limits. Biological timers are molecular machineries that confer rhythmicity to biological processes.

- Circadian oscillations: In the case of the circadian clock, the cycles are structured around the 24 hours day/night rhythm. Circadian clocks have been selected in all domains of life to adapt and take advantage of these cyclic changes in the environment. In my postdoctoral research at the University of Groningen, I have found different variable that show circadian oscillations in *C. elegans*. In the same work, we described a circadian rhythm in a conserved metabolic marker of the circadian clock (Olmedo et al., 2012. PNAS 109: 20479-84). This represented the first observation of rhythmicity of a phylogenetically conserved marker in this nematode.

- Developmental timing: *C. elegans* progresses through four larval stages before reaching adulthood. This occurs in a rhythmic process with a different timescale to that of the circadian rhythms. However, the analysis of this process points to a possible conservation of the molecular components between these two clocks. In the last part of my postdoc at the University of Munich I have developed a new high-throughput method to measure developmental timing. This method has been proven by physiologically and genetically altering developmental speed and will allow the identification of the components of the developmental timer.

The experience in circadian rhythms in several organisms and developmental timing in *C. elegans* represents a unique trajectory that will allow integration of the different aspects of biological timing. The topic of biological timing in *C. elegans* has generated a great interest in both the chronobiology and the *C. elegans* community. As indication of this growing interest, my abstracts have been selected for talks at all the meetings presented in 2012, 2013 and 2014 (including Chronobiology, *C. elegans* Neurobiology meetings and the European *C. elegans* meeting).

My main research interest is to understand how these rhythms are generated and how they structure numerous biological processes. To achieve this I am working toward several goals:

1. Uncover new molecular components of these two mechanisms.
2. Understand how they are modulated by environmental cues, specially nutrition and temperature.
3. Investigate to what extent they are evolutionary related.

Resumen del Currículum Vitae:

Positions:

- 1 Marie Curie Postdoctoral Fellow. University Pablo de Olavide. Sevilla, Spain. 2014-
- 2 Postdoctoral researcher. Ludwig-Maximilians University. Munich, Germany. 2012-2014
- 3 Postdoctoral researcher. University of Groningen. Groningen, The Netherlands. 2008-2012
- 4 PhD student. University of Sevilla, Sevilla, Spain. 2001-2008
- 5 Undergraduate student. Faculty of Biology, University of Sevilla, Sevilla, Spain. 1995-2000

Selected publications:

Olmedo, M. §, J.S. O'Neill, R.S. Edgar, U.K. Valekunja, A.B. Reddy and M. Merrow §. 2012. Circadian regulation of olfaction and an evolutionarily conserved, nontranscriptional marker in *Caenorhabditis elegans*. Proc Natl Acad Sci USA 109: 20479-84 (§ Corresponding authors)

Edgar, R.S.* , E.W. Green*, Y. Zhao*, G. van Ooijen*, M. Olmedo*, X. Qin, Y. Xu, M. Pan, U.K. Valekunja, K.A. Feeney, E.S. Maywood, M.H. Hastings, N.S. Baliga, M. Merrow, A.J. Millar, C.H. Johnson, C.P. Kyriacou, J.S. O'Neill and A.B. Reddy. 2012. Peroxiredoxins are conserved markers of circadian rhythms. Nature 485: 459-64 (* Equal contribution)

Olmedo, M., L. Navarro-Sampedro, C. Ruger-Herreros, S.R. Kim, B.K. Jeong, B.U. Lee, and L.M. Corrochano. 2010. A role in the regulation of transcription by light for RCO-1 and RCM-1, the *Neurospora* homologs of the yeast Tup1-Ssn6 repressor. Fungal Genetics and Biology 47:



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939-52.

Olmedo, M., C. Ruger-Herreros and L.M. Corrochano. 2010. Regulation by blue light of the fluffy gene encoding a major regulator of conidiation in *Neurospora crassa*. *Genetics* 184: 651-8.

Olmedo, M., C. Ruger-Herreros, E.M. Luque-Fobelo and L.M. Corrochano. 2010. A complex photoreceptor system mediates the regulation by light of the conidiation genes *con-10* and *con-6* in *Neurospora crassa*. *Fungal Genetics and Biology* 47: 352-63.

Fellowships:

Marie Curie IEF Fellowship. Awarded in 2013.

EMBO short-term Fellowship. Awarded in 2013.

Oral presentations at internationally established conferences:

European *C. elegans* Meeting. Berlin, Germany. 2014. High throughput, automated monitoring of *C. elegans* developmental.

EBRS 2013. Meeting of the European Biological Rhythms Society. Munich, Germany. 2013. Circadian rhythms in *Caenorhabditis elegans*: from molecules to behaviour.

EMBO Conference series: *C. elegans* Neurobiology. Heidelberg, Germany. 2012. Molecular and behavioural analysis of circadian rhythms in *C. elegans*.

SRBR 2012. Meeting of the Society for Research on Biological Rhythms. Sandestin, FL, USA. 2012. Molecular and behavioural analysis of circadian rhythms in *C. elegans*.

Invited speaker at the 26th Fungal Genetics Conference. Asilomar Conference Center, Pacific Grove, CA, USA. 2011. Expanding the molecular clock network of *Neurospora crassa*.

European Conference on Nematode Neurobiology. Cambridge, UK. 2009. The circadian clock in *C. elegans*: A novel circadian behaviour.

Posters: 25 contributions on poster format at internationally established conferences.

Invited seminars at national/group meetings:

2013: Spanish Worm Meeting. Carmona, Spain/ German Clock Club. Germany.

2011: Dutch Center for Timing Research. The Netherlands.

2010: 3rd European *Neurospora* Meeting. The Netherlands.

2008: 2nd European *Neurospora* Meeting. UK.

2007: XXI Congress of the Spanish Microbiology Society. Spain.

2006: 2nd Meeting of the Spanish Network of Filamentous Fungi. Spain.



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Nombre: GUARDADO CALVO, PABLO
Referencia: RYC-2014-15497
Área Científica: Biología Fundamental y de Sistemas
Correo Electrónico: pablo.guardado@gmail.com

Título:

Structural Virology

Resumen de la Memoria:

My research career has been focused on understanding the molecular mechanisms of the viral life cycle. Particularly, I have focused on three important aspects of the virus-cell interactions: (1) The structural characterization of the proteins involved in the attachment of the virus to the cell, (2) the structural mechanism of viral assembly and, (3) the structural and molecular mechanisms of the penetration of enveloped viruses (a phenomenon denoted as viral fusion). Moreover, I have studied the structural basis of the neutralization capability of some broadly neutralizing antibodies against enveloped viruses.

I started my research career at Universidad de Santiago de Compostela with a thesis entitled "Crystallographic structures of proteins from animal viruses involved in the interaction virus-host" under the supervision of Dr. Mark Johan van Raaij. During my PhD I worked in several projects with viral proteins of the families Reoviridae and Adenoviridae. 1) I carried out studies of several proteins responsible for the attachment to the cellular receptor; I solved the structure of the fiber of the avian reovirus, the head domain of the long fiber of fowl adenovirus 1, and the head domain of the fiber of the porcine adenovirus 4 (NADC-1 strain). 2) I solved the structure of the tandem repeat galectin of the porcine adenovirus 4, identified its ligands using a glycan microarray and solved the structures of the complexes, and 3) I worked on the structure of the dsRNA-binding protein sigmaA from the avian reovirus, and we proposed a dsRNA binding model that could explain its biological function.

After my PhD, I moved to the Institut Pasteur in Paris, where I spent 5 years under the supervision of Dr. Felix Rey. During these years I was involved in many projects. I carried out 1) structural studies of capsid proteins of viruses of the family Retroviridae, solving the structure of the CACTD domain of the Feline Immunodeficiency Virus (FIV), the structures of several HIV-CACTD mutants, and the complexes of the different capsid domains with several nanobodies. 2) I did structural studies of several class II fusion glycoproteins of the family Bunyviridae and 3) solved the structures of several broadly neutralizing antibodies in complex with the Dengue envelope glycoprotein. These structures led to the development of a new vaccine strategy, which was the subject of a UK-based patent.

Resumen del Currículum Vitae:

I completed my PhD at Universidad de Santiago de Compostela with a thesis entitled "Crystallographic structures of proteins from animal viruses involved in the interaction virus-host", during which time I also worked in the European Synchrotron Radiation Facility (ESRF) and the Department of Material Science and Technology (University of Crete). From my thesis I published 11 articles (8 as first author) and presented my work in several international and national meetings. After my thesis I moved to the Institut Pasteur, with an EMBO long-term Fellowship that was later completed with a Sidaction postdoctoral Fellowship. I also obtained a CNRS postdoctoral fellowship that I rejected. In total, I spent 5 years working in several projects. Notably, I am co-first author in a recent paper published in Nature where we describe the structural basis of a completely new type of broadly human neutralizing antibody against all Dengue serotypes. This work has led to the development of a new structure-based vaccine strategy, which has had the subject of a UK-based patent application. All these results have been presented in international congresses (see CV for details).



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Nombre: FIDALGO PEREZ, MIGUEL ANGEL

Referencia: RYC-2014-16779

Área Científica: Biología Fundamental y de Sistemas

Correo Electrónico: miguel.fidalgo@gmail.com

Título:

Dissecting the molecular mechanisms governing pluripotency and somatic cell reprogramming

Resumen de la Memoria:

The goal of my PhD training in the laboratories of Dr. Juan Zalvide and Dr. Celia Pombo, was to find out novel signalling pathways affected by oxidative stress in two relevant pathophysiological conditions (cancer and vascular malformations). As a result of my PhD research I published a total of 6 publications (2 as first author (Fidalgo, M., et al., JCSi 2010; Fidalgo et al., JBC 2012) and one as co-first (Nogueira, E., Fidalgo, M., et al., JBC 2010)).

For my postdoctoral studies, I switched to the study of pluripotency and reprogramming. Because this research area was and is of particular interest due to the promising therapeutic potential of pluripotent stem cells, and yet our understanding of the molecular mechanisms underlying pluripotency and reprogramming is currently limited. In January of 2011, I joined to Dr. Wang lab as a postdoctoral fellow (Black Family Stem Cell Institute, Icahn School of Medicine at Mount Sinai, New York), to study novel transcription factors and their roles in controlling stem cell pluripotency and somatic cell reprogramming. In Dr. Wang lab, I have gained extensive knowledge in stem cell biology and experience working with mouse and human embryonic stem cells (ESCs) as well as induced pluripotent stem cells (iPSCs), which are exemplified by 3 first-authors papers and two co-authored publications in prestigious journals such as Stem Cells, PNAS, Mol Cell, Nature and Nature Cell Biology. In addition, my major findings have been: 1) the discovery of a novel multi-layered control of DNA hydroxylase Tet2 controlling naive and primed pluripotency (Fidalgo et al., under revision) 2) the consequences of Histone acetylation recognition by bromodomains in chromatin architecture and epigenetic regulation during somatic cell reprogramming (Fidalgo et al., under revision).

My long-term goal is to further characterize and understand the differential epigenetic code and chromatin architecture between pluripotency and totipotency, which should provide novel insights into the regulatory mechanisms to improve cell reprogramming and cell differentiation for clinical approaches. I have not doubts that been awarded with a Ramon y Cajal contract will be a crucial impulse in my scientific career.

Resumen del Currículum Vitae:

Education:

01/2011-Present Postdoctoral Fellow in Dr. Wang Lab at Icahn School of Medicine at Mount Sinai

02/2010 PhD in Molecular Medicine, Santiago de Compostela University (USC) Advisors: Dr. Zalvide and Dr. Pombo.

03/2009 Master MS Biotechnology Engineering (Industrial and Bio-Sanitary Program) (USC)

04/2005 BS Biotechnology (USC)

09/2002 BS Biology (Molecular and Biotechnology Program) (USC)

During my PhD training I published a total of 6 publications (2 first and 1 co-first), and I was granted with two predoctoral fellows from Xunta de Galicia and FPU. During this period I also participated in teaching activities (80 hours).

For my postdoctoral studies, I switched to the study of pluripotency and reprogramming in Dr. Wang lab. A research area with high relevance for regenerative medicine and developmental biology. So far, my work has resulted in 3 first-authors papers and two co-authored publications in prestigious journals such as Stem Cells, PNAS, Mol Cell, Nature and Nature Cell Biology. The last years in Dr. Wang lab, my main research was to identify the protein-protein and protein-DNA networks that governs the cell fate decisions between somatic cells and pluripotent cells or between different states of potency (such as: naive and primed pluripotent states, and totipotent state). As result of my research, currently I have two manuscripts under revision as first author in two of the top ranked-cited journals, and another manuscript in preparation also as first author.

My studies have been presented in several international meetings (EMBO, CSHL, ISSCR...) and have been cited 338 times.