MINISTERIO
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AGENCIA
ESTATAL DE
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**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

| CV date | 07/11/2025 |
|---|---|

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|---|---|---|---|
| First name | MÓNICA | | |
| Family name | BALSERA DIÉGUEZ | | |
| Open Researcher and Contributor ID (ORCID) (*) | 0000-0002-5586-6050 | | |

### A.1. Current position

| | | | |
|---|---|---|---|
| Position | Staff scientist | | |
| Initial date | 1.10.2009 | | |
| Institution | Instituto de Recursos Naturales y Agrobiología de Salamanca (IRNASA-CSIC) | | |
| Department/Center | Abiotic stress | | |
| Country | Spain | Teleph. number | 0034923219606 |
| Keywords | Molecular Biology; Biochemical and Biophysical methodologies; Bioinformatics; Structural Biology; Flavoenzymes; Photosynthesis; Redox Biology; Signaling pathways. | | |

### A.2. Previous positions (research activity interruptions, see call)

| Period | Position/Institution/Country/Interruption cause |
|---|---|
| October 2020-February 2021 | Temporary disability due to medical leave. |
| May.2008-September.2009 | Postdoctoral researcher. Paul Scherrer Institute (PSI), Villigen, Switzerland. |
| June.2005-May.2008 | Postdoctoral researcher. Lüdwig-Maximilians-Universität (LMU), Munich, Germany. |
| July.2004-May.2005 | Postdoctoral fellow. Fundación para la Investigación Biomédica Hospital Gregorio Marañón, Madrid, Spain. |
| June.2000-June.2004 | Predoctoral fellow. Instituto de Recursos Naturales y Agrobiología de Salamanca (IRNASA), Salamanca, Spain. |

### A.3. Education

| PhD, Licensed, Graduate | University/Country | Year |
|---|---|---|
| PhD | University of Salamanca, Spain | 2004 |
| Master | University of Salamanca, Spain | 2002 |
| Grade in Chemistry | University of Córdoba, Spain | 1997 |

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

My research has focused on the biochemical and structural characterization of biomolecules. During my PhD (2000-2004), I studied the extrinsic proteins of photosystem II in plants, combining structural biology, biochemistry, biophysics and bioinformatics. In 2004, I held a post-doctoral fellowship at the Gregorio Marañón Hospital in Madrid, where I contributed to developing an immunochemical assay for diagnosing rheumatoid arthritis. In 2005, I was awarded a Ramón Areces postdoctoral fellowship and joined Prof. Soll's group at LMU (Munich, Germany), studying protein transport complexes in chloroplasts. A sabbatical stay in Munich by Prof. Bob B. Buchanan (Berkeley, USA) sparked my interest in redox biology, leading to our work on protein-protein interactions that regulate chloroplast transport and redox regulation. In 2008, I joined the Biomolecular Research Group at Paul Scherrer Institute (Villigen, Switzerland) contributing to the characterization of membrane protein complexes associated with bacterial metabolism. During this time, I expanded my knowledge in new methods for the structural and biophysical characterization of proteins.

Since 2009, I have been a tenured scientist at CSIC, leading the "Redox Biochemistry of Plants and Cyanobacteria" group at IRNASA. I have held the positions of head of the Department of Abiotic Stress and Secretary of the Claustro. I have been awarded four research six-year terms for my work.

My scientific interest focused on deciphering molecular mechanisms involved in the exchange of redox information within the cell, with a special interest in photosynthesis. Our laboratory is pursuing two related lines of research, one focused on characterizing redox components involved in retrograde signaling, and the other on studying the structure-function relationships of proteins involved in redox regulation and climate adaptation. We have contributed significantly to the study of thioredoxin reductase enzymes, identifying new enzymes and regulatory mechanisms that have expanded our understanding of these critical biological processes. As pioneers in this field, we continue to advance our knowledge of regulatory proteins that respond to redox environmental changes, providing insight into the complex mechanisms underlying cellular responses to oxidative stress. In pursuit of my research goals, I regularly collaborate with national and international groups as reflected by my co-authorship in scientific publications.

Throughout my career, I have served as expert evaluator for agencies such as the Spanish Agencia Nacional de Evaluación y Prospectiva (ANEP), Spanish Agencia Estatal de Investigación (AEI), Junta de Andalucía (DEVA), and international agencies such as the Agence Nationale de la Recherche (ANR) and Deutsche forschungsgemeinschaft (DFG). I have also been reviewer for a variety of prestigious organizations and scientific journals such as Molecular Plant, Plant Physiology, PNAS, ARS, Molecular and Cellular Proteomics, Nature Plants, New Phytologist, Plant Signaling Behaviour, Journal of Experimental Botany, Nature Communication, The Plant Cell, FEBS Letters, among others.

I am part of the PhD program in Agrobiotechnology at the University of Salamanca, and I teach and tutor students in the Biotechnology degree and the Master's in Molecular and Cellular Biology. I have supervised one PhD thesis, four undergraduate final projects, and two master's theses. Our lab also hosts vocational training students (FP).

I actively support scientific outreach and dissemination, aiming to communicate research findings to broader audiences. In addition to presenting our research at national and international conferences and seminars, I have participated in radio and other social media, and our work has been featured in local and regional newspapers. I regularly engage in science communication through digital platforms, helping to promote research and foster public interest in plant biology and biotechnology. I am a member of several scientific societies, including the Spanish Society for Biochemistry and Molecular Biology (SEBBM), Spanish Biophysical Society (SBE) and Spanish Society of Plant biology (SEBP), where I currently serve on the executive board. Additionally, I am involved in the joint initiative LifeHUB-CSIC. Recently, I organized the national symposium on "Redox Biology in Plants" at Zaragoza (Spain) and co-organized the international workshop "Plants under environmental stress: Overcoming current climate change" at UNIA, Baeza (Spain). I am also editing a special Issue titled "Enhancing Plant Performance for a Sustainable Future: Molecular and Physiological Approaches", to be published in the Journal of Experimental Botany.

## Part C. RELEVANT MERITS

### C.1. Publications (ten most relevant; ***corresponding author**)


1. Minjarez-Saenz M, Correa-Pérez V, Rivero M, ... **Balsera M*** (2025). "A π-stacking gate for redox control in Flavin Ferredoxin-Thioredoxin Reductases." Int J Biol Macromol. *In press*. DOI: 10.1016/j.ijbiomac.2025.148860. (11/11)

2. Buey RM, Fernandez-Justel D, González-Holgado G, ... **Balsera M*** (2021). Unexpected diversity of ferredoxin-dependent thioredoxin reductases in cyanobacteria. Plant Physiology, 186(1): 285-296. DOI: 10.1093/plphys/kiab072. (9/9)

3. **Balsera M***, Buchanan BB (2019). Evolution of the thioredoxin system as a step enabling adaptation to oxidative stress. Free Radical Biology and Medicine, 140:28-35. DOI: 10.1016/j.freeradbiomed.2019.03.003

4. Buey RM, Fernandez-Justel D, de Pereda JM, Revuelta JL, Schürmann P, Buchanan BB, **Balsera M*** (2018). Ferredoxin-linked flavoenzyme defines a family of pyridine nucleotide-

independent thioredoxin reductases. Proceedings of the National Academy of Sciences of ohe United States of America, 115 (51): 12967-72. DOI: 10.1073/pnas.1812781115

5. Buey RM, Arellano JB, López-Maury L, ... **Balsera M*** (2017). Unprecedented pathway of reducing equivalents in a diflavin-linked disulfide oxidoreductase. Proceedings of the National Academy of Sciences of the United States of America, 114:12725-30. DOI: 10.1073/pnas.1713698114. (11/11)

6. Buey RM, Galindo-Trigo S, López-Maury L, ... **Balsera M*** (2017). A new member of the thioredoxin reductase family from early oxygenic photosynthetic organisms. Molecular Plant, 10:212-15. DOI: 10.1016/j.molp.2016.06.019. (10/10)

7. Uberegui E, Hall M, Lorenzo O, Schröder WP, **Balsera M*** (2015). An Arabidopsis soluble chloroplast proteomic analysis reveals the participation of the Executer pathway in response to increased light conditions. Journal of Experimental Botany, 66:2067-77. DOI: 10.1093/jxb/erv018

8. **Balsera M***, Uberegui E, Schürmann P, Buchanan BB (2014). Evolutionary development of redox regulation in chloroplasts. Antioxidants and Redox Signalling, 21: 1327-55. DOI: 10.1089/ars.2013.5817

9. **Balsera M***, Uberegui E, Susanti D, Schmitz RA, Mukhopadhyay B, Schürmann P, Buchanan BB (2013). Ferredoxin:thioredoxin reductase (FTR) links the regulation of oxygenic photosynthesis to deeply rooted bacteria. Planta, 237: 619-35. DOI: 10.1007/s00425-012-1803-y

10. **Balsera M***, Goetze TA, Kovács-Bogdán E, Schürmann P, Wagner R, Buchanan BB, Soll J, Bölter B. Characterization of Tic110, a channel-forming protein at the inner envelope membrane of chloroplasts, unveils a response to Ca(2+) and a stromal regulatory disulfide bridge (2009). Journal of Biological Chemistry. 284:2603-2616.

**C.2. Congress** (ten most relevant)

1. "Exploring the interplay of protein redox state, environmental conditions, and photosynthesis: Implications for adaptation and acclimation". M. Balsera. International Workshop "Plants under environmental stress: Overcoming current climate change" UNIA, (November 2024), Baeza. Jaén. Invited oral communication.
2. "Redox signaling and regulation mechanisms in plant acclimation and adaptation to environmental changes". Symposium "Biología Redox de Plantas" M. Balsera. 45th Annual Meeting of the Spanish Society of Biochemistry & Molecular Biology, SEBBM (September 2024). Zaragoza, Spain. Oral presentation.
3. "High-resolution X-ray crystallographic structures expand the repertoire of flavoenzymes in bacteria". M. Balsera. XXX Simposio. La próxima generación: Nuevas tecnologías para nuevos materiales y biomoléculas (January, 2023). Benidorm, Spain. Oral presentation.
4. "Structural and functional diversity of bacterial thioredoxin reductase flavoenzymes". M. Balsera. 20th International Symposium on Flavins & Flavoproteins (September, 2021), Graz, Austria. Invited oral communication.
5. "Thioredoxin regulation via a ferredoxin-dependent flavoenzyme (FFTR) in photosynthesis". M. Balsera. International Workshop "Understanding Plant Responses to Climate Change: Redox-Based Strategies", (September, 2021), Baeza, Spain. Oral presentation.
6. "Redox regulation in chloroplasts" M. Balsera. SEB's 2019 Annual Meeting (September, 2019), Sevilla, Spain. Invited oral communication.
7. "Thiol-based redox signaling and regulation: Diversity of the thioredoxin system". M. Balsera. 42nd Annual Meeting of the Spanish Society of Biochemistry & Molecular Biology (September, 2019). Madrid, Spain. Oral communication.
8. Exploring the structural and functional diversity of the thioredoxin system (Octubre, 2017). Red de Excelencia de Regulación Redox y Estrés Oxidativo y Nitrosativo en Plantas. San Lúcar de Barrameda (Cádiz). Oral communication.

9. “Diversity and evolution of Thioredoxin Reductases: Structural relationships” M. Balsera. EMBO meeting: Thiol Oxidation in Toxicity and Signaling (September, 2017), Sant Feliu du Guixols, Spain. Oral communication.

10. “Diversity and evolution of thioredoxin reductases” M. Balsera. Meeting on Redox regulation: Historical background and future developments (March, 2017), Nancy, France. Oral communication.

### C.3. Research projects

1. 2023-2025. Red de Investigación “Integración de la señalización redox en el desarrollo y la adaptación de las plantas a estrés medioambiental”. AEI (Ref. RED2022-134072-T). PI: Mónica Balsera Diéguez. Budget: 20.000 €.
2. 2020-2024. *Flavoenzimas y señalizacion-regulación redox dependiente de tioles en fotosíntesis: un estudio estructural y funcional.* MICINN (Ref.: PID2019-110900GB-I00). PI: Mónica Balsera Diéguez. Budget: 121.000 €.
3. 2021-2024. Unidad de excelencia IRNASA. Junta de Castilla y León (Ref. 217361). Coordinator: M. Mar Siles Lucas. Role: Guarantor. Budget: 850.000 €.
4. 2020-2022. Red de Excelencia “Señalización redox y regulación post-traduccional en el desarrollo y respuesta a estrés de las plantas”. MICINN (Ref. RED2018-102397-T). Coordinator: Luisa M. Sandalio González. Role: Research participant. Budget 18.000 €.
5. 2017-2020. Evolución y diversidad de nuevos miembros de la familia de flavoproteínas implicadas en modificación de grupos sulfhidrilo en biomoléculas. MEIC. PI: Mónica Balsera Diéguez. BFU2016-80343-P. Budget: 108.900 €.
6. 2016-2017. Variabilidad genotípica en la calidad nutricional del grano de trigo en el escenario climático futuro. Junta de Castilla y León (Ref.: CSI083U16). PI: Rosa Morcuende Morcuende. Role: Research participant. Budget: 40.000 €.
7. 2014-2016. Cambios moleculares y funcionales con impacto potencial en la adaptación al aumento de $CO_2$ atmosférico en la cebada. Junta Castilla y León (Ref. CSI250U13). PI: M. Pilar Pérez Pérez. Role: Research participant. Budget: 34.999 €.
8. 2011-2014. Caracterización funcional de las proteínas Executer en la señalización plastídica mediada por oxígeno singlete. Ministerio de Ciencia e Innovación (Ref. BFU2010-18252). PI: Mónica Balsera Diéguez. Budget: 108.900 €.
9. 2010-2012. Análisis molecular de la señalización retrógrada del cloroplasto al núcleo en condiciones de estrés fotooxidativo inducido por oxígeno singlete en plantas. Junta Castilla y León (Ref. CSI002A10-2). Investigador principal: Juan B. Arellano Martínez. Role: Research participant.. Importe: 39.500 €.
10. 2005-2008. Funktion und regulation des protein import-translocons der inneren chloroplasten-hüllmembran. Deutsche Forschungsgemeinschaft (Ref. SFB594). Investigador Principal: Prof. Jürgen Soll (Universität Ludwig Maximiliams. Munich, Alemania). Role: Research participant.

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

1/10/2013-30/10/2016. Collaboration agreement: CSIC, IRNASA Y CECOSA SEMILLAs, S.L. Cambios moleculares y funcionales con impacto potencial en la adaptación al aumento de CO2 atmosférico en la cebada. Principal Investigator: Pilar Pérez Pérez.