

**CURRICULUM VITAE ABREVIADO (CVA)**

**Part A. PERSONAL INFORMATION**

First name	Luis Ángel		
Family name	Fernández Herrero		
Gender (*)	Male	Birth date (dd/mm/yyyy)	09/12/1967
Passport / ID number	PAT002865 / 52085935C		
e-mail	lafdez@cnb.csic.es	URL Web	
Open Researcher and Contributor ID (ORCID) (*)	0000-0001-5920-0638		

(\*) *Mandatory*

**A.1. Current position**

Position	Investigador Científico / CSIC Scientific Researcher (A2)		
Initial date	15/03/2011		
Institution	Consejo Superior de Investigaciones Científicas (CSIC)		
Department/Center	Biot. Micro.	Centro Nacional de Biotecnología (CNB)	
Country	Spain	Teleph. number	915854854
Key words	Biotechnology, Microbiology, Synthetic Biology, Nanobodies		

**A.2. Previous positions (research activity interruptions, indicate total months)**

Period	Position/Institution/Country/Interruption cause
2005-2011	<i>Científico Titular</i> CSIC /CNB / Spain
2002-2004	<i>Ramón y Cajal</i> CSIC / CNB / Spain
1998-2001	Postdoctoral researcher CSIC / CNB /Spain
1995-1997	Postdoctoral researcher UCSF / USA

**A.3. Education**

PhD, Licensed, Graduate	University/Country	Year
PhD in Science, Molecular Biology	Universidad Autónoma de Madrid	1995
Licensed Biological Sciences, Biochemistry and Mol. Biology	Universidad Autónoma de Madrid	1990

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

I lead a fully independent group in the Department of Microbial Biotechnology of CNB-CSIC focused on protein secretion, antibody, and bacterial engineering. We use adhesins and protein secretion systems from bacterial pathogens, mostly enteropathogenic *E. coli* (EPEC), as molecular tools to develop novel biotechnological applications. We have developed novel systems for selection of nanobodies in *E. coli* based on bacterial surface display with intimin and autotransporters. Using this platform, we have obtained nanobodies binding viral and bacterial antigens, as well as antigens in human disease and cancer. We have also developed synthetic biology tools that enable precise and markerless gene engineering in the bacterial chromosome, and targeted in vivo mutagenesis of genes in the chromosome of *E. coli* for directed evolution. We have also programmed *E. coli* with synthetic adhesins that direct the attachment of the engineered bacterium to specific tumor cells or bacteria expressing a surface antigen. We combine these tools in synthetic bacteria carrying protein delivery systems, such as the injectisomes from EPEC type III secretion system, for protein injection into target cells. I am (co)author in a total of 84 peer-reviewed scientific publications, out of which 65 are original articles, 13 reviews, and 6 book chapters. I have a total 3019 number of citations (WoS). I have 5 recognized six-year research evaluation periods CNEAI-MEC (last 2016-2021) and being invited in 40 talks and conferences in the last 10 years.



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

### C.1. Publications (10 articles last 5 years) Complete <https://orcid.org/0000-0001-5920-0638>

1. Ruano-Gallego D., Yara D., Di Ianni L., Frankel G., Schüller S., and **L.A. Fernández\*** (2019) "A nanobody targeting the translocated intimin receptor inhibits the attachment of enterohemorrhagic *E. coli* to human colonic mucosa" ***PLoS Pathogens*** **15**(8):e1008031 PMID: 31465434 DOI: [10.1371/journal.ppat.1008031](https://doi.org/10.1371/journal.ppat.1008031)
2. Álvarez B., Mencía M., de Lorenzo V., and **L.A. Fernández\*** (2020) "In vivo diversification of target genomic sites using processive base deaminase fusions blocked by dCas9". ***Nature Communications*** **11**:6436 PMID: 33353963 DOI: [10.1038/s41467-020-20230-z](https://doi.org/10.1038/s41467-020-20230-z)
3. Ruano-Gallego D., Sánchez-Garrido J., Kozik Z., Núñez-Berruero E., Cepeda-Molero M., Mullineaux-Sanders C., Roumeliotis T.I., Naemi-Baghshomali J., Slater S., Wagner N., Glegola-Madejska I., Pupko T., **Fernández L.A.**, Rodríguez-Patón A., Choudhary J.S., and Gad Frankel\* (2021) "Type III secretion system effectors form robust and flexible intracellular virulence networks" ***Science*** **371**(6534): eabc9531 PMID: 33707240 DOI: [10.1126/science.abc9531](https://doi.org/10.1126/science.abc9531)
4. Al-ramahi Y., Nyerges A., Margolles Y., Cerdán L., Ferenc G., Pál C., **Fernández L.A.\*** and Víctor de Lorenzo\* (2021) "ssDNA recombineering boosts in vivo evolution of nanobodies displayed on bacterial surfaces" ***Communications Biology*** **4**(1):1169 PMID: 34621006 DOI: [10.1038/s42003-021-02702-0](https://doi.org/10.1038/s42003-021-02702-0)
5. Seco E.M., and **L.A. Fernández\*** (2022) "Efficient markerless integration of genes in the chromosome of probiotic *E. coli* Nissle 1917 by bacterial conjugation" ***Microbial Biotechnology*** **15**(5):1374-1391 PMID: 34755474 DOI: [10.1111/1751-7915.13967](https://doi.org/10.1111/1751-7915.13967)
6. Casasnovas J.M.\*, Margolles Y., Noriega M.A., Guzmán M., Arranz R., Melero R., Casanova M., Corbera J.A., Jiménez de Oya N., Gastaminza P., Garaigorta U., Saiz J.C., Martín-Acebes M.A., and **L.A. Fernández\*** (2022) "Nanobodies protecting from lethal SARS-CoV-2 infection target receptor binding epitopes preserved in virus variants other than omicron" ***Frontiers in Immunology*** **13**:863831 PMID: 35547740 DOI: [10.3389/fimmu.2022.863831](https://doi.org/10.3389/fimmu.2022.863831)
7. Álvarez B., Muñoz-Abad V., Asensio-Calavia A., and **L.A. Fernández\*** (2022) "Enhanced protein translocation to mammalian cells by expression of EtgA transglycosylase in a synthetic injector *E. coli* strain" ***Microbial Cell Factories*** **21**:133 PMID: 35780105 DOI: [10.1186/s12934-022-01860-y](https://doi.org/10.1186/s12934-022-01860-y)
8. Robledo M., Álvarez B., Cuevas A., González S., Ruano-Gallego D., **Fernández L.A.** and F. de la Cruz\* (2022) "Targeted bacterial conjugation mediated by synthetic cell-to-cell adhesions" ***Nucleic Acids Research*** **50**(22): gkac1164 PMID: 36511856 DOI: [10.1093/nar/gkac1164](https://doi.org/10.1093/nar/gkac1164)
9. Asensio-Calavia A., Ceballos-Munuera Á., Méndez-Pérez A., Álvarez B. and **L.A. Fernández\*** (2024) "A tuneable genetic switch for tight control of tac promoters in *Escherichia coli* boosts expression of synthetic injectisomes" ***Microbial Biotechnology*** Vol. 17 Issue 1 Pages e14328 PMID: 37608576 DOI: [10.1111/1751-7915.14328](https://doi.org/10.1111/1751-7915.14328)
10. Cerdán L., Álvarez B. and **L.A. Fernández\*** (2024) "Massive integration of large gene libraries in the chromosome of *Escherichia coli*" ***Microbial Biotechnology*** Vol. 17 Issue 1 Pages e14367 PMID: 37971317 DOI: [10.1111/1751-7915.14367](https://doi.org/10.1111/1751-7915.14367)

### C.2. Participation in Research, Development and Innovation Projects

Grants in the last 4 years (National and EU Grants as PI).

Title of project: ALADDIN "Accelerated Discovery Nanobody Platform"

Funding: **EU Horizon-EIC-Pathfinder 101130574**; Date of start: 1-1-2024. Duration: 4 years.

Participating entities: CSIC, INL, HUJI, LIU, IIS-FJD, ISCIII, InCellia, Zirka Innotech

Amount of subsidy: 3,31 M €; (CSIC 595.062 €)



PI CSIC and Coordinator: Dr. Luis Ángel Fernández Herrero

Title of project: PHITBAC "Nanophotonic biosensors for diagnostics and clinical management of bacterial infections at the point of care."

Funding: **MICIN PLEC2021-007739**; Date of start: 1-10-2021. Duration: 3 years.

Participating entities: ICN2, CSIC, FUH Vall D'Ebron, Fundació Hospital del Mar d'investigaciones Mediques, APTUS BIOTECH, BIOMEDAL.

Amount of subsidy: 1.26 M €; (CSIC 271.168 €)

PI CSIC: Dr. Luis Ángel Fernández Herrero; Coordinator: Dr. Laura M. Lechuga (ICN2)

Title of the project: BIOCELLPHE "Ultrasensitive BIoSensing platform for multiplex CELLular protein PHEnotyping at single-cell level".

Funding: **EU H2020 FET-OPEN 965018**; Date of start: 1-04-2021. Duration: 4 years.

Participating entities: UVigo, INSERM, INRAE, CSIC, INL, ICSM, UPM, RUBY, TEM.

Amount of subsidy: 3.57 M € (CSIC 0.5 M€)

PI CSIC: Dr. Luis Ángel Fernández Herrero; Coordinator: Dra. Isabel Pastoriza (UVigo).

Title of project: "CSIC PTI+Salud Global"

Title of subproject: "WP9:Plataforma de antivirales:9.2 Modelos biológicos basados en dianas (SGL2103051):9.2.7. Anticuerpos terapéuticos neutralizantes de SARS-CoV-2"

Funding: **MICIN REC\_EU SGL 2103051**; Date of start: 01-01-2021. Duration: 3 years.

Participating entities: CSIC

Amount of subsidy subproject 9.2.7: 171.141 €

PI subproject 9.2.7: Dr. Luis Ángel Fernández Herrero; Coordinator WP9: Dr. Urtzi Garaigorta.

### C.3. Participation in Research, Development and Innovation Contracts

More relevant out of 5 R&D contracts with companies.

Contract Title: Anti-tumor activity of engineered *E. coli* strains (CSIC Ref. 20182256)

Company: SynLogic Inc. (Boston, EEUU). PI: Dr. Luis Ángel Fernández Herrero. Date of start of the contract: 01-02-2018. Date of end of the contract: 31-07-2020. Amount: 200.000 €

**C.4. Patents** 8 awarded patents (4 international) and 9 applications. More relevant:

- Inventors: L.A. Fernández-Herrero, A. Ceballos-Munuera, Alejandro Prieto-Durán

Title: "CHIMERIC PROTEINS AND THEIR USE AS AN ANTIGEN DETECTING SYSTEM"

Application number: EP23382158; PCT/EP2024/054448; Priority country: Spain.

Priority date: 21-02-2023. Holder entity: CSIC

- Inventors: L.A. Fernández-Herrero, J.M. Casasnovas-Suelves, Y. Margolles Azpiazu, M.A. Noriega-Febrero, P. Gastaminza-Landart, U. Garaigorta de Dios, M.A. Martín-Acebes, J.C. Saiz-Calahorra, J.A. Corbera-Sánchez. NANOBODIES AGAINST SEVERE ACCUTE RESPIRATORY SYNDROME CORONAVIRUS 2. Application numbers: EP22382222.2; EP22382223.0; EP22382224.8; EP22382225.5; EP22382226.3; EP22382227.1; EP22382228.9. PCT/EP2023/055849; PCT/EP2023/055830. Priority country: Spain. Priority date: 09-03-2022. Holder entity: CSIC 95% / ULPGC 5%.

- Inventors: Asensio-Calavia, B. Álvarez González, L.A. Fernández-Herrero. RECOMBINANT BACTERIUM AND USES THEREOF. Application number: EP20383142, EP21839559 and PCT/EP2021/086708. Priority country: Spain. Priority date: 22-12-2020. Holder entity: CSIC

- Inventors: A. Blanco, L.A. Fernández-Herrero. Application number: 200700644. MICROORGANISM PRODUCING ANTIBODIES, ELEMENTS NECESSARY FOR THEIR OBTAINING, ANTIBODIES THUS PRODUCED, THERAPEUTIC COMPOSITIONS AND THEIR APPLICATIONS. Priority country: Spain. Priority date: 12-03-2007. Holder entity: CSIC PCT/ES2008/070051, Patent US 8,623349 B2



### C.5a. Direction of Doctoral Thesis

-14 Doctoral Thesis directed (+2 *ongoing*), all at the PhD program of the Department of Molecular Biology (UAM). All obtained maximal qualification *Cum Laude*.

E. Veiga (2003); P. Jurado (2004); D. Munera (2006); E. Marín (2009); A. Blanco (2010); V. Salema (2014); C. Piñero (2014); D. Ruano (2014); M. Cepeda (2016); C. Mañas (2019); L. Cerdán (2020); E. Pico (2020); A. Asensio (2021); A. Ceballos (2023);

### C.5b. Direction of Master and Graduation Works (TFMs and TFGs)

All experimental, all with qualifications >9/10.

- 8 TFM supervised (+2 *ongoing*): D. Ruano (2009, UAM); L. Di Ianni (2013, UNIVERSITA' DI BOLOGNA); A. Fernández (2013, UCM); L. Cerdán (2015, UCM); A. Ceballos (2016, UAM); A. Méndez (2019, UPM); M. Roda (2022, UAM); D. Crespo (2022, UAM);

-4 TFG supervised: A. Gil de Bona (2008, UFV); M. Díaz de Frutos (2015, UCM); V. Muñoz Abad (2016, UAM); I. Anguiano Vara (2023, UAM)

### C.5c. Lecturing in Masters

Lectures in the following topics: antibody selection, antibody engineering and expression, phage display, bacterial protein secretion systems, bacterial engineering, synthetic biology.

Master in Biotechnology (UAM, 2 h/year); Master in Microbiology (UAM, 2 h/year); Master in Virology (UCM; 1.5 h/year); Master in Health Biotechnology (CESIF, 2 h/curso); Master in Molecular Oncology (CEB, 1,5 h/year);

### C.6. Management of scientific activity

- National Agency of Evaluation (ANEP). Associate in Molecular Biology, Cellular Biology and Genetics, subarea Microbiology and Biotechnology (01-02-2006– 31/07/2009).
- External Scientific Advisory Committee of IBBTEC. Member since 2016.
- Chair of the Biosafety Committee of the CNB-CSIC since 2016; Member since 2010.
- Head of Department of Microbial Biotechnology (CNB-CSIC), since 2022.

### C.7. Invited scientific presentations

Out of 40 total invited presentations in last 10 years. More relevant:

Workshop on Synthetic and System Biology CNRS, INRA, INSERM (Bordeaux, France); Centre de Biochimie Structurale (CBS) (Montpellier, France). Massachusetts General Hospital & Harvard Medical School (Boston, USA). FEMS Congress of European Microbiologists (Glasgow, Scotland); Keystone eSymposia (Colorado, USA); Imperial College London, Center for Synthetic Biology (London, UK); Department of Engineering Science (U. of Oxford, UK).

### C.8. Other relevant contributions

L.A. Fernández (2022) "Sticky logic toolkit programs cells to pattern" *Nature* **608**:267-268 (News&Views) <https://doi.org/10.1038/d41586-022-02102-2>  
Scientific co-organizer of 4 International Symposia.

### C.9. Scientific awards

Research award "Jaime Ferrán" of the Spanish Society of Microbiology (XII edition; 2007).