



Part A. PERSONAL INFORMATION

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|-------------|---------------------|-------------------------|---|-----------|
| | | | CV date | 23-2-2022 |
| First name | José Manuel | | | |
| Family name | García Fernández | | | |
| Gender (*) | Man | Birth date (dd/mm/yyyy) | 17/05/1967 | |
| ID number | 05650349P | | | |
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| ORCID (*) | 0000-0003-2983-1214 | | | |

A.1. Current position

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|-------------------|--|----------------|--------------|
| Position | Full professor of Biochemistry and Molecular Biology | | |
| Initial date | 14-3-2018 | | |
| Institution | Universidad de Córdoba | | |
| Department/Center | Biochemistry and Molecular Biology | | |
| Country | Spain | Teleph. number | +34957211075 |
| Key words | <i>Prochlorococcus</i> , <i>Synechococcus</i> , N and C metabolism, glucose uptake, high affinity transport, transcriptomics, proteomics, adaptive mechanisms, microvesicles | | |

A.2. Previous positions (research activity interruptions, art. 14.2.b)

| Period | Position/Institution/Country |
|-----------|--|
| 2010-2018 | Senior lecturer (<i>profesor titular</i>). Universidad de Córdoba (UCO), Spain |
| 2007-2010 | Lecturer (<i>profesor contratado doctor</i>). UCO. Spain. |
| 2003-2007 | Ramón y Cajal grant, Spanish Ministry of Science & Innovation. UCO, Spain. |
| 1998-2003 | Post-doc grants. UCO, Spain. |
| 2000-2001 | Return grant, Spanish Ministry of Education and Science. UCO, Spain |
| 1998-2000 | Post-doc grant from PROMOLEC project (MASTIII, EU). UCO, Spain |
| 1997 | Human Capital & Mobility return grant (EU). UCO, Spain |
| 1995-1996 | Human Capital & Mobility post-doc (EU). Station Biologique de Roscoff. France |
| 1995 | Short term FEBS post-doc fellowship. University of Leicester, United Kingdom. |

A.3. Education

| PhD, Licensed, Graduate | University/Country | Year |
|---------------------------------|-------------------------------|------|
| PhD in Biological Sciences | Universidad de Córdoba, Spain | 1994 |
| Licensed in Biological Sciences | Universidad de Córdoba, Spain | 1990 |

Part B. CV SUMMARY (max. 5000 characters, including spaces)

I did the PhD at the Dpt. of Biochemistry and Mol. Biology (University of Córdoba, UCO), on the glutamine synthetase of the green alga *M. braunii*, demonstrating the occurrence of a single form of GS in this organism and showing its main regulatory features. This period allowed me to learn a large diversity of biochemical techniques. Then I did a postdoc at the Phytoplankton team, Station Biologique de Roscoff (France), working on the photosynthetic apparatus of *Prochlorococcus*, where I learned molecular biology to study gene expression of the *psbA* and *pcb* genes. In 1997 I returned to UCO, where I combined those two fields: I started working on the N metabolism in *Prochlorococcus*, with a series of international and national fellowships and grants. Since 1998 to 2001 I was the PI of the Spanish team in a project funded by the EU, PROMOLEC, in collaboration with six other teams from several countries. In 2003 I received a Ramón y Cajal contract, and in 2007 I got the I3 distinction (*Informe de Trayectoria Investigadora Destacada*). In 2010 I got the position of senior lecturer, and in 2018 that of full professor. Since 2009, I have been PI of 3 consecutive research grants funded by the Spanish government, 3 grants funded by EU, 3 grants funded by Junta de Andalucía and 2 grants funded by UCO. We have received over € 2 million of funding since we started working on marine cyanobacteria. During my career, I have contributed to the knowledge on the nitrogen and carbon metabolism in photosynthetic microorganisms, first in eukaryotic algae (*M. braunii*), and since 1995 in a marine cyanobacterium of great ecological importance, *Prochlorococcus*. In 2010 we incorporated the marine cyanobacterium *Synechococcus* to our studies. We were pioneers in the research on N and C metabolism in these microorganisms, contributing a series of studies on the regulation of several enzymes and on the adaptive modifications of the N/C balance regulatory mechanisms in marine picocyanobacteria. Besides, we discovered that



Prochlorococcus can take up glucose, thus demonstrating that this organism is actually a mixotroph, and not a strict autotroph; this became the second big line of research in our lab. Our research has made significant contributions on genome streamlining, simplification of regulatory mechanisms and occurrence of high affinity transport mechanisms as key mechanisms for the ecological success of marine picocyanobacteria. We have acquired capabilities on omics techniques and studies in the field, that complement our background on biochemistry and molecular biology. Our contributions have been relevant enough to publish several manuscripts in high reputation journals: a review in 2004 in *Microbiology and Molecular Biology Reviews*; a paper of great relevance in *Proceedings of the National Academy of Sciences USA* (2013), which was selected for the Jacobo Cárdenas Torres prize, awarded by UCO in 2014; another paper in *The ISME Journal*, the top primary research journal in the field of Microbial Ecology, in 2020; besides, we have been recently invited by *FEMS Microbiology Reviews* to publish a manuscript on N metabolism in marine picocyanobacteria. I have been invited to give talks on our work in relevant international and national meetings. Since 2011, 55 % of our papers are international collaborations, and 64 % are open access. Our goal is to make significant advances in the knowledge of the adaptive mechanisms in the N and C metabolism of *Prochlorococcus* and *Synechococcus*, the most abundant photosynthetic organisms on Earth. We have collaborated with leading researchers in our field (SW Chisholm, WR Hess, DM Karl, I Luque, F Partensky, etc). Since 1997, and together with Prof. J. Díez, we established a team composed currently of 8 researchers, where I supervised 7 PhD theses (+ 2 ongoing) and a large series of undergraduate students. I have contributed to their scientific development, with a careful mentoring which is firmly anchored on the belief that a good personal and scientific relationship is essential to ensure a healthy, productive work environment. Currently I work as full professor at UCO, where I am actively involved in Biochemistry teaching (including bilingual teaching in English since 2017). Besides teaching and research, I have been working as manuscript reviewer for high relevance journals (*Nature*, *Science*, *PNAS*, *ISME J*, etc); and also as grants reviewer for REA (European Commission), NSF (USA), NERC (UK), FST (Portugal) and ANEP-AEI (Spain). Since 2018 I have been engaged in the organization of international and national meetings. Our team (*Cyanotrans*) is heavily involved in the dissemination of our work, covering all kind of strategies, from local to international events to spread our research both in the specialized and general public.

Part C. RELEVANT MERITS (sorted by typology)

C.1. Publications

1. Muñoz-Marín MC, Gómez-Baena G, López-Lozano A, Moreno-Cabezuelo JA, Díez J & García-Fernández JM (2020) Mixotrophy in marine cyanobacteria: use of organic compounds by *Prochlorococcus* and *Synechococcus*. *The ISME Journal* 14: 1065-1073. doi 10.1038/s41396-020-0603-9
2. Moreno-Cabezuelo JA, López-Lozano A, Díez J & García Fernández JM (2019) Differential expression of the glucose transporter gene *glcH* in response to glucose and light in marine picocyanobacteria. *PeerJ* 6:e6248. DOI 10.7717/peerj.6248
3. Domínguez-Martín MA, López-Lozano A, Clavería-Gimeno R, Velázquez-Campoy A, Seidel G, Burkovski A, Díez J & García-Fernández JM (2018) Differential NtcA responsiveness to 2-oxoglutarate underlies the diversity of C/N balance regulation in *Prochlorococcus*. *Frontiers in Microbiology*. DOI 10.3389/fmicb.2017.02641.
4. Domínguez-Martín MA, López-Lozano A, Rangel-Zúñiga OA, Díez J & García-Fernández JM (2018) Distinct features of C/N balance regulation in *Prochlorococcus marinus* MIT9313 *FEMS Microbiology Letters*. DOI 10.1093/femsle/fnx278.
5. Domínguez-Martín MA, Gómez-Baena G, Díez J, López-Grueso MJ, Beynon RB & García-Fernández JM (2017) Quantitative proteomics shows extensive remodeling induced by N limitation in *Prochlorococcus* sp. SS120 *mSystems* 2 (3), e00008-17. DOI 10.1128/mSystems.00008-17.
6. Muñoz-Marín MC, Gómez-Baena G, Díez J, Beynon RJ, González-Ballester D, Zubkov MV & García Fernández JM (2017) Glucose uptake in *Prochlorococcus*: diversity of kinetics and effects on the metabolism. *Frontiers in Microbiology*. DOI 10.3389/fmicb.2017.00327.
7. Domínguez-Martín MA, Díez J & García-Fernández, JM (2016) Physiological studies of glutamine synthetases I and III in *Synechococcus* sp. strain WH 7803 reveal differential



- regulation. *Frontiers in Microbiology*, Vol. 7, article 969, Q1. DOI 10.3389/fmicb.2016.00969.
8. Gómez-Baena G, Domínguez-Martín MA, Donaldson R, García-Fernández JM & Díez J (2015) Glutamine synthetase sensitivity to oxidative modification during nutrient starvation in *Prochlorococcus marinus* PCC 9511. *PLOS ONE* 10 (8), e0135322. DOI 10.1371/journal.pone.0135322.
 9. Domínguez-Martín MA, López-Lozano A, Díez J, Gómez-Baena G, Rangel Zúñiga OA & García-Fernández JM (2014) Physiological regulation of isocitrate dehydrogenase and the role of 2-oxoglutarate in *Prochlorococcus* sp. strain PCC 9511. *PLOS ONE* 9 (7):e103380. DOI: 10.1371/journal.pone.0103380.
 10. Muñoz-Marín MC, Luque I, Zubkov MV, Hill PG, Díez J & García-Fernández J (2013). *Prochlorococcus* can use the Pro1404 transporter to take up glucose at nanomolar concentrations in the Atlantic Ocean. *Proc. Natl. Acad. Sci. USA* 110 (21): 8597-8602. DOI: 10.1073/pnas.1221775110
 11. McDonagh B, Domínguez-Martín A, Gómez-Baena G, López-Lozano A, Díez J, Bárcena JA & García-Fernández JM (2012) Nitrogen starvation induces extensive changes in the redox proteome of *Prochlorococcus* sp. strain SS120. *Environ. Microbiol. Rep.* 4(2): 257-267. DOI 10.1111/j.1758-2229.2012.00331.x

C.2 Congresses (invited talks)

1. García-Fernández JM, Domínguez-Martín MA, López-Lozano A, Gómez-Baena G, Muñoz-Marín MA & Díez J (2017) Evolution of the regulation of nitrogen and carbon assimilation in marine picocyanobacteria. FEBS3+ 1st Joint Meeting of the French-Portuguese-Spanish Biochemical and Molecular Biology Societies-XL SEBBM Congress. Barcelona, Spain.
2. García-Fernández JM, López-Lozano A, Gómez-Baena G, Rangel OA, Toribio F & Díez J (2008) Regulación de la interacción carbono/nitrógeno en *Prochlorococcus*. IX Reunión Nacional de Metabolismo del Nitrógeno. Alicante, Spain.
3. García-Fernández JM, Gómez-Baena G, López-Lozano A, Rangel O, Toribio F & Díez J (2005) Metabolic tuning as a key for the ecological success of *Prochlorococcus* in marine oligotrophic environments. VIth Workshop on the Molecular Biology of Cyanobacteria. Gdansk, Poland.
4. García-Fernández JM, El Alaoui S, López-Lozano A, Gómez-Baena G, Toribio F & Díez J (2004) Mecanismos adaptativos de la asimilación de nitrógeno en *Prochlorococcus*. VII Reunión Nacional de Metabolismo del Nitrógeno. Almonte, Spain.

C.3. Research projects and grants

1. Interacciones entre las cianobacterias *Prochlorococcus*, *Synechococcus* y las bacterias heterótrofas coexistentes. UCO/Junta de Andalucía. FEDER-UCO 2020 programme, project 1380227. 2021-2022. 35000 €. PI: JM García-Fernández.
2. Comunicación entre bacterias marinas mediante vesículas. UCO/Junta de Andalucía. FEDER-UCO 2020 programme, project 1380795. 2021-2022. 35000 €. PI: MC Muñoz-Marín.
3. Transportadores de alta afinidad como mecanismos adaptativos clave en el éxito ecológico de las cianobacterias marinas. Junta de Andalucía, Frontier Projects. P20-00052. 2021-2022. 75575 €. PI: JM García-Fernández.
4. Determination of bacterial vesicles interactions in the most abundant marine cyanobacteria and its potential applications (VESYNECH). European Commission, H2020-MSCA-IF-2018 proposal 844891. 2019-2021. 160933 €. PI: JM García-Fernández.
5. Photosynthesis and photoprotection regulation in marine cyanobacteria and its potential applications (PHOTO-CY-APPs). European Commission, H2020-MSCA-IF-GF-2017 proposal 795070. 2018 – 2021. 239191 €. PI: JM García-Fernández.
6. Transporte de alta afinidad y otros mecanismos adaptativos en cianobacterias marinas. Ministerio de Economía y Competitividad. BFU2016-76227-P. 2016-2018. 139150 €. PI: JM García Fernández.
7. Metabolismo del carbono y el nitrógeno en cianobacterias marinas: uso de glucosa y diversidad de mecanismos regulatorios. Ministerio de Economía y Competitividad. BFU2013-44767. 2014-2016. 157300 €. PI: JM García Fernández.
8. Analyzing metabolism in an unusual nitrogen fixing symbiosis using metatranscriptomics (TRANSUCYNA). European Commission, FP7-PEOPLE-2013-IOF proposal 625188.



- 2014-2017. 255243 €. PI: JM García Fernández.
- Utilización de carbono orgánico y metabolismo del nitrógeno en las cianobacterias marinas *Prochlorococcus* y *Synechococcus*. Proyectos de Excelencia, Junta de Andalucía. P12-BIO-214. 2014-2018. 266144 €. PI: JM García Fernández.
 - Utilización de glucosa y mecanismos adaptativos y de control en el metabolismo del nitrógeno y del carbono en *Prochlorococcus*. Ministerio de Ciencia y Tecnología. BFU2009-08008/BMC. 2010-2013. 151200 €. PI: JM García Fernández.
 - Claves del éxito ecológico de la cianobacteria marina *Prochlorococcus*: Estudios de proteómica y expresión génica centrados en el metabolismo del nitrógeno y del carbono. Proyectos de Excelencia, Junta de Andalucía. P07-CVI-3055. 2008-2012. 84000 €. PI: JM García Fernández
 - El proteoma redox comparado. Proyectos de Excelencia, Junta de Andalucía. P06-CVI-1611. 2007-2011. 145000 €. Investigador. PI: JA Bárcena Ruiz.

C.4. Supervision of PhD theses

- Effect of stress on the release and composition of vesicles produced by marine *Synechococcus*. E Angulo Cánovas. UCO. Completion planned for December 2025.
- Assimilation of low nitrate concentrations by marine picocyanobacteria. YM Melero Rubio. UCO. Completion planned for December 2022.
- Physiological regulation and characterization of the GlcH glucose transporter in marine picocyanobacteria. JA Moreno Cabezuelo. UCO. 27 May 2019. *Cum laude* distinction given unanimously. International mention.
- Diversity of regulatory mechanisms in the C/N metabolism of the marine cyanobacteria *Prochlorococcus* and *Synechococcus*. MA Domínguez Martín. UCO. 19 December 2014. *Cum laude* distinction given unanimously. International mention.
- Utilization of glucose by *Prochlorococcus*: characterisation of Pro1404 transporter and metabolic effects. MC Muñoz Marín. UCO. 22 November 2013. *Cum laude* distinction given unanimously. International mention.

C.5. Reviewer

Reviewer of research projects

- National Science Foundation (USA). 2009, 2015.
- ANEP/ Agencia Estatal de Investigación (Spain). 2009, 2010, 2011, 2012, 2014, 2018.
- European Commission, DG Research & Innovation. 7th Framework Programme and Horizon 2020. 2009, 2013, 2014 (First & Second Stage), 2016.
- European Commission, DG Research & Innovation. Reviewer of intermediate reports of research projects. 2015, 2016, 2017, 2018, 2019, 2020, 2021.
- Natural Environment Research Council (United Kingdom). 2019.

Reviewer of manuscripts for the following journals:

| | | |
|------------------------------|---|-------------------------------------|
| <i>Nature</i> | <i>mBio</i> | <i>Journal of Bacteriology</i> |
| <i>Science</i> | <i>Biochemical Society Transactions</i> | <i>PLOS ONE</i> |
| <i>Nature Communications</i> | <i>Molecular Ecology</i> | <i>Physiologia Plantarum</i> |
| <i>PNAS</i> | <i>Frontiers in Microbiology</i> | <i>Journal of Applied Phycology</i> |
| <i>The ISME Journal</i> | <i>Environmental Microbiology</i> | <i>Hydrobiologia</i> |
| <i>New Phytologist</i> | <i>Limnology and Oceanography</i> | <i>FEMS Microbiology Letters</i> |
| <i>eLife</i> | <i>Applied and Environmental Microbiology</i> | <i>Cahiers de Biologie Marine</i> |

C.6 Organization of scientific meetings

- Main organizer, together with leaders in the field (Dr. Z. Johnson, Prof. S.W. Chisholm and Dr. F. Partensky), of [ProSynFest2020](#), a world meeting on *Prochlorococcus* and *Synechococcus*. Córdoba, March 16-19, 2022.
- Vicepresident of the organizing committee of the [XV National Meeting on Nitrogen Metabolism](#). Córdoba, February 2-4, 2022.

C.7 Awards

- Award "Jacobo Cárdenas Torres" for papers in Experimental Sciences, Engineering and Technology, given by the University of Córdoba in 2014, to Dr. María del Carmen Muñoz Marín, (PhD thesis supervised by J Diez and m), for the paper "*Prochlorococcus* can use the Pro1404 transporter to take up glucose at nanomolar concentrations in the Atlantic Ocean", published in *Proceedings of the National Academy of Sciences of the USA*, in 2013.