***CURRICULUM VITAE ABREVIADO (CVA)***

***IMPORTANT – The Curriculum Vitae cannot exceed 4 pages. Instructions to fill this document are available in the website.***

## Part A. PERSONAL INFORMATION

| | | | |
|---|---|---|---|
| First name | José Luis | | |
| Family name | Crespo González | | |
| Gender (*) | Male | Birth date (dd/mm/yyyy) | |
| Social Security, Passport, ID number | | | |
| e-mail | | URL Web | |
| Open Researcher and Contributor ID (ORCID) (*) | | | |

*(*) Mandatory*

### A.1. Current position

| | | | | |
|---|---|---|---|---|
| Position | Investigador Científico - Director of IBVF | | | |
| Initial date | 17/02/2021 | | | |
| Institution | Consejo Superior de Investigaciones Científicas (CSIC) | | | |
| Department/Center | IBVF | Instituto de Bioquímica Vegetal y Fotosíntesis | | |
| Country | Spain | | Teleph. number | 954489574 |
| Key words | TOR signaling, autophagy, $CO_2$, stress, Chlamydomonas, alga | | | |

### A.2. Previous positions (research activity interuptions, indicate total months)

| Period | Position/Institution/Country/Interruption cause |
|---|---|
| 2008-2021 | Científico Titular (CSIC) at IBVF |
| 2003-2008 | Ramón y Cajal researcher at IBVF |
| 1999-2003 | FEBS postdoctoral fellow at the Prof. Michael Hall lab (Biozentrum, Basel, Switzerland) |

### A.3. Education

| PhD, Licensed, Graduate | University/Country | Year |
|---|---|---|
| PhD in Biology | Universidad de Sevilla (US) | 1999 |
| Degree in Biology | Universidad de Sevilla (US) | 1993 |

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

**Research career:** My research career was initiated with the study of nitrogen metabolism in cyanobacteria during my PhD at the University of Sevilla. After completing my PhD, I performed a postdoctoral stay (1999-2003) at the Biozentrum (University of Basel, CH) to investigate the TOR signaling pathway under the supervision of Prof. Michael Hall with the support of a FEBS long-term fellowship. In 2003 I got a *Ramón y Cajal* research position at the IBVF to investigate the TOR signaling pathway in photosynthetic organisms using the single-celled green alga *Chlamydomonas reinhardtii* as model system. In 2008, I got a permanent position at CSIC as *Científico Titular* to continue my research work on the TOR pathway and autophagy, a TOR-controlled process highly conserved in all eukaryotes. In 2021, I was promoted to *Investigador Científico* at CSIC, and since March 2022 I am the Director of IBVF.

**Main research achievements:** During my postdoctoral stay at the Prof. Hall's lab, we found that Gln regulates the yeast TOR signaling pathway (Crespo et al. 2002 PNAS) and described for the first time the localization of the TOR kinase in two complexes, TORC1 and TORC2 (Loewith et al. 2002 Mol Cell). Since 2003, I am responsible of the research group "TOR signaling and autophagy in microalgae" at IBVF. Our group has been a pioneer in the study of

the TOR pathway and autophagy in microalgae (Crespo et al. 2005 Plant Physiol; Pérez-Pérez et al. 2010 Plant Physiol; Díaz-Troya et al. 2011 Plant Physiol; Pérez-Pérez et al. 2012 Autophagy). We have described the process of autophagy in algae and demonstrated that TOR negatively regulates this catabolic process for the first time in photosynthetic organisms (Pérez-Pérez et al. 2010 Plant Physiol). Our studies have shown that autophagy is subjected to redox regulation (Pérez-Pérez et al. 2012 Autophagy; Pérez-Pérez et al. 2014 Autophagy; Pérez-Martín et al. 2014 Plant Physiol; Pérez-Pérez et al. 2016 Plant Physiol; Pérez-Pérez et al. 2021 JXB) and maintains chloroplast homeostasis (Heredia-Martínez et al. 2018 Plant Physiol). More recently, our group has made significant contributions to understand the nutrient regulation of TOR and the underlying mechanisms in photosynthetic organisms. We have established that phosphorous availability regulates TOR activity in Chlamydomonas via LST8, a TORC1 core protein essential for TOR function (Couso et al. 2020 Plant Cell). Moreover, our group has demonstrated that photosynthetic assimilation of $CO_2$ activates TOR (Mallén-Ponce et al. 2022 PNAS; Mallén-Ponce et al. 2022 JXB; Mallén-Ponce et al. 2022 New Phytol). This study revealed for the first time a direct link between $CO_2$ fixation, photosynthesis and TOR. Recently, we identified dihydroxyacetone phosphate (DHAP) generated in the chloroplast as the key metabolite mediating $CO_2$ and light signals to TOR in photosynthetic cells (Mallén-Ponce, et al. *resubmitted to Science Advance after minor revision*). Moreover, we have initiated a new research line to investigate TOR signaling and autophagy in extremophilic organisms (Pérez-Pérez et al. 2024 New Phytol) and their biotechnological and ecological potential. My current research work aims to unravel the nutrient regulation of the TOR kinase in photosynthetic cells, the TOR-target interactome as well as the potential biotechnological implications of this signaling pathway in microalgae.

**Research training experience:** I have supervised the research work of 3 PhD researchers: Sandra Díaz-Troya (2009), currently professor at the University of Sevilla, Marta Pérez-Martín (2016), currently postdoc at University of Texas, Luis Heredia-Martínez (2022), who is a postdoc at University of Seville. Currently, I am supervising 2 Theses: Yosu Odriozola, supported by an FPI fellowship; and Irene Muñoz granted by the *Garantía Juvenil* program. I have also supervised the work of several PhD researchers during short-term stays performed in my lab in the frame of international collaborations: S. Schmolinger and P. Muller (from Dr Schroda lab), and S. Morisse (from Dr Lemaire lab).

I have also mentored the work of several postdocs in my group: Emilio Gutiérrez-Beltran, first as Marie Curie-Sklodowska fellow (H2020-MSCA-IF-2015) and then as *Juan de la Cierva-Incorporación* researcher (2018-2019), Inmaculada Couso-Liañez as Comfuturo researcher and Marie Curie-Sklodowska fellow (H2020-MSCA-IF-2016), Águila Ruiz-Sola (2019) and Manuel Mallén-Ponce (2021), both as *Juan de la Cierva-Incorporación* researchers in my group. Moreover, I have supervised international postdoc researchers for short-term stays: M. Bedhome (France), M. Carbó (Czech Republic) and C. Paliwal (Czech Republic).

**Internationalization:** My research allowed me to establish a solid network of international collaborators: Dr Grossman, Standford; Dr Field, CEA Marseille; Dr Lemaire, CNRS Paris; Dr Schroda, Kaiserslautern; Dr Merchant, Berkeley; Dr Umen, Danford; Dr Hicks, U North Carolina. I have publications leaded by our group with most of them. In addition, I have been enrolled in a European consortium to set up Synthetic Biology tools in *Chlamydomonas* (Crozet *et al* 2018 *ACS Synth Biol*; Crozet *et al* in preparation).

**Reviewer experience:** Member of the Evaluation Panel (PID2022) in the Biosciences and Biotechnology Section (Research National Agency). External reviewer for research programs from international institutions (ERC, Europe; ANR, France; SNF, USA; SNSF, Switzerland; BARD, Israel-USA; GIF, Germany-Israel; FONCYT, Argentina). Manuscript reviewer for different journals including The Plant Cell, Autophagy, Nature Comm, Plant Physiology, New Phytologist, J Exp Botany, etc.

**Part C. RELEVANT MERITS** *(sorted by typology)*

**C.1. Publications** (10 selected contributions from a total of 30 in last 10 years). [CA], corresponding author.

**Research productivity (WoS):** total number of publications in indexed journals: 61; total citations: 13.484; h index: 34.

1. Mallén-Ponce MJ, Quintero-Moreno A, Gámez-Arcas S, Grossman AR, Pérez-Pérez ME, Crespo JL[CA] (2025) Dihydroxyacetone phosphate generated in the chloroplast mediates the activation of TOR by $CO_2$ and light. ***Science Advances*** 11(16):eadu1240. IF: 11.7. D1. https://doi.org/10.1126/sciadv.adu1240
2. Pérez-Pérez ME[CA], Mallén-Ponce MJ, Odriozola-Gil Y, Rubio A, Salas JJ, Martínez-Force E, Pérez-Pulido AJ, Crespo JL[CA] (2024) Lipid turnover through lipophagy in the newly identified extremophilic green microalga *Chlamydomonas urium*. ***New Phytologist*** 243: 284-298 IF: 9.4. D1. https://doi.org/10.1111/nph.19811.
3. Mallén-Ponce MJ, Pérez-Pérez ME, Crespo JL[CA] (2022) Photosynthetic assimilation of $CO_2$ regulates TOR activity. ***Proc Natl Acad Sci USA*** 119 (2): e2115261119. IF: 11.205. D1 https://doi.org/10.1073/pnas.2115261119.
4. Mallén-Ponce MJ, Pérez-Pérez ME, Crespo JL[CA] (2022) Analyzing the impact of autotrophic and heterotrophic metabolism on the nutrient regulation of TOR. ***New Phytologist*** 236: 1261-1266. IF: 9.4. D1 https://doi.org/10.1111/nph.18450.
5. Mallén-Ponce MJ, Pérez-Pérez ME, Crespo JL[CA] (2022) Deciphering the function and evolution of the target of rapamycin signaling pathway in microalgae. ***J Exp Botany*** 73: 6993-7005. IF:6.992. D1. https://doi.org/10.1093/jxb/erac264.
6. Gutierrez-Beltran E, Elander PH, Dalman K, Dayhoff GW 2nd, Moschou PN, Uversky VN, Crespo JL, Bozhkov PV (2021) Tudor staphylococcal nuclease is a docking platform for stress granule components and is essential for SnRK1 activation in Arabidopsis. ***EMBO J*** 40:e105043. IF: 11.598. D1 doi.org/10.15252/embj.2020105043.
7. Couso I, Pérez-Pérez ME, Ford MM, Martínez-Force E, Hicks LM, Umen JG, Crespo JL[CA] (2020) Phosphorus availability regulates TORC1 signaling in Chlamydomonas. ***The Plant Cell*** 32: 69-80. IF:11.277. D1 https://doi.org/10.1105/tpc.19.00179.
8. Laureano-Marín AM, Aroca A, Pérez-Pérez ME, Yruela I, Jurado-Flores A, Moreno I, Crespo JL, Romero LC, Gotor C (2020) Abscisic Acid-Triggered Persulfidation of the Cys Protease ATG4 Mediates Regulation of Autophagy by Sulfide. ***The Plant Cell*** 32(12): 3902-3920. IF:11.277. D1 https://doi.org/10.1105/tpc.20.00766.
9. Heredia-Martínez LG, Andrés-Garrido A, Martínez-Force E, Pérez-Pérez ME[CA], Crespo JL[CA] (2018) Chloroplast damage induced by bthe inhibition of fatty acid synthesis triggers autophagy in Chlamydomonas. ***Plant Physiol*** 178(3): 1112-1129. IF: 6.305. D1. **Selected for journal cover** https://doi.org/10.1104/pp.18.00630**.**
10. Pérez-Pérez ME[CA], Lemaire SD, Crespo JL (2016) Control of autophagy in Chlamydomonas is mediated through redox-dependent inactivation of the ATG4 protease. ***Plant Physiol*** 172: 2219-2234. IF: 6.456. D1 https://doi.org/10.1104/pp.16.01582.

**C.2. Congress**

**Organizer:**

• "II Algae Symposium 2025" (AS2025). November 2025.
• EMBO Workshop Target of Rapamycin signaling in photosynthetic organisms. October 2021.
• Sociedad Española de Autofagia (SEFAGIA) 2022. Toledo, November 2022.
• Sociedad Española de Autofagia (SEFAGIA) 2020. Cáceres, March 2020.
• Sociedad Española de Autofagia (SEFAGIA) 2018. Miraflores de la Sierra, November 2018.
• Spanish Network for Autophagy Research (NEAR) 2017. Miraflores de la Sierra, Nov 2017.
• Spanish Network for Autophagy Research (NEAR) 2016. Miraflores de la Sierra, June 2016.
• First Joint Meeting of Nordic, Spanish and French Autophagy Networks. Tolouse, France September 2014.

**Scientiffic committee:**

• Plant Autophagy: Improving Crop and Energy Production. Transautophagy COST. Madrid, March 2017.
• 16th International Conference on the Cell and Molecular Biology of Chlamydomonas. Asilomar, Pacific Grove, USA, June 2014.

**Keynote/invited at international conferences:**

• French Society of Photosynthesis. Paris, France, May 2025.
• Plant Energy Management: Molecular Mechanisms and Signaling. Umea, Sweeden, Aug 2024.

• 20th International Conference on the Cell and Molecular Biology of Chlamydomonas. Princeton, USA June 2023.
• 19th International Conference on the Cell and Molecular Biology of Chlamydomonas. Ile des Embiez, France, August 2021.
• 9th European Symposium on Plant Lipids. Marseille, July 2019.
• EMBO Workshop Target of rapamycin (TOR) signaling in photosynthetic organisms. Bischoffsheim, France, May 2018.

**C.3. Research projects**, indicating your personal contribution.

**International grants as Principal Investigator:**

• "Understanding how Inositol Polyphosphates regulate autophagy and lipid body formation in photosynthetic organisms: crosstalk with TOR signaling". European Comission H2020-MSCA-IF-2016. Duration: 2018-2020. Budget: 170.121 €.
• "Functional analysis of Stress Granules formation in plant adaptation to stress". European Comission H2020-MSCA-IF-2015. Duration: 2017-2019. Budget: 170.121 €.
• "Molecular mechanism of autophagy in algae and its aplication in algal fuels". Korean Research Institute of Bioscience & Biotechnology (KRIBB). Duration: 2015-2019. Budget: 190.023 €.

**National grants as Principal Investigator:**

• "New insights in the molecular regulation of TOR by light and CO2 signals (RegulaTOR). Ministerio de Ciencia e Innovación (PID2024-162302NB-I00). Duration: 2025-2028. Budget: 268.750 € (plus FPI fellow).
• "Modulating the TOR signaling pathway to improve $CO_2$ assimilation into biomass (TORCO2)". Ministerio de Ciencia e Innovación (TED2021-130912-B-100). Duration: 2022-2025. Budget: 230.000 €.
• "Elucidating the nutrient regulation of TOR signaling in photosynthetic organisms (GREENTOR)". Ministerio de Ciencia e Innovación (PID2021-123500-NB-100). Duration: 2022-2025. Budget: 217.800 € (plus FPI fellowship).
• "Elucidating the mechanisms for selective autophagy in the alga *Chlamydomonas*". Ministerio de Economía y Competitividad (PGC2018-099048-B-100). Duration: 2019-2021. Budget: 137.698 €.
• "Redox control of autophagy". Ministerio de Economía y Competitividad (BFU2015-68216-P). Duration: 2016-2018. Budget: 201.586 € (plus FPI fellowship).
• "Control of autophagy by TOR signaling and ROS in Chlamydomonas". Ministerio de Economía y Competitividad (BFU2012-35913). Duration: 2013-2015. Budget: 138.060 €.

**Regional grants as Principal Investigator:**

• "Application of extremophilic microalgae for wastewater bioremediation (ALGAclean)". Junta de Andalucía (DGP_PIDI_2024_01534). *Under evaluation.*
• "Autophagy in a new extremophilic microalgae". Junta de Andalucía/Proyectos de Excelencia (P20-00057). Duration: 01/01/2021-31/12/2022. Budget: 80.000 €.
• "Autophagy as a cell adaptation process to stress in photosynthetic organisms". Junta de andalucía (CVI-7336). Duration: 01/02/2013-30/09/2016. Budget: 158.705 €.

**C.4. Contracts, technological or transfer merits**

**Research transfer to society:**

• Ellaboration of the CSIC White Paper on Sustainable Primary Production-Biotechnology and Plant Breeding (CSIC SCIENTIFIC CHALLENGES: TOWARDS 2030).
• Collaboration with the company AGRISERA for the generation of ATG8 and ATG4 antibodies.
• Participation in the project GENETDIESEL (960.000 €) with the company ALGAENERGY.

**Outreach activities:**

• Participation in Feria de la Ciencia, Café con Ciencia, and European Researchers Night.
• Management of social media (X: @ChlamyAutophagy).

**C.5. Teaching activity**

• External prof. Master Molecular Genetics and Biotechnology (Univ. Sevilla), 2018-present
• Degree in Biology (Univ. Sevilla), 2003-2008
• Acreditation as "Profesor Contratado Doctor" (ANECA), 2008