MINISTERIO DE CIENCIA E INNOVACIÓN

Cofinanciado por la Unión Europea

AGENCIA ESTATAL DE INVESTIGACIÓN

CURRICULUM VITAE (CVA)

Part A. PERSONAL INFORMATION

CV date	Jan. 23, 23

First name	**Alejandro**		
Family name	**TOLEDO-ARANA**		
Gender (*)	Male	Birth date	March 19th, 1976
DNI number	73504760A		
e-mail	a.toledo.arana@csic.es	URL Web: https://www.idab.csic.es/bgrlaboratory/	
Open Researcher and Contributor ID (ORCID)		0000-0001-8148-6281	

A.1. Current position

Position	CSIC Senior Research Scientist (Final resolution pending) Director of the Agrobiotechnology Institute (IdAB-CSIC)		
Initial date	July 1st, 2022		
Institution	Spanish National Research Council (CSIC)		
Department/Center	Microbial Biotechnology Department / Agrobiotechnology Institute		
Country	Spain	Phone number	+34 948 16 9752
Key words	Molecular microbiology, bacterial gene regulation, post-transcriptional regulation, non-coding RNAs, RNA-binding proteins, mini-proteins, bacterial pathogens		

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

Period	Position/Institution/Country/Interruption cause
2022	Vice-director of Agrobiotechnology Institute (IdAB-CSIC), Spain.
2012-2022	CSIC Tenured Scientist. IdAB-CSIC, Spain.
2011-2012	Ramón y Cajal Researcher. IdAB-CSIC, Spain.
2008-2010	JAE-Doc Post-doctoral Researcher. IdAB-CSIC, Spain.
2006-2008	EMBO Post-doctoral Researcher. Pasteur Institute, Paris. France.
2005	CAN foundation fellow. IdAB-CSIC, Spain.
2002-2004	FPU Pre-doctoral Researcher. IdAB-CSIC, Spain.
2000-2002	AECI Pre-doctoral Researcher. IdAB-CSIC, Spain.
1997-1999	Research Assistant Professor, National University of Río Cuarto, Argentina

A.3. Education

PhD, Licensed, Graduate	University/Country	Year
Ph.D. Biotechnology	Public University of Navarre, Spain	2005
B.Sc. Microbiology	Río Cuarto National University, Argentine	2000

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

A. Toledo-Arana is **leading the Laboratory of Bacterial Gene Regulation** since 2015 at the Microbial Biotechnology Department in the Agrobiotechnology Institute (IdAB), a center of the Spanish National Research Council (CSIC) and participated by *Gobierno de Navarra*. In 2022, he was promoted to **CSIC Senior Research Scientist** (final resolution pending) and he was also elected as **Director of the IdAB-CSIC**.
His group is interested on deciphering the **molecular mechanisms governing relevant biological processes in bacteria**, including regulatory mechanisms mediated by non-coding RNAs and the RNA-binding proteins, using *Staphylococcus aureus*, one of the most relevant pathogen worldwide, as a model. Recently, the studies on non-coding RNAs lead to discover that several of these RNA molecules are indeed translated into small proteins, which are excluded from current genome annotations. This led to stablishing a **new research line** to investigate the ***S. aureus* hidden proteome**. His research projects have been supported by competitive grants financed by the European Research Council (ERC-Consolidator grant), the National Science and Innovation Ministry and the Navarre regional government.
Previously, the PI contributed to stablishing and consolidating research lines on RNA-mediated regulation in *Listeria monocytogenes* and *Staphylococcus aureus* as an **EMBO post-doctoral researcher fellow** in the laboratory of Prof. Pascale Cossart of the Pasteur Institute, Paris, France, and as a **Ramón y Cajal Researcher** in the Microbial Biofilms Laboratory of Prof. Iñigo Lasa, of the Agrobiotechnology Institute UPNA-CSIC, Spain, respectively. He participated in pioneer publications that highlighted the importance of post-transcriptional regulation in Gram-positive pathogens. He was involved in the characterization of high-resolution transcriptome maps that revealed complex transcriptional architectures in bacteria (Toledo-Arana et al, Nature, 2009; Lasa et al, PNAS 2011), including new regulatory molecular mechanisms that modulate important biological process in bacterial pathogens (Ruiz de los Mozos, PLOS Genetics 2013, Caballero, 2018, NAR; Saenz-Lahoya, PNAS, 2019; Menendez-Gil, NAR, 2020, Catalán-Moreno, NAR, 2021). Also, he actively collaborates in several research projects showing novel regulatory mechanisms in bacteria (e.g. Villanueva, 2018, Nat Comm; Bronesky, 2019, EMBO J; Fernandez-Calvet, 2021, mBio). Moreover, he recently participated on an institutional collaborative project (CUN-Navarrabiomed-CSIC) dedicated to study the gut microbiome variations in patients with Irritable Bowel Syndrome (IBS). He also actively participated on technology transfer projects to EBTs companies. Currently, he is collaborating through national (AEI CPP2021-008490) and regional (GN 0011-1365-2022-000206) technology transfer projects with the Bioinsectis S. L. company to develop novel bioinsecticides for the biocontrol of relevant agronomical pest.
A. Toledo-Arana **has published 50 scientific articles** in the best journals of his expertise areas (35% in **D1** and 76% in **Q1**). The relevance of these works is supported by the number of cites they received (*h*-index 29, a mean of 87.2 cites per article, note that 24 and 14 articles received more than 50 and 100 cites, respectively). Also, some of them have been awarded by Scientific Committees of the Molecular Microbiology Meetings (2012, 2016, 2018, 2022), one article received the UPNA University Publication Award to the best scientific contribution of 2013-2014, and four articles were highlighted by the Faculty of 1000 Biology. Regarding his academic training capacities, A. Toledo-Arana has supervised 5 PhD students (another one in progress), 4 master thesis and 2 ungraduated students. He also participated in the creation of Recombina S. L., a Biotech company, as a founding member and he is authoring two licensed patents.

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

C.1. Publications
10 most relevant *publications from the* ***last 5 years****; CA, corresponding author.*

1) **2022**. L. Bastet, P. Bustos-Sanmamed, A. Catalan-Moreno, C. J. Caballero, S. Cuesta, L. Matilla-Cuenca, M. Villanueva, J. Valle, I. Lasa and **A. Toledo-Arana (CA)**. Regulation of heterogenous LexA expression in *Staphylococcus aureus* by an antisense RNA originating from transcriptional read-through upon natural mispairings in the *sbrB* intrinsic terminator. **International Journal of Molecular Sciences** 23, 576. **IF^{2021}: 6.208, Q1**.

2) **2022**. P. Menendez-Gil, A. Catalán-Moreno, C. J. Caballero, and **A. Toledo-Arana (CA)**. *Staphylococcus aureus ftnA* 3'-untranslated region modulates ferritin production facilitating growth under iron starvation conditions.
Frontiers in Microbiology 13: 838042. **IF^{2021}: 6.064, Q1.**

3) **2021**. A. Catalan-Moreno, M. Cela, P. Menendez-Gil, N. Irurzun, C. J. Caballero, I. Caldelari and **A. Toledo-Arana (CA)**. RNA thermoswitches modulate *Staphylococcus aureus* adaptation to ambient temperatures.
Nucleic Acids Research 49(6): 3409-3426. **IF^{2020}: 16.971. D1.** Cites at WOS: **11.**
1º Premio MICROMOL 2022, XIII Molecular Microbiology Meeting, SEM, Granada.

4) **2021**. A. Fernández-Calvet, B. Euba, C.Gil-Campillo, A. Catalan-Moreno, /---/, **A. Toledo-Arana (15/16)** and J. Garmendia. Phase variation in HMW1A controls a phenotypic switch in *Haemophilus influenzae* associated with pathoadaptation during persistent infection.
mBio 12(3): e00789. **IF^{2020}: 7.867. Q1.** Cites at WOS: **3.**

5) **2020**. P. Menendez-Gil, C. J. Caballero, A. Catalan-Moreno, N. Irurzun, I. Barrio-Hernandez, I. Caldelari and **A. Toledo-Arana (CA)**. Differential evolution in 3'UTRs leads to specific gene expression in *Staphylococcus*.
Nucleic Acids Research 48(5):2544-2563. **IF^{2020}: 16.971. D1.** Cites at WOS: **9.**

6) **2020**. A. Catalan-Moreno, C. J. Caballero, N. Irurzun, S. Cuesta, J. López-Sagaseta and **A. Toledo-Arana (CA)**. One evolutionarily selected amino acid variation is sufficient to provide functional specificity in the cold shock protein paralogs of *Staphylococcus aureus.*
Molecular Microbiology 113:826–840. **IF^{2020}: 3.501, Q2.** Cites at WOS: **9**.

7) **2020**. P. Menendez-Gil, C. J. Caballero, C. Solano and **A. Toledo-Arana (CA)**. Fluorescent molecular beacons mimicking RNA secondary structures to study RNA chaperone activity.
Methods Mol Biol 2106:41-58. Cites at WOS: **2**.

8) **2019**. S. Saenz-Lahoya, N. Bitarte, B. García, S. Burgui, M. Vergara-Irigaray, J. Valle, C. Solano, **A. Toledo-Arana** and I. Lasa. Noncontiguous operon is a genetic organization for coordinating bacterial gene expression.
PNAS 116 (5): 1733-1738. **IF^{2018}: 9.580, D1.** Cites at WOS: **19.**
Highlighted by Dr. David Lane in **Faculty of 1000 Biology**

9) **2018**. M. Villanueva, B. García, J. Valle, I. Ruiz de los Mozos, C. Solano, M. Martí, J. R. Penadés, **A. Toledo-Arana** and I. Lasa. Sensory deprivation in *Staphylococcus aureus*.
Nature Communications 9: 523. **IF^{2017}: 12.353, D1.** Cites at WOS: **50.**

10) **2018**. C. J. Caballero, P. Menendez-Gil, A. Catalan-Moreno, M. Vergara-Irigaray, B. García, V. Segura, N. Irurzun, M. Villanueva, I. Ruiz de los Mozos, C. Solano, I. Lasa and **A. Toledo-Arana (CA)**. The regulon of the RNA chaperone CspA and its auto-regulation in *Staphylococcus aureus*.
Nucleic Acids Research 46(3): 1345-1361. **IF^{2017}: 11.561, D1.** Cites at WOS: **33.**

C.2. Congress

List of invited conferences in which the applicant has participated in the last 10 years

1) Webinar: Beyond the genetic code: multifunctional messenger RNAs in bacteria. Ciclo de seminarios remotos de la Asociación Civil de Microbiología General de Argentina. Argentinian RNA Club, Universidad Nacional de Quilmes, CONICET. 20/10/2020
2) Keynote lecture: Beyond the Messenger: regulatory features of the mRNAs. Workshop: RNA regulation in bacteria. Centro Nacional de Biotecnología, Madrid, Sapin. 31/05/2019.
3) Conference: Qué sabes de… La regulación de genes en bacterias. Ciclo de Conferencias: Qué sabemos de… organized by CSIC. Instituto de Recursos Naturales y Agrobiología de Salamanca (IRNASA). Salamanca, Spain. 17/11/2017
4) Seminar: Post-transcriptional regulation in bacteria: RNA regulatory elements and RNA-binding proteins. Centro de Investigación Médica Aplicada (CIMA), Universidad de Navarra, Pamplona, Spain. 27/03/2017

5) Seminar: Modulation of gene expression by 3'-untranslated regions (3'-UTRs): an additional regulatory layer in bacteria. Instituto de Biología Molecular y Celular (IBMC). Strasbourg, France. 04/03/2016
6) Invited speaker: Post-transcriptional regulation mediated by 3' mRNA regions in bacteria. Regulating with RNA in Bacteria and Archaea Conference. Cancún, México. 5/12/2015
7) Invited speaker: Base pairing interaction between 5'- and 3'-UTRs controls icaR mRNA translation in Staphylococcus aureus. FEBS-ASM Workshop on: Biology of RNA in host-pathogen interactions. Tenerife, Canary Islands, Spain Fecha: 28/01/2014.
8) In addition, from 2012 to 2022, the applicant participated in 17 and 25 talks/posters presentations at international and national congresses, respectively.

C.3. Research projects

List of most relevant projects in which the applicant participated as principal investigator (PI).

1) Reference: **PID2019-105216GB-I00**. Identificación y caracterización funcional de las mini-proteínas de *Staphylococcus aureus*. PI: **A. Toledo-Arana.** Founding body: Ministerio de Ciencia e Innovación. Period: 01/06/2020-31/05/2023. Funding: 169.400,00€.
2) Reference: **ERC-CoG-2014-646869**. ERC Consolidator Grant: High-throughput in vivo studies on post-transcriptional regulatory mechanisms mediated by bacterial 3'-UTRs. PI: **A. Toledo-Arana.** Founding body: European Research Council. Period: 01/09/2015-31/08/2020. Funding: 1.876.778,35€.
3) Reference: **BFU2014-56698-P**. Regulación post-transcripcional mediada por las regiones 3' no traducidas del RNA mensajero en bacterias. PI: **A. Toledo-Arana**. Founding body: MINECO. Period: 01/01/2015-31/12/2017. Funding: 157.300,00€.
4) Reference: **BFU2011-23222**. Análisis de la regulación post-transcripcional mediada por proteínas de unión a RNA en *Staphylococcus aureus*. PI: **A. Toledo-Arana.** Founding body: MICINN. Period: 01/01/2012-30/06/2015. Funding: 106.480,00€.
5) In addition, from 2012 to 2022, the applicant participated in 4 collaborative projects financed by Gobierno de Navarra.

C.4. Contracts, technological or transfer merits

1) 2020-2025. Three technology transfer projects financed by MICIN-AEI and Gobierno de Navarra. References: **0011-1365-2020-000033; 0011-1365-2022-000206; CPP2021-008490;** in collaboration with, Bioinsectis S.L., a SME and the UPNA and CSIC as public research institutions. A. Toledo-Arana was the PI at the CSIC partner of the consortium. Funding: 124.482,04 €; 75.517,00 €; and 244.001,24 €, respectively.
2) Creation of the biotech company Recombina S.L. A. Toledo-Arana was a founding member and participated in the advisory board since 2013 to 2017, when an important company from the veterinary sector acquired his shares. Recombina continues providing services to national and international companies and research institutions.
3) Worldwide Patent Number: WO2017032909A1. M. Villanueva, J. Valle, B. García, J. R. Penadés, M. Martí, **A. Toledo-Arana**, I. Lasa. Mutant strains of *Staphylococcus aureus* with multiple inactivated tcs systems. Universidad Pública de Navarra y Consejo Superior de Investigaciones Científicas. PCT/ES2015/070636.

C.5. Direction of PhD, Masters, B.Sc. students

PhD Thesis directed (5): 2020, Arancha Catalán Moreno (**Premio MicroMol 2022**). 2020, Pilar Menéndez-Gil. 2018, Carlos Caballero Sanchez. 2014, Maite Villanueva (**Premio extraordinario de doctorado por la UPNA**). 2014, Igor Ruiz de los Mozos (**Premio mejor contribución científica por la UPNA**).

Under supervision (1): Ane Muruzabal Galarza.

In addition A. Toledo-Arana has supervised 4 Master thesis and 2 B.Sc. thesis.