MINISTERIO
DE CIENCIA, INNOVACIÓN
Y UNIVERSIDADES

Cofinanciado por
la Unión Europea

AGENCIA
ESTATAL DE
INVESTIGACIÓN

AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023
Turno General

Área Temática: **Biociencias y biotecnología**
Nombre: OCAÑA PALLARÉS, EDUARD
Referencia: RYC2023-042807-I
Correo Electrónico: ed3716@gmail.com
Título: Reconstructing the evolution of eukaryotic genomes and understanding the mechanisms governing this process

Resumen de la Memoria:

As an evolutionary biologist, I aim to unravel the complex evolutionary history of eukaryotes, including the evolutionary mechanisms that allowed eukaryotes to evolve towards such 'endless, most beautiful, and most wonderful forms'. I did my PhD in a highly competitive and multidisciplinary environment (Iñaki Ruiz-Trillo's lab, 15-20 members) (Institute of Evolutionary Biology, Barcelona). Since the very beginning, Iñaki trusted in my potential and encouraged me to develop my own research ideas. This contributed a lot to the success achieved, with 4 first-author publications and 10 communications in meetings derived from the research developed.

Evolution, particularly in eukaryotes, is often conceived as a purely vertical process in which lineages can almost only evolve by accumulating divergence in the DNA inherited from the parental line. In my first publication on the evolution of the nitrate assimilation pathway in eukaryotes (Ocaña-Pallarès. et al. 2019, PLoS Genet 15(2): e1007986), for which I already have a corresponding author role, we demonstrated that, contrary to the prevailing view, horizontal gene transfer (HGT) can play a pervasive role in the evolution of eukaryotic gene families. We also found that gene fusions played a key role in the evolution of this metabolism.

After the PhD, I did a postdoc in Gergely J Szöllősi□s lab (ELTE university, Hungary), working in the ERC-awarded project GENECLOCKS. Thanks to the cutting-edge bioinformatic techniques learned during this postdoc, I managed to analyze the complex genomic data which I previously generated during my PhD. This culminated in a recent publication in the journal Nature (Ocaña-Pallarès et al. 2022, Nature 609:747□753). In it, we demonstrated that animals and fungi evolved from two divergent genomic trajectories that started early since their last common ancestor split into two lineages more than a billion years ago.

During my postdoc at Szöllősi□s lab and also during my current postdoc at Toni Gabaldón's lab (Barcelona Supercomputing Center), I have become expert in the usage of ALE (https://github.com/ssolo/ALE), a tool developed in Szöllősi□s lab for the computational inference of HGT events on a broad-scale level. In particular, I have used this tool to infer HGT events occurred in the evolution of Fungi, and from the timing information of the inferred events (the donor of the HGT event must be older than the receptor lineage), we have been able to infer a comprehensive fungal tree of life by incorporating relative time order information derived from the inferred HGT events in those parts of the phylogeny for which fossil information is more scarce (see Congress nº1 in CV).

ALE, the previously introduced tool, is powerful in the sense that it allows one of my research aims which is to quantify the exact contribution of HGT to the evolution of eukaryotic gene content to be achieved. I plan to execute this project, which will require the integration of this tool into a complex bioinformatic pipeline, if I am awarded with the RyC fellowship. On the other hand, and to terminate with the skepticism regarding HGT in eukaryotes, I also plan to provide experimental evidence of the occurrence of HGT in eukaryotes, by reproducing and exploring this phenomenon in laboratory conditions.

Resumen del Currículum Vitae:

Always aiming to learn from the most enthusiastic scientists of my field, my research has taken place in five research groups which have been awarded with a total of 8 European Research Council (ERC) grants in the last years (Profs. Iñaki Ruiz-Trillo from IBE-Barcelona, Eric Bapteste from Sorbonne Uni.-Paris, Gergely Szöllosi from ELTE Uni.-Budapest, Toni Gabaldón from BSC-Barcelona, Tom Richards from Oxford Uni.). I am the author of 7 publications and 4 first-author publications. In the first author publications, I have the role of corresponding author in two of them, including my last publication in Nature. This publication has been highlighted in prestigious journals (Nature Rev Genetics, Current Biology), and also in national and international media. I have been invited to present my work in three distinct institutions I have been awarded with the □Egyetemi Kiválósági Alap kiemelkedő presztízsű tudományos" prize (ELTE university, 1,232.38□), and my publication was honored as one of the three best articles published in 2022 by the Societat Catalana de Biologia. I also have been awarded twice in congresses, as best poster and best talk communications in 2018 and 2019.

In my publications, I have collaborated with researchers from 16 different nationalities, and I participated in multiple international projects, including two ERCs. My research has been funded with a PhD and a postdoc grant (157,550□ in total), and has been supported with international funding to participate in courses, congresses and research stays, including the honor of being Full Member of Common Room at Oxford Merton College. Despite being a young researcher, I am leading competitive projects, including "A fungal tree of life dated with fossils and horizontal gene transfer data", which I recently presented at SMBE 2023 meeting (>1000 attendants). This project, of which I am last and corresponding author, is being developed under the Juan de la Cierva-Formación postdoc fellow at Barcelona Supercomputing Center in Prof. Toni Gabaldón's lab.

For the general audience, I have participated in numerous outreach activities, including Open Days and school visits in four distinct research institutions, the European Researchers' Night (Barcelona, 2023), the mentoring of two PhD students through the BIST Mentoring Programme (2023), and writing articles for the general audience, among others. I also transfer the knowledge acquired as a university teacher: First, I coordinate the practical sessions of the CFG subject in the Bioinformatics BSc at ESCI-UPF. Second, I participated as a teacher in the two-week Workshop on Phylogenomics 2024 in Czechia. I regularly participate in the peer-review process and I am member of the Societat Catalana de Biologia, the Sociedad Española de Biología Evolutiva, and the Society for Molecular Biology and Evolution. Beyond teaching and mentorship activities described above, I train researchers in my

every-day interactions with students and postdocs. Since my first postdoc I have been leading a main PhD project of Lenard Szánthó (PhD student at ELTE university).

I strongly advocate for Open Science: all my publications are at least green open access and all my first and corresponding author have full open access licenses. I deposit data and code of my works always in public repositories following the FAIR Data Principles.

MINISTERIO
DE CIENCIA, INNOVACIÓN
Y UNIVERSIDADES

Cofinanciado por
la Unión Europea

AGENCIA
ESTATAL DE
INVESTIGACIÓN

AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023
Turno General

Área Temática: **Biociencias y biotecnología**
Nombre: SPRUCE , THOMAS
Referencia: RYC2023-045243-I
Correo Electrónico: tdf.spruce@gmail.com

Título: Gene expression regulation in vertebrate development

Resumen de la Memoria:

My career has focused on understanding the gene regulatory networks underlying vertebrate development, with a special focus on the specification of extra-embryonic structures. I conducted my PhD in the lab of Dr. Tristan Rodriguez at the MRC-Clinical Sciences Centre in London. My PhD focused on investigating the roles played by microRNAs in regulating early post-implantation mouse development. I found that miRNAs play very different roles in the three lineages of the early embryo. In the epiblast they prevent excessive apoptosis, in the visceral endoderm they are required to promote cell cycle progression and for correct patterning to occur and in the trophoblast they prevent premature differentiation (Dev Cell 2010; Cell Cycle 2011). During my PhD I was also involved in 3 successful collaborations with the groups of Prof. Stefano Piccolo, Prof. Brockdorff and Dr. Fisher (Cell 2010; Epigenetics Chromatin, 2008 and 2010).

Following my PhD, I joined the lab of Prof. Jim Smith at the MRC-NIMR/Francis Crick Institute (London). During my time here I established the use of gene editing technologies in Xenopus tropicalis to knock out two essential T-box transcription factors (t and t2). By comparing the transcriptome of these genetic knockouts with Morpholino (MO) knockdowns we demonstrated MOs can have a range of off-target effects through both activation of an immune response and disrupting splicing (Dev Cell. 2018). I also helped develop a project that examined the role of maternally inherited transcription factors in remodeling chromatin in early Xenopus development, that led to a publication of which I am a second author (Nat Commun. 2019).

In 2015 I joined the lab of Dr. Manuel Irimia (CRG, Barcelona, 2015-present) as a semi-independent senior postdoc. Here, funded by a Marie Skłodowska-Curie Actions fellowship, I established my own research line investigating the role of alternative splicing in the development and evolution of mammalian extra-embryonic tissues. This involved developing from scratch almost all the resources (protocols, techniques, mouse colony) required for the study of mouse trophectoderm/placenta development in the lab. Additionally, as part of this project I coordinated a large international network of collaborating scientists and was involved in managing two laboratory technicians and one bioinformatician. I found that the X-linked splicing regulator Mbnl3 has undergone a striking process of evolutionary specialization in eutherian mammals, where it has been co-opted to restrict placental growth probably as a result of its genomic location meaning it favours the maternal side of the parental genetic conflict (Plos Biol, 2022). I am first and co-corresponding author for this study. I am currently working on a project looking at the role of alternative Yap splicing in extraembryonic lineage segregation (in preparation).

I now aim to become an independent researcher, developing a research line studying RNA metabolism during zygotic genome activation and trophoblast specification in mammals. Whilst securing my transition to independence, I have recently joined as a senior researcher, the lab of Dr. Pernaute at the CADB in Seville, a centre of research excellence dedicated to the study of developmental biology where I can find extensive synergy and a good environment for future collaborations.

Resumen del Currículum Vitae:

Following my degree, in 2005 I gained a competitive MRC studentship to enter a 4 year MRes/PhD programme at the MRC-CSC (London, UK). During the first year I conducted 3 short projects in the groups of Prof Brockdorff, Dr Gil and Dr Rodriguez. I chose to remain in Dr Rodriguez□s lab for my PhD, which focused on investigating the roles played by microRNAs in early post implantation mammalian development, and led to the publication of 2 papers of which I am a co-first author (Dev Cell 2010; Cell Cycle 2011). I presented this work as a selected talk at the ISDB Congress (Edinburgh, 2009) and at the 2nd meeting of the STEMBRYO network (Oxford, 2009). My project opened a novel research line for the lab, looking at how miRNAs regulate cell death, leading to a further second author publication (Genes Dev, 2014). During this time I was involved in an international collaboration with Dr Piccolo□s group (University of Padua, Italy) that resulted in a publication of which I am a co-author (Cell, 2010), and in collaborations with two other groups at the CSC, which led to 2 further publications (Epigenetics Chromatin, 2008 and 2010). My post graduate studies allowed me to gain an extensive knowledge of early mouse development.
In 2011 I joined the group of Prof. Smith at the MRC-NIMR/Francis Crick Institute supported by an MRC Career Development Fellowship. I worked on two projects. One was aimed at systematicity assessing the off-target effects of Morpholinos and establishing the use of gene editing technologies in Xenopus tropicalis. I presented this work at the CSHL Cell & Developmental Biology of Xenopus course (USA, 2012) and at the 14th International Xenopus Conference (France, 2012) and it led to a publication of which I am co-first author (Dev Cell, 2018). The second project investigated chromatin remodelling by maternally inherited transcription factors in early Xenopus development, and led to a publication of which I am the second author (Nat Commun, 2019). Additionally, during my time here I assisted in the supervision of the PhD student Rita S. Monteiro. My first postdoctoral position allowed me to acquire a strong background in transcriptome and genome wide profiling techniques and to learn about the development and use of another model organism, Xenopus.
In 2015 I was awarded a Marie Skłodowska-Curie Actions co-fund fellowship to move to the laboratory of Dr. Irimia at the CRG (Barcelona, Spain). Here I developed a project looking at the role of alternative splicing regulation in trophectoderm development and evolution. This involved a large international network of collaborating labs and led to a publication of which I am both first and co-corresponding author (Plos Biol. 2022). I presented this work as a selected talk in the 17th Meeting of the SEBD (Virtual meeting, 2020). During this period I have also worked on a project looking at YAP isoform function in extra-embryonic lineage segregation (manuscript in preparation, co-first author). In addition to giving me the opportunity to enhance my computational skills and knowledge of trophectoderm development and RNA metabolism, my second postdoctoral position

allowed me to gain extensive experience of developing my own research. Whilst securing my transition to independence, I have recently joined (2024), as a senior researcher, the lab of Dr. Pernaute at the CADB in Seville.

MINISTERIO
DE CIENCIA, INNOVACIÓN
Y UNIVERSIDADES

Cofinanciado por
la Unión Europea

AGENCIA
ESTATAL DE
INVESTIGACIÓN

AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023
Turno General

Área Temática: **Biomedicina**
Nombre: COSIN TOMAS, MARTA
Referencia: RYC2023-044292-I
Correo Electrónico: marta.cosin@isglobal.org
Título: Understanding the intermediate biological pathways that orchestrate the impact of environmental/genetic factors on brain development, and mental health trajectories

Resumen de la Memoria:

I am an outstanding researcher with extensive research skills and national and international experience. During my career, I have pursued a coherent research line in studying the mechanisms through which environmental and genetic factors influence neurodevelopment and brain health. I have studied these scientific questions through a unique translational and multidisciplinary path that developed quite naturally. From in vitro and in vivo animal studies, going through clinical and finally epidemiological studies. Thus, I have combined different approaches, state-of-the-art molecular biology techniques, and advanced bioinformatic methods for integrating -omics, clinical and environmental data.

I conducted my graduate studies in Biochemistry, and due to my increasing concerns about environmental influences on health, I completed an M.Sc. in Public Health. As I progressed through my postgraduate studies, I developed an interest in epigenetic mechanisms as potential orchestrators of the complex interactions between environment and genes in the context of brain health. Accordingly, I conducted my Ph.D. under the supervision of Dr. Kaliman and Prof. Pallàs at the University of Barcelona. My work focused on the contribution of epigenetic mechanisms to aging and Alzheimer□s disease (AD) and the effect of voluntary exercise on these mechanisms in AD models and clinical samples. I also joined Prof. Rozen□s lab at McGill University (Canada) for 9 months, where I studied the mechanisms associated with the risk of developing AD in mice with a dietary or genetic folate deficiency. After finishing my Ph.D. (awarded Cum laude), I conducted my 1st postdoc at Prof. Rozen□s lab where I studied the impact of high folate consumption during pregnancy on placenta and offspring□s brain. In 2020, I started my 2nd postdoc in Prof. Sunyer□s group at ISGlobal (Barcelona). I am currently investigating the impact of environmental factors during pregnancy on placental or blood epigenetics and its association with neurodevelopment and childhood neurobehavior.

Overall, I have published my work in high-impact journals, accumulating more than 1160 citations. I have an outstanding record of success in obtaining highly competitive fellowships (8, total amount: ~350000□), and teaching and mentoring experience. My mobility record and my participation in international consortiums has allowed me to establish a solid worldwide research network. Concretely, (i) my multidisciplinary background in molecular biology/epidemiology, and neuroscience, (ii) my translational expertise, and (iii) the technical, methodological, mentoring and leadership skills acquired through my career put me in the perfect position to develop a pioneering research line in Spain on the study of the mechanisms by which prenatal and early childhood environmental and genetic factors influence neurodevelopment and mental health trajectories. This research line will help develop preventive strategies and treatments to protect people's health globally.

Resumen del Currículum Vitae:

I am an outstanding researcher with broad research capacities and national and international experience. During my career, I have pursued a coherent research line in studying the mechanisms through which environmental and genetic factors influence brain health and neurodevelopment. I have adopted a unique translational and multidisciplinary approach, implementing cutting-edge molecular biology and epidemiology methodologies (e.g. in vitro and in vivo assays, RNA-seq, bisulphite pyrosequencing, -omics data analysis, etc.), using murine models and human samples from clinical cohorts and population-based birth-cohorts. As a result, I have published 28 scientific papers (11 as 1st author, 2 as corresponding author - both in D1 journals-), cited > 1160 times, with an h and i10-index of 13 and 18. Additionally, I have submitted 2 papers, and 3 are under preparation. Eighty-five % of my publications are in Q1, and 30% are in D1 journals. I conducted a B.S. in Biochemistry and an M.Sc. in Public Health. During my postgraduate studies, I already developed a strong interest in epigenetic mechanisms and their role in brain health. Consequently, my Ph.D. work focused on the contribution of epigenetic mechanisms to aging and Alzheimer□s disease (AD) and the effect of voluntary exercise on these mechanisms, using AD models and clinical samples. I conducted my thesis under the supervision of Dr. Kalliman and Dr. Pallàs at the University of Barcelona. I also performed 8-months research stay at Prof. Rozen□s lab at McGill University (Canada), where I studied the mechanisms underlying the risk of developing AD in mice with a dietary or genetic folate deficiency. After finishing my Ph.D., I conducted my 1st postdoc at Prof. Rozen□s lab, where I studied the impact of high folate consumption during pregnancy on the placenta and offspring□s brain. In 2020, I started my 2nd postdoc in Prof. J. Sunyer□s team at ISGlobal (Barcelona). I am currently investigating the impact of environmental factors (e.g., air pollution) during pregnancy on placental or blood epigenetics/transcriptomics and its association with neurodevelopment and childhood neurobehavior. During my entire career, I have had an outstanding record of success in obtaining highly competitive fellowships, which have covered the full cost of my salary, research complements, and stays abroad, accumulating more than 350000□. In addition, my research excellence has been recognized with several prizes and awards: Cum laude and international mention to my Ph.D. thesis, the seal of excellence from the MSCA-H2020, and 4 different awards in conferences and symposiums. Indeed, my work has been presented at more than 17 conferences. Despite my junior positions, I currently lead several projects, and I have established national and international collaborations to obtain funding as a Co-PI. Because of my expertise and research excellence, I am regularly invited to present my work at national and international centers and act as a reviewer in several well-known journals. Thanks to my mobility record and participation in many international consortiums, I have established a solid worldwide network of multidisciplinary researchers. I have gained teaching experience at university, supervised undergraduate, MSc. and Ph.D. students, volunteered to organize scientific meetings, and involved in disseminating activities.

MINISTERIO
DE CIENCIA, INNOVACIÓN
Y UNIVERSIDADES

Cofinanciado por
la Unión Europea

AGENCIA
ESTATAL DE
INVESTIGACIÓN

AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023
Turno General

Área Temática: **Biomedicina**
Nombre: RIVERA GONZÁLEZ, PATRICIA
Referencia: RYC2023-044921-I
Correo Electrónico: patricia.rivera@ibima.eu

Título: Perinatal programming: a multidisciplinary point of view

Resumen de la Memoria:

Graduated in Biology, period during which I collaborated with the Cellular Biology Department of the University of Malaga. I started working in research in 2007 at FIMABIS where I completed my doctoral thesis under the direction of Dr. Juan Suarez and Fernando Rodriguez de Fonseca. I defended my thesis "The endocannabinoid system in the rat hippocampus and its modulation by epigenetic factors" in 2011 with a Cum Laude grade. During my predoctoral stage at FIMABIS and the University of Malaga, I spent a stay at the Faculty of Medicine of the University of Santiago de Compostela with Dr. Carlos Diéguez.

Later, I worked in the Mental Health UGC of the Regional University Hospital of Málaga, with a contract through a regional competition from the Junta de Andalucía.

In the 2016 call of the Strategic Action in Health (ISCIII), I obtained a Sara Borrell Contract (File: CD16/00067) at the Fundación Investigacion Biomedica Del Hospital Niño Jesus (Madrid) with the Children's Endocrinology group directed by Drs. Julie Chowen and Jesús Argente (01/01/2017- 12/31/2019). During this period, I studied the involvement of the cannabinoid and inflammatory systems in metabolic programming during the development of childhood obesity and I began to establish my line of research based on disorders of early origin in life; studying the effect of perinatal malnutrition on offspring neurodevelopment and metabolic diseases. During this period, I obtained a mobility aid (MV18/00017) from the M-AES research staff (ISCIII). Center for the stay: INSERM U1215 Neurocentre Magendie, Bordeaux (France). Line of work: Involvement of the CB1 cannabinoid receptor of hypothalamic astrocytes in the development of diet-induced obesity.

In 2020 I returned to Málaga, to the Biomedical Research Institute (IBIMA) with a contract from the Miguel Servet program of the ISCIII (2020-2024); period during which I have been principal investigator of two national and regional research projects.My line of research is currently funded by 3 active projects:

1) Perinatal alcohol exposure as a risk factor in Alzheimer's disease. Ref. 2020/048. Research projects in drug addiction. Plan Nacional sobre Drogas, Ministerio de Sanidad.

2) Perinatal caloric restriction-induced metabolic alterations in offspring. Role of hypothalamic astrocytes. Ref. CP19/00068. Instituto de Salud Carlos III. Ministerio de Ciencias, Innovacion y Universidades.

3) Analysis of the neuroprotective role of the non-psychoactive phytocannabinoid cannabidiol in neurodevelopmental defects due to alcohol intoxication: evaluation of morphological, neurogenic and cognitive-emotional alterations. ProjectExcel_00291. Agency: Junta de Andalucía.

My line of research is quite defined in the perinatal field. I approach perinatal programming from different points of view (nutrition and addiction mainly), relating it to different medium and long-term diseases (metabolic, cognitive impairment, growth disorders...) and analyzing mechanisms involved focused mainly on cannabinoid signaling. This line of research is novel and is one of the focuses of current studies since until a few years ago it was not considered that diseases that develop throughout life could be associated with or even have their origin in perinatal events. It opens doors to the request of numerous innovative projects that could also be adapted to very diverse areas.

Resumen del Currículum Vitae:

Graduate in Biology from the University of Malaga (2006) and PhD from the University of Malaga (2011). In 2011 I did a predoctoral stay in the group of Dr. Carlos Diéguez at the University of Santiago de Compostela, as a result of which we have created an international patent (PCT/ES2012/070276) "COMBINATION THERAPY FOR THE TREATMENT OF METABOLIC DISEASES". PI of a project on hepatotoxicity during 2014-2016 funded by the Junta de Andalucía (PI-0337-2012). Researcher of the Sara Borrell program (CD16/00067) in the group of Dr. Julie Chowen and Jesús Argente at the Niño Jesús Hospital (Madrid) from 2017 to 2019. During this period I obtained funding from ISCIII (MV18/00017) for a stay in the research group of Dr. Daniela Cota at the Neurocentre Magendie in Bordeaux (France). During this period at the Niño Jesús hospital in Madrid I began to establish my line research based on disorders of early life origin; study the effect of perinatal malnutrition on the neurodevelopment of offspring and metabolic diseases. In 2020 I obtained a Miguel Servet contract at IBIMA associated with the Neuropsychopharmacology group led by Dr. Rodríguez de Fonseca; financed by the ISCIII with which I have begun my journey as my own group following the perinatal line initiated in Madrid. In 2019 I obtained as PI a project funded by the National Drug Plan (Title: Perinatal exposure to alcohol as a risk factor in Alzheimer's disease. PND2020/048. Agency: Government Delegation for the national drug plan. Ministry of Health. Financing: 75,437.88. Duration: 2021-2023)

I am currently the principal investigator of 2 active projects:

1.Title: Analysis of the neuroprotective role of the non-psychoactive phytocannabinoid cannabidiol in neurodevelopmental defects due to alcohol intoxication: evaluation of morphological, neurogenic and cognitive-emotional alterations. ExcelProj_00291. Agency: Andalusian Plan for Research, Development and Innovation. Andalusian Government Financing: 199,000.00. Duration: 2023-2025. Project of excellence.

2. Title: Metabolic alterations induced by perinatal caloric restriction in offspring. Role of hypothalamic astrocytes. CP19/00068. Agency: ISCIII. Financing: 40,000. Duration: 2020-2024.

Participation in at least 34 national and international conferences. I have published 72 articles in journals indexed in Journal Citation Reports. Since my postdoctoral stage, these scientific publications have been focused on the first stages of life, providing relevant information for society; for example, establishing a model for the prediction of insulin resistance in obese and prepubertal adolescents or demonstrating the importance of nutrition and non-consumption of drugs such as alcohol during pregnancy and breastfeeding to avoid behavioral and metabolic disorders in offspring, even in adulthood.

My career has also involved obtaining the I3 certification.

I participate in stable research structures such as SEIC, in which I am part of the board of directors as a member, and RIAPAd. I collaborate with private companies such as Euronutra and Phytoplant, with which we carry out common projects.So far I have supervised 1 doctoral thesis and I am the director

of 4 other theses in progress. I have obtained 4 human resources contracts as group leader, including a "Rio Hortega" contract from the ISCIII. I maintain collaboration with different groups both nationally and internationally.

MINISTERIO
DE CIENCIA, INNOVACIÓN
Y UNIVERSIDADES

Cofinanciado por
la Unión Europea

AGENCIA
ESTATAL DE
INVESTIGACIÓN

AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023
Turno General

Área Temática: **Ciencias físicas**
Nombre: ARAMENDIA GUTIERREZ, JULENE
Referencia: RYC2023-044614-I
Correo Electrónico: julene.aramendia@ehu.eus

Título: Métodos espectroscópicos de alta resolución para la exploración planetaria in-situ y la astrobiogeoquímica

Resumen de la Memoria:

My research background is focused on the application of spectroscopic techniques for important issues such as the preservation of cultural heritage, spatial exploration, or human health research. Samples related to these fields are unique, and most of the time, non-destructive techniques may be applied for their study. My experience in the use of these techniques has provided me with the opportunity to study important artworks, rare meteorites, and scarce human samples. Additionally, I am also specialized in the use of portable techniques to avoid sampling procedures. This background aligns perfectly with space exploration requirements, as ongoing and upcoming missions are maximizing the use of remote and on-site spectroscopic techniques. Thanks to this, I was accepted as a member of two important missions for the exploration of Mars, Mars2020 and Exomars. I am currently working on the SuperCam and RLS instruments, respectively. I also participated in the development of the SuperCam Calibration Target.

It can be said that in the last 10 years, I got specialized in the application of non-destructive analytical techniques for Space Exploration. In this way, I have been acquiring experience abroad, performing several postdocs and stays at JPL-Caltech, Los Alamos National Laboratory, CNES, and the Mars group at Aarhus University. Together with other postdoctoral experiences abroad (at the University of Sannio, UPMC), this provided me with unique expertise to develop a crucial and innovative research line on the application of innovative spectroscopic methods applied to astrobiogeochemistry. Moreover, during these stays, I have established international contacts and collaborators in Space Exploration that furnish me with unique samples and access to different facilities to carry out outstanding research. This, together with the networks to which I belong, provides the perfect atmosphere for collaborations, creation of new projects, and fundraising.

Considering all this, my future research will focus on developing new analytical methodologies based on high-resolution spectroscopic techniques for space exploration and the study of the origin of life on Earth and beyond. The main objective of the proposed research line is to contribute to maintaining Spain's leading research in the current surface space exploration missions (MARS2020, EXOMARS) and to boost our participation in upcoming missions. For this aim, the common nexus of my research line will be the improvement of detection and interpretation of biosignatures in geologic matrixes providing new horizons in astrobiogeochemistry. In this sense, applying TERS for biosignature detection will be a challenging objective. The construction of new open access databases for Deep-UV Raman and high-pressure Raman spectroscopies will be also a priority, given the limited existing knowledge, as well as the study of biosignatures preservation under high-pressure impacts. The new methodologies will rely on combining spectroscopic techniques and multivariate data analysis for the accurate interpretation of data received from space missions. All this will contribute to maintaining Spain as an international reference in space exploration, achieving our participation in future exciting missions such as Mars Sample Return (MSR).

Resumen del Currículum Vitae:

Indicators of research quality: 2 book chapters and 59 papers (h-index: 15 Scopus and 19 Google Scholar). 33.3% of my publications are co-authored with researchers in other countries/regions. Supervision of 3 Bachelor theses, 5 Master's theses, and 5 PhD theses. Professor in the Doctoral Program in Scientific Cross-Disciplinary Approaches to Heritage and Landscape. Doctoral special award by the University of the Basque Country (2016) and the Basque Government (2013). Over 100 presentations at National and International Conferences. Member of the Science Team of the SuperCam instrument on the MARS2020 Mission. Operations scientist in the MARS2020 mission acting as Science Payload Downlink Lead, sPDL. Member of the Science Team of the Raman Laser Spectrometer (RLS) in the ESA EXOMARS Mission. Evaluator for ESA Science Reviews of Proposals. Fernand Braudel IFER MSCF COFUND Postdoc (2014-2015) at Pierre et Marie Curie University. Postdoc (2018-2019) at the Jet Propulsion Laboratory (NASA/Caltech). Assistant Professor at Aarhus Institute of Advanced Studies in 2021-2022 (AIAS-MSCF COFUND). Maria Zambrano researcher at UPV/EHU.
I have developed different semi-quantification methodologies using Raman imaging, resulting in successful outcomes. With one of these methods, I assessed the homogeneity of the Mars 2020 SuperCam Calibration Targets. Moreover, in recent years, I have been developing new research lines based on SERS and TERS, both for astrogeobiochemistry and health sciences. During my scientific career, I have also worked with other analytical techniques.
I established a spectroscopic laboratory and research line at UniSannio during my research contract there. This background enabled my participation in more than 20 research projects, acting as the principal investigator for 7 of them (including 2 international competitive projects funded by public entities, 2 regional projects funded by public entities, and 3 research contracts with private R&D&I enterprises). Furthermore, I have engaged in numerous outreach activities such as the University of the Basque Country Science Week, providing dissemination talks or interviews in media (RTVE, ETB, Elhuyar), and serving as this year's Vocaciones Cientificas guest in La Palma island. I am the coordinator of IBeA and Mars exploration activities during UPV/EHU Science Week. Additionally, I have collaborated in organizing 4 international scientific conferences. I am a reviewer for several scientific journals and a member of the editorial board of Frontiers in Astronomy and Space Sciences.

MINISTERIO
DE CIENCIA, INNOVACIÓN
Y UNIVERSIDADES

Cofinanciado por
la Unión Europea

AGENCIA
ESTATAL DE
INVESTIGACIÓN

AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023

Turno General

Área Temática: **Producción industrial, ingeniería civil e ingenierías para la sociedad**

Nombre: CUSSÓ , LORENA

Referencia: RYC2023-043775-I

Correo Electrónico: lcusso@hggm.es

Título: Preclinical molecular imaging and its application to biomedical research

Resumen de la Memoria:

I graduated in Biology at Universidad Autónoma de Madrid in 2008. Under a fellowship obtained in 2011 I completed a researched stay at the Stanford University. In 2012 I got a research grant in the BiiG group at University Carlos III de Madrid (UC3M). I defended my PhD Thesis (international mention), in 2014. In 2014 I obtained a Visitante Lector position at UC3M, doing teaching and research as postdoc in several projects. From 2016-2020 I collaborated in the Plataforma de Innovación en Tecnologías Médicas y Sanitarias (ITEMAS) of the ISCIII, and I was its project manager from 2016-2018. Presently I participate in the Animal Models and Biomedical Imaging Platform (PT20/00044) of the ISCIII.

My scientific contributions address molecular imaging as an advanced tool for biomedical research. This methodology facilitates results translation and help to fulfil the 3Rs criteria for animal research. Molecular imaging is particularly useful in the context of complex biological problems, for example, I have been working in the improvement of the detectability of non-specific tracers via background reduction in cardiac and infectious diseases; in the quantification of the persistence, or its severity, of an infection after the treatment; and in the development of a new method to assess aortic distensibility by cardiac MRI.

From 2011 to 2012 I did a research stay at Multimodality Molecular Imaging Laboratory, Department of Radiology at Stanford University, CA. Dr. Gambhir. The results of this stay can be consulted in the following publication 10.1371/journal.pone.0073138. In 2017 to date, through an agreement with UC3M, I became co-director of the Advanced Image Unit in CNIC. To date, my collaboration in the center has resulted in 4 scientific articles, all Q1. I currently belong to the network of excellence RENIM (Red Madrileña de Nanomedicina en Imagen Molecular B2017/BMD-3867) of the Community of Madrid. To date, my collaboration in the RENIM network has resulted in 3 scientific articles all Q1. Moreover, since 2015 I have promoted and organized ford editions (2015, 2017, 2019 and 2022) of the " Workshop de introducción de imagen molecular preclínica y sus aplicaciones a la investigación biomédica" https://sites.google.com/hggm.es/wimpaib-2022/inicio?pli=1.

Resumen del Currículum Vitae:

During my career I have participated in a total of 28 research projects (11 were national, 5 international, 3 regional, 7 funded by private entities and 2 from the UC3M internal program), 5 R&D&I contracts and more than 60 presentations at national and international conferences.

I obtained the recognition of the R3 certificate (CR32023-039672) from the state research agency (Ministerio de Ciencia e Innovación). I also have two research sexennials recognized by the Comisión Nacional Evaluadora de la Actividad Investigadora (CNEAI), periods 2009-2014 and 2015-2020.

I have authored or co-authored 28 in ISI journals (10 of them in Q1 and 10 in D1). In 2020 I achieved my first co-PI projects (PID2019-110369RB-I00 and CSFFLOW-CM-UC3M), which marked the beginning of my consolidation as an independent researcher. Nowadays I led two Imaging Units (at the CNIC and the IiSGM) with 11 different imaging systems and 10 people, with different profiles (2 doctors, 1 graduate, 7 technicians). I have supervised 6 bachelor thesis and one master thesis, and nowadays I am directing a FPI candidate as Thesis supervisor.

My objective is to consolidate my career as an independent scientist, specialized in molecular imaging, and to continue developing novel approaches, as well as to expand my collaboration with biological research groups that may benefit from these techniques.

MINISTERIO
DE CIENCIA, INNOVACIÓN
Y UNIVERSIDADES

Cofinanciado por
la Unión Europea

AGENCIA
ESTATAL DE
INVESTIGACIÓN

AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023
Turno General

Área Temática: **Psicología**
Nombre: CIRIA PEREZ, LUIS FERNANDO
Referencia: RYC2023-045268-I
Correo Electrónico: lciriaperez@gmail.com

Título: Cognitive neuroscience under strained states

Resumen de la Memoria:

From the outset of my academic journey, my passion has been deeply rooted in Cognitive Neuroscience, with a specific emphasis on unravelling the intricate interplay between health-oriented behaviours and the modulation of neural dynamics governing higher-order cognitive functions. During my PhD (2015-2019), I followed an interdisciplinary approach, by techniques from the fields of physics, mathematics, and physiology that I gathered working with multidisciplinary research groups during two research stays in Boston University (USA) in 2016 and University of Cambridge (UK) in 2018. I was not afraid swim against the stream, and I demonstrated that we could obtain feasible neural and cognitive information in extreme conditions such as physical exertion.

After a year working as a postdoctoral researcher (2020-2021) at the University of Malaga and the Autonomous University of Madrid on the basis of the learning of maladaptive behaviour and habits, and after declining a Juan de la Cierva postdoctoral fellowship at the Autonomous University of Madrid, I returned to the University of Granada (2021) with a 3-years postdoctoral fellowship to continue developing my own line of research. I kept focused on elucidating the neural and cognitive dynamics of physical exertion to provide valuable insight into its mechanisms and how to tailor exercise-based interventions to optimally affect individuals. The idea of understanding the rapidly-fluctuating dynamics of brain function while exercising using EEG complexity measures later (2022) crystallised in a Marie Sklodowska-Curie Individual Fellowship to boost my line of research at the University of Cambridge in 2024. This pioneering research line proposes a radical shift of the traditional paradigm in Exercise Physiology and Sport Science, turning on the focus from the characterization of physical exertion as a function of transient cardiorespiratory adaptations to the neural dynamics that occur while exercising.

My pre and postdoc background investigating brain function under physical exertion gave me a broader view of the organism's homeostatic regulatory mechanisms to cope with physiological stress. This led to a new framework based on the use of drowsiness and physical exercise as naturally occurring alterations of the arousal level with a preserved capacity to behaviourally respond. This innovative approach extends the traditional framework of understanding the interplay between cognition and arousal through the prism of the homeostatic steady-state dynamics using pharmacological interventions or transient alterations of emotional state. In 2023, I secured funding to further expand my research into other physiological transitions to strain states. I was awarded an early career research grant from the Spanish research program to study the impact of arousal fluctuation (using sleep transition) on perceptual decision making by using a combination of EEG, behavioural paradigms, and computational modelling.

Overall, my line of research combines classic and vanguardist advances from computational modelling (psychophysics, signal detection theory, and computational models), innovating experimental designs from sleep and exercise research and cutting-edge neuroimaging techniques to unravel how perceptual decision-making is fragmented or remain resilient under (reversible) perturbations of arousal.

Resumen del Currículum Vitae:

Having been actively engaged in several research groups as a research assistant for over 3 years, I began my PhD in Psychology (2015-2019), funded by the Spanish Minister of Economy and Competitiveness. The experience and knowledge acquired, including two pre-doctoral stays at the University of Boston (USA) in 2016 and the University of Cambridge (UK) in 2018, allowed me to establish a novel framework to study brain function under physical exertion that led to 4 impactful publications (NeuroImage2018; Psychophysiology2019; Cortex2021; CommsBio2022). I have published a total of 20 scientific peer-reviewed papers in JCR-indexed journals (first or last author in 11 of them, including 8 without my PhD supervisors), having the opportunity to present my research in several scientific meetings (24 international and 7 national communications), including 6 invited oral communications. I have also reviewed for NeuroImage, Scientific Reports, Communications Biology, Health Psychology or Journal of Sport & Exercise Psychology, among others, which illustrates international recognition in the main fields covered during my PhD (psychology, neuroscience, sports sciences, and physiology).

After a year working as a postdoctoral researcher (2019-2020) at the University of Malaga and the Autonomous University of Madrid, and after declining a Juan de la Cierva-Formación postdoctoral fellowship at the Autonomous University of Madrid, I returned to the University of Granada in 2021 with a 3-years Junta de Andalucía postdoctoral fellowship to continue developing my own line of research focused on determining the neural and cognitive signatures of physical exertion.

I have collaborated in several research projects funded by national (5) and international (1) entities. As PI, I have secured funding for 3 research projects, including a Marie Sklodowska-Curie Postdoctoral Fellowship to boost my line of research at the University of Cambridge (UK) in 2024.

As academic and scientific mentor I have had the opportunity to develop management skills by mentoring 3 undergraduate students in psychology, 1 research assistant, 4 MSc in Cognitive Neuroscience and co-supervised 1 PhD student in Psychology. I also have deep background as a lecturer in Psychology (2015-2024) and Sports Sciences (2020-2023) at the University of Granada.

MINISTERIO
DE CIENCIA, INNOVACIÓN
Y UNIVERSIDADES

Cofinanciado por
la Unión Europea

AGENCIA
ESTATAL DE
INVESTIGACIÓN

AYUDAS RAMÓN Y CAJAL – CONVOCATORIA 2023

Turno General

I have further developed my leadership skills and independent thinking by co-funding in 2012 Brain House Institute, a start-up on neuroscience applied to marketing, successfully sold in 2017. I lead a research team in several projects for international companies to investigate attentional and emotional human reactions to audio-visual stimuli and the translation of the main findings into specific consumer-oriented actions.