DATE	31/07/2025

Part A. PERSONAL INFORMATION

First Name	Fernando Publio		
Surname	Molina Heredia		
Sex	Male	Date of Birth	
ID/Passport			
Email Address			
Open Researcher and Contributor ID (ORCID)	0000-0002-3637-0519		

A.1. Current Professional Situation

Position	Full Professor		
Start Date	23/12/2024		
Organisation / Institution	University of Seville		
Department / Faculty	Plant Biochemistry and Molecular Biology / Faculty of Biology		Pla
Country	Spain	Telephone	
UNESCO Specialisation Codes	**2302, 2403, 2406, 2409, 2415, 2419**, 2302.09, 2302.12,2302.21, 2302.25,		
Keywords	Photosynthesis, respiration, protein engineering, molecular biology, cyanobacteria, metalloproteins, superoxide, oxidative stress, bioethanol, biofuels, bioplastics, biofertilizer, biostimulants		

A.2. Previous Positions

Period	Position / Institution / Country
27/11/2009–22/12/2024	Associate Professor / University of Seville / Spain
10/05/2008–26/11/2009	Senior Lecturer University of Seville / Spain
15/03/2007–09/05/2008	Senior Lecturer Level II / University of Seville / Spain
16/06/2005–14/03/2007	Senior Lecturer Level I, Permanent Contract / University of Seville
14/03/2005–15/06/2005	Senior Lecturer Level I, Temporary Contract / University of Seville
07/03/2004–13/03/2005	University Assistant, 2nd period (LRU) / University of Seville /
03/02/2003–02/02/2004	Ingénieur E2/ CEA / Francia
07/03/2002–06/03/2004	University Assistant, 1st period (LRU) / University of Seville /

A.3. Academic Training

Degree	University / Country	Year
PhD in Biology	University of Seville	2001
BSc in Biological Sciences	University of Seville	1996

A.4. General Quality Indicators of Scientific Output

Six-Year Research Periods Awarded	5 (4 in research and 1 in knowledge transfer)
Publications	52 (WOS), 41 indexed
Citations	2028 (GE)
Conference Contributions	120
PhD Theses Supervised	3
h-index	24
i10-index	34

Parte B. CV SUMMARY

Five six-year periods recognised by the CNEAI, four in research (the most recent awarded in 2022) and one in knowledge transfer (the most recent awarded in 2019),

five five-year teaching periods (the most recent awarded in 2024), and 5/5 Andalusian research/teaching/management periods.

95% of indexed publications are in Q1.
49 publications on ResearchGate with a Research Interest Score above 85%.
Two articles recommended by Faculty of 1000.
More than 120 conference papers/publications in congresses and scientific meetings.

Awards and Responsibilities:

- Royal Maestranza de Caballería Research Prize 2005, awarded by the Royal Sevillian Academy of Sciences.
- Head of Admissions at the University of Seville since March 2021.
- Vice Dean for Students, National Mobility and Teaching Innovation, Faculty of Biology, University of Seville (March 2016 – March 2021).
- Member of the University Senate of the University of Seville.
- Member of the Academic Committee of the PhD Programme in Integrated Biology, University of Seville.
- Member of the Academic Committee of the Master's Degree in Advanced Biology, University of Seville.
- Academic Coordinator of the Degree in Biochemistry jointly offered by the University of Seville and the University of Málaga (Andalucía-Tech).
- Head of Research Group PAI AGR-288.
- Principal Investigator of two competitive research projects and six company-funded research projects in the last five years.
- Participant in 11 research projects, including EU-funded projects.
- Co-author of three patents.

Main research topics:

- **Biofuel production**: in particular, enzymatic cocktails for the hydrolysis of lignocellulosic residues used in second-generation bioethanol production.
- **Bioplastics production**: discovery of new enzymes for polyester production from glycerol.
- **Structure–function relationships of metalloproteins** involved in electron transfer in respiratory and photosynthetic electron transfer chains, and in defence against oxidative stress.
- **Development of new biofertilisers** with high N_2-fixation capacity.

Parte C. LIST OF MOST RELEVANT CONTRIBUTIONS

C.1. Most Important Publications in Peer-Reviewed Books, Journals and Conferences

1 **Scientific article**. Jiménez-Ríos, Lucía; Torrado, Alejandro; González-Pimentel, José Luis; Iniesta-Pallares, Macarena; (5/7) Molina-Heredia, Fernando P; Mariscal, Vicente; Álvarez, Consolación. 2024. Emerging nitrogen-fixing cyanobacteria for sustainable cotton cultivation. SCIENCE OF THE TOTAL ENVIRONMENT. ELSEVIER SCIENCE BV; ELSEVIER. 924, pp.171533. ISSN 0048-9697, ISSN 1879-1026. SCOPUS (0), WOS (0) https://doi.org/10.1016/j.scitotenv.2024.171533

2 **Scientific article**. Torrado, Alejandro; Iniesta-Pallarés, Macarena; Velázquez-Campoy, Adrián; Álvarez, Consolación; Mariscal, Vicente; (6/6) Molina-Heredia, Fernando P. (AC). 2023. Phylogenetic and functional analysis of cyanobacterial Cytochrome c_6-like

proteins. FRONTIERS IN PLANT SCIENCE. FRONTIERS MEDIA SA. 14. ISSN 1664-462X. SCOPUS (1), WOS (1) https://doi.org/10.3389/fpls.2023.1227492

3 **Scientific article**. Rodríguez-Gil, Tomás; Torrado, Alejandro; Iniesta-Pallarés, Macarena; Álvarez, Consolación; Mariscal, Vicente; (6/6) Molina-Heredia, Fernando P. (AC). 2021. Cytochrome c_M is probably a membrane protein similar to the C subunit of the bacterial nitric oxide reductase. APPLIED SCIENCES-BASEL. MDPI. 11-20. ISSN 2076-3417. SCOPUS (2), WOS (2) https://doi.org/10.3390/app11209396

4 **Scientific article**. Torrado, Alejandro; Ramírez-Moncayo, Carmen; Navarro, José A.; Mariscal, Vicente; (5/5) Molina-Heredia, Fernando P. (AC). 2019. Cytochrome c_6 is the main respiratory and photosynthetic soluble electron donor in heterocysts of the cyanobacterium *Anabaena* sp. PCC 7120. BIOCHIMICA ET BIOPHYSICA ACTA-BIOENERGETICS. ELSEVIER SCIENCE BV. 1860-1, pp.60-68. ISSN 0005-2728, ISSN 1879-2650. SCOPUS (14), WOS (12) https://doi.org/10.1016/j.bbabio.2018.11.009

5 **Scientific article**. Reyes-Sosa, Francisco Manuel; López Morales, Macarena; Platero Gómez, Ana Isabel; Valbuena Crespo, Noelia; Sánchez Zamorano, Laura; Rocha-Martín, Javier; (7/8) Molina-Heredia, Fernando P.; Díez García, Bruno. 2017. Management of enzyme diversity in high-performance cellulolytic cocktails. BIOTECHNOLOGY FOR BIOFUELS. BIOMED CENTRAL LTD. 10-156, pp.1-10. ISSN 1754-6834. SCOPUS (19), WOS (17) https://doi.org/10.1186/s13068-017-0845-6

6 **Scientific article**. Torrado, Alejandro; Valladares, Ana; Puerto-Galán, Leonor; Hervás, Manuel; Navarro, José A.; (6/6) Molina-Heredia, Fernando P. (AC). 2017. Cyt $c_{6\text{-}3}$: A New Isoform of Photosynthetic Cyt c_6 Exclusive to Heterocyst-Forming Cyanobacteria. Plant and Cell Physiology. 58-2, pp.256-265. ISSN 0032-0781, ISSN 1471-9053. SCOPUS (3), WOS (3) https://doi.org/10.1093/pcp/pcw184

7 **Scientific article**. Reyes-Sosa, Francisco M.; Gil-Martínez, Jorge; (3/3) Molina-Heredia, Fernando P. (AC). 2011. Cytochrome c_6-like protein as a putative donor of electrons to photosystem I in the cyanobacterium *Nostoc* sp. PCC 7119. PHOTOSYNTHESIS RESEARCH. KLUWER ACADEMIC PUBL. 110-1, pp.61-72. ISSN 0166-8595, ISSN 1573-5079. SCOPUS (10), WOS (12) https://doi.org/10.1007/s11120-011-9694-5

8 **Scientific article**. Reyes-Sosa, Francisco M.; (2/3) Molina-Heredia, Fernando P. (AC); De La Rosa, Miguel A. 2010. A novel alpha-amylase from the cyanobacterium *Nostoc* sp. PCC 7119. APPLIED MICROBIOLOGY AND BIOTECHNOLOGY. SPRINGER. 86-1, pp.131-141. ISSN 0175-7598, ISSN 1432-0614. SCOPUS (6), WOS (6) https://doi.org/10.1007/s00253-009-2191-5

9 **Scientific article**. (1/7) Molina-Heredia, FP (AC); Wastl, J; Navarro, JA; Bendall, DS; Hervás, M; Howe, CJ; De la Rosa, MA. 2003. A new function for an old cytochrome? NATURE. 424-6944, pp.33-34. ISSN 0028-0836, ISSN 1476-4687. SCOPUS (63), WOS (62) https://doi.org/10.1038/424033b

10 **Scientific article**. (1/5) Molina-Heredia, FP; Balme, A; Hervás, M; Navarro, JA; De la Rosa, MA. 2002. A comparative structural and functional analysis of cytochrome c_M, cytochrome c_6 and plastocyanin from the cyanobacterium *Synechocystis* sp. PCC 6803. FEBS LETTERS. WILEY-BLACKWELL; WILEY. 517-1-3, pp.50-54. ISSN 0014-5793, ISSN 1873-3468. SCOPUS (23), WOS (28) https://doi.org/10.1016/S0014-5793(02)02576-0

11 **Scientific article**. (1/4) Molina-Heredia, FP; Hervás, M; Navarro, JA; De la Rosa, MA. 2001. A single arginyl reside in plastocyanin and in cytochrome c_6 from the cyanobacterium *Anabaena* sp. PCC 7119 is required for efficient reduction of photosystem I. JOURNAL OF BIOLOGICAL CHEMISTRY. AMER SOC BIOCHEMISTRY MOLECULAR BIOLOGY INC; ELSEVIER. 276-1, pp.601-605. ISSN 0021-9258, ISSN 1083-351X. SCOPUS (47), WOS (49) https://doi.org/10.1074/jbc.M007081200

12 **Scientific article**. (1/5) Molina-Heredia, FP; Diaz-Quintana, A; Hervás, M; Navarro, JA; De la Rosa, MA. 1999. Site-directed mutagenesis of cytochrome c_6 from *Anabaena* species PCC 7119 - Identification of surface residues of the hemeprotein involved in photosystem I reduction. JOURNAL OF BIOLOGICAL CHEMISTRY. AMER SOC BIOCHEMISTRY MOLECULAR BIOLOGY INC; ELSEVIER. 274-47, pp.33565-33570. ISSN 0021-9258, ISSN 1083-351X. SCOPUS (40), WOS (40) https://doi.org/10.1074/jbc.274.47.33565

13 **Scientific article**. (1/4) Molina-Heredia, FP; Hervás, M; Navarro, JA; De la

Rosa, MA. 1998. Cloning and correct expression in *Escherichia coli* of the petE and petJ genes respectively encoding plastocyanin and cytochrome c_6 from the cyanobacterium *Anabaena* sp. PCC 7119. BIOCHEMICAL AND BIOPHYSICAL RESEARCH COMMUNICATIONS. ACADEMIC PRESS INC JNL-COMP SUBSCRIPTIONS. 243-1, pp.302-306. ISSN 0006-291X, ISSN 1090-2104. SCOPUS (41),
WOS (42) https://doi.org/10.1006/bbrc.1997.7953

14 **Book chapter.**Torrado, Alejandro; (2/2) Molina-Heredia, Fernando P.2016. Cytochrome c_6-like proteins in cyanobacteria, algae, and higher plants. Handbook of Photosynthesis, Third Edition. pp.229-240. ISBN 9781482230758, ISBN 9781482230734. SCOPUS (1),
WOS (1)

C.3. Research Projects or Lines of Research

1 **Project.** PROYEXCEL_00298, Biofertilisation of rice with symbiotic cyanobacteria from the Guadalquivir marshes (BioSym). Junta de Andalucía (Consejería de Transformación Económica, Industria, Conocimiento y Universidades). Álvarez Núñez, Consolación; Molina-Heredia, Fernando Publio. 01/04/2023-31/03/2026. 159.804 €.

2 **Project.** US-1380747, Study of rice–cyanobacteria symbiosis and its agronomic application. Junta de Andalucía (Consejería de Economía, Conocimiento, Empresas y Universidad). Álvarez Núñez, Consolación; Molina-Heredia, Fernando Publio. 01/01/2022-31/03/2023. 100.000 €.

3 **Contract.** Development of strains overexpressing growth factors for in vitro meat production. BDI Biotech. Molina Heredia, Fernando Publio. 01/02/2021- 01/02/2022. 72.600 €.

4 **Contract.** Biochemical support for the development of enzymatic cocktails to increase sugar yield from lignocellulosic biomass. Abengoa Bioenergía Nuevas Tecnologías. Molina Heredia, Fernando Publio. 17/11/2014- 17/11/2015. 60.500 €.

5 **Contract.** Production of advanced biopolymers from waste (Biopolim-A CANAGROSA).Molina Heredia, Fernando Publio. 11/12/2013-01/01/2015. 57.475 €.

6 **Contract**. Purification and identification of proteins with auxiliary activities from enzymatic cocktails to increase yield in lignocellulosic ethanol production. Abengoa Bioenergía Nuevas Tecnologías. Molina Heredia, Fernando Publio. 15/05/2013-15/05/2014. 133.100 €.

7 **Contract.** Purification of cellulolytic enzymes.Abengoa Bioenergía Nuevas Tecnologías. Molina Heredia, Fernando Publio. 14/05/2012-14/05/2013. 99.120 €.

8 **Contract.** Technical feasibility study for the biotechnological exploitation of beer bagasse from the Heineken factory in Seville. Rosa Acosta, Miguel Ángel de la. 01/08/2007-31/12/2007. 6.960 €.

C.4. Technology/Knowledge Transfer and Exploitation of Results

1 **Utility model.** Mariscal Romero, Vicente; Álvarez Núñez, Consolación; Jiménez Ríos, Lucía; Molina-Heredia, Fernando Publio; Pallarés Verdugo, Fernando; Pallarés Verdugo, Juan Carlos; Rojas Pareja, María del Mar; Santos Mejías, Myriam; Pallarés Bono, Álvaro. U202231993. Amino acid biostimulant composition for plants. 29/11/2022. Qabtur Agroquímicos, S.L.

2 **Utility model.** Álvarez Núñez, Consolación; Mariscal Romero, Vicente; Molina-Heredia, Fernando Publio; Sierra Valiño, Enrique; Martínez Polo, Miguel; Sánchez-Noriega Gómez, Antonio. U202132508. Fertiliser based on sarcosine and free amino acids for different crops. 16/05/2022. Fitoquivir.

3 **Patent.** De la Rosa Acosta, Miguel Ángel; De la Cerda Haynes, Berta; Molina-Heredia, Fernando Publio; Rodríguez Roldán, Vicente; Hervás Morón, Manuel; García Heredia, José Manuel; Navarro Carruesco, José Antonio. ES2315039B1. Genetic construct encoding cytochrome *c* and method for its production. 16/12/2009. Consejo Superior de Investigaciones Científicas (CSIC); University of Seville.