

**Part A. Personal Information**

<b>DATE</b>	May 2019
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Surname(s)	<b>Rodríguez Carvajal</b>	
Forename	<b>Miguel Ángel</b>	
Social Security, Passport, ID number	<b>52294369M</b>	
Sex	<b>Male</b>	
Age	<b>47</b>	
Researcher codes	WoS Researcher ID (*)	<b>F-2577-2012</b>
	SCOPUS Author ID(*)	
	Open Researcher and Contributor ID (ORCID)	<b>0000-0002-2131-6448</b>

(\*) At least one of these is mandatory

**A.1. Current position**

Post/ Professional Category	<b>Assistant Professor (Titular de Universidad)</b>	
UNESCO Code	<b>2306</b>	
Key Words	<b>Nuclear Magnetic Resonance (NMR) Mass Spectrometry (MS) Structure Determination Polysaccharide Plant Growth-Promoting Rhizobia (PGPR)</b>	
Name of the University/Institution	<b>University of Seville</b>	
	Department/Centre	<b>Organic chemistry</b>
	Full Address	<b>Faculty of Chemistry c/ Profesor García González, 1 41012 – Seville (Spain)</b>
	Email Address	<a href="mailto:rcarvaj@us.es">rcarvaj@us.es</a>
	Phone Number	<b>+34 954557019</b>
Start date	<b>13<sup>th</sup> October 2019 (as Assistant Professor)</b>	

**A.2. Education** (*title, institution, date*)

Year	University	Degree	Title
<b>1994</b>	<b>University of Seville</b>	<i>First degree</i>	<b>Chemistry</b>
		<i>Masters (if appropriate)</i>	
<b>2000</b>	<b>University of Seville</b>	<i>PhD</i>	<b>Study on the structures of capsular polysaccharides from <i>Sinorhizobium fredii</i></b>

**A.3. Indicators of Quality in Scientific Production** (*See the instructions*)

a) Citations:
Total (1997-2018): <b>1105</b> Last five years (2014-2019): <b>591</b>
Average number of citations last five years (2014-19): <b>98.5</b>
b) Total number of publications (1997-2019) <b>51</b> → Q1: <b>23</b> , D1: <b>12</b>
c) h-index: <b>20</b>
d) Supervised thesis: <b>2</b>
e) "Sexenios" (six-year period of research) = <b>3</b> (Fourth period starting from January 2015)

**Part B. Free Summary of CV** (*Max. of 3.500 characters, including spaces*)

<b>Education and professional</b>
Graduated in Chemistry at the University of Seville (1994), with the distinction of the extraordinary degree award for the academic records. PhD in Chemistry (2000) under the supervision of Dr. Antonio Gil Serrano and Dr. Pilar Tejero Mateo at the same university.

Postdoctoral stage (2000-2003) at the CERMAV-CNRS (Grenoble, France) under the supervision of Dr. Serge Perez, Dr. Karim Mazeau and Dr. Catherine Hervé du Penhoat), with Spanish Education Ministry and Marie Curie grants, working on NMR and molecular modelling of oligo- and polysaccharides. Incorporation to the Organic Chemistry Department at the University of Seville in 2002 and, after several promotions, Associate Professor on Nov 2009. Head of the NMR Service at the University of Seville from November 2014

My research field is focused on the structure determination of biological molecules, mainly bacterial oligosaccharides and polysaccharides, as well as their conformational behaviour. My results have been published in 49 international articles and two book chapters, and presented in more than 30 national and international congresses. Most of my research is related to bacteria-plant symbiosis: in particular, rhizobium-leguminous and, in general, those bacteria that promote plant growth (Plant-growth promoting bacteria, PGPR). This research field comes from the tight collaboration among my research group ("Natural products: polysaccharides and oligosaccharides", headed by Dr. Antonio M. Gil Serrano), and the research groups headed by Dr. Manuel Megías Guijo (Department of Microbiology and Parasitology, Faculty of Pharmacy), Dr. Javier Ollero Márquez and Dr. José Enrique Ruiz Sainz (Department of Microbiology, Faculty of Biology), and Dr. Francisco Temprano (Institute of Agricultural Research and Training), participating in more than 20 research projects and contracts. These projects have always based on a multidisciplinary approach of Chemistry, Microbiology and Agronomy to the study of the beneficial interactions between bacteria and plants.

## Part C. Relevant accomplishments

### C.1. Publications

- (1) Sebastián Acosta-Jurado, Dulce-Nombre Rodríguez-Navarro, Yasuyuki Kawaharada, **Miguel A. Rodríguez-Carvajal**, Antonio Gil-Serrano, María E. Soria-Díaz, Francisco Pérez-Montaña, Juan Fernández-Perea, Yanbo Niu, Cynthia Alias-Villegas, Irene Jiménez-Guerrero, Pilar Navarro-Gómez, Francisco Javier López-Baena, Simon Kelly, Niels Sandal, Jens Stougaard, José E. Ruiz-Sainz, José-María Vinardell. (2019) "*Sinorhizobium fredii* HH103 *nolR* and *nodD2* mutants gain capacity for infection thread invasion of *Lotus japonicus* Gifu and *Lotus burtii*". *Environm. Microbiol.* 21:1718-1739. (Impact index 4.974, 21/125 Microbiology, Q1).
- (2) S. Acosta-Jurado, P. Navarro-Gómez, J. C. Crespo-Rivas, C. Medina, P. S. Murdoch, L. Cuesta-Berrio, **M. A. Rodríguez-Carvajal**, J. E. Ruiz-Sainz, J. M. Vinardell. (2017) "The *Sinorhizobium (Esinfer) fredii* HH103 *rpk-2* region is involved in the biosynthesis of lipopolysaccharide and exopolysaccharide but not in K-antigen polysaccharide production". *Plant Soil* 417:415-431. (Impact index 4.076, 25/124 Microbiology, Q1).
- (3) S. Acosta-Jurado, C. Alias-Villegas, P. Navarro-Gómez, S. Zehner, P. S. Murdoch, M. A. **Rodríguez-Carvajal**, M.A., J. Soto, F. J. Ollero, J. E. Ruiz-Sainz, M. Göttfert, J. M. Vinardell. (2016) "The *Sinorhizobium fredii* HH103 MucR1 global regulator is connected with the nod regulon and is required for efficient symbiosis with *Lotus burtii* and *Glycine max* cv. Williams." *Mol. Plant-Microbe Interact.* 29:700-712. (Impact index 4.332, 19/211 Plant Sciences, D1).
- (4) S. Acosta-Jurado, D. N. Rodríguez-Navarro, Y. Kawaharada, J. Fernández Perea, A. Gil-Serrano, H. Jin, Q. An, **M. A. Rodríguez-Carvajal**, S. U. Andersen, N. Sandal, J. Stougaard, J. M. Vinardell, J. E. Ruiz-Sainz. (2016) "*Sinorhizobium fredii* HH103 invades *Lotus burtii* by crack entry in a Nod factor-and surface polysaccharide-dependent manner". *Mol. Plant-Microbe Interact.* 29:925-937. (Impact index 4.332, 19/211 Plant Sciences, D1).
- (5) Perez-Mendoza, D., **Rodriguez-Carvajal, M.A.**, Romero-Jimenez, L., de Araujo Faira, G., Loret, J., Gallegos, M.T., Sanjuán, J. (2015) "Novel mixed-linkage beta-glucan activated by c-di-GMP in *Sinorhizobium meliloti*". *PNAS* 112:E757-E765 (Impact index 9.423, 4/63 Multidisciplinary sciences, D1).
- (6) P. del Cerro, A. Paiva Rolla-Santos, D. F. Gomes, B. Berquó Marks, R. Espuny, **M. A. Rodríguez-Carvajal**, M. E. Soria-Díaz, A. Shigueyoshi Nakatani, M. Hungria, F. J. Ollero, M. Megías. (2015) "Opening the 'black box' of *nodD3*, *nodD4* and *nodD5* genes

of *Rhizobium tropici* strain CIAT 899.” *BMC Genomics* 16:864-874 (Impact index 3.867, 32/161 Biotechnology & applied microbiology, Q1).

- (7) Rodriguez-Navarro, D. N.; **Rodriguez-Carvajal, M.A.**; Acosta-Jurado, S., Soto, M.J., Margaret, I., Crespo-Rivas, J.C., Sanjuan, J., Temprano, F., Gil-Serrano, A., Ruiz-Sainz, J.E., Vinardell, J.M. (2014) “Structure and Biological Roles of *Sinorhizobium fredii* HH103 Exopolysaccharide”. *Plos One* 9:e115391 (Impact index 3.234, 8/56 Multidisciplinary sciences, Q1).
- (8) Margaret, I., Crespo-Rivas, J.C., Acosta-Jurado, S., Cubo, M.T., Gil-Serrano, A., Moreno, J., Murdoch, P.S., **Rodriguez-Carvajal, M.A.**, Rodriguez-Navarro, D.N., Ruiz-Sainz, J.E., Sanjuan, J., Soto, M.J., Vinardell, J.M. (2012) “*Sinorhizobium fredii* HH103 *rkp-3* genes are required for K-antigen polysaccharide biosynthesis, affect lipopolysaccharide structure and are essential for infection of legumes forming determinate nodules” *Mol. Plant-Microbe Interact* 25:825-838. (Impact index 4.307, 17/197 Plant science, D1)
- (9) de Cordoba, F.J.F., **Rodriguez-Carvajal, M.A.**, Tejero-Mateo, P., Corzo, J., Gil-Serrano, A.M. (2008) Structure of the O-antigen of the main lipopolysaccharide isolated from *Sinorhizobium fredii* SMH12. *Biomacromolecules* 9:678-685 (Impact index 4.146, 6/73 Polymer science, D1).
- (10) Dardanelli, M.S., Fernandez de Cordoba, F.J., Rosario Espuny, M., **Rodriguez Carvajal, M.A.**, Soria Diaz, M.E., Gil Serrano, A.M., Okon, Y., Megias, M. (2008) Effect of *Azospirillum brasilense* coinoculated with *Rhizobium* on *Phaseolus vulgaris* flavonoids and Nod factor production under salt stress. *Soil Biol. Biochem.* 40, 2713-2721 (Impact index 2.926, 1/31 Soil science, D1).

## C.2. Research Projects and Grants

(Last five years)

- Title: “Regulación de la biosíntesis de factores de nodulación por *Rhizobium tropici* CIAT899: Implicaciones de su aplicación como inoculante molecular en leguminosas y cereales”. Ref.: AGL2016-77163-R. Funding body: Ministerio de Economía y Competitividad. Dates: from 31/12/2016 to 31/12/2019. Amount of subsidy: 169400 €. Principal investigator: Francisco Javier Ollero Márquez & Antonio Gil Serrano (University of Seville). Type of participation: Researcher.
- Title: “Estudio de la regulación de los genes de la biosíntesis de factores de nodulación producidos por *Rhizobium tropici* en presencia de estrés abiótico”. Ref.: AGL2012-38831. Funding body: Ministerio de Economía y Competitividad. Dates: from 31/12/2012 to 31/12/2015. Amount of subsidy: 128700 €. Principal investigator: Manuel Megías Guijo (University of Seville). Type of participation: Researcher.
- Title: “Estudios de las simbiosis establecidas por *Sinorhizobium fredii* con la soja y la leguminosa modelo *Lotus*”. Ref.: P11-CVI-7500. Funding body: Junta de Andalucía. Dates: from 26/03/2013 to 26/03/2016. Amount of subsidy: 232959 €. Principal investigator: José Enrique Ruiz Sainz (University of Seville). Type of participation: Researcher.

## C.3. Contracts

(Last five years)

- “Proyecto de regeneración de orgánica” (Ref. 3317/0931). Company: Cobre Las Cruces. Amount of funding: 28000 €. Principal investigator: Miguel Ángel Rodríguez Carvajal (University of Seville).
- “MIPLASCOE: Desarrollo de nuevos biopolíésteres a partir de subproductos agroindustriales para aplicaciones en el sector ferroviario y del envasado” (Ref. PRJ20162929 & PRJ20162932). Company: Cítricos del Andévalo. Amount of funding: 200000 €. Dates: from 01/07/2016 to 31/12/2018. Principal investigator: Francisco Merchán Ignacio (University of Seville).
- “Desarrollo de inoculantes moleculares innovadores basados en LCOs: Aplicaciones agronómicas (AGROINOLCO)” (Ref. 0918/0406). Company: ResBioAgro. Dates: from 25/05/2010 to 24/03/2013. Amount of funding: 8120 €. Principal investigator: Antonio Miguel Gil Serrano (University of Seville).

- “Aplicación de la actividad enzimática ACC desaminasa producida por microorganismos promotores del crecimiento de plantas (PGPMs) en la producción sostenible de cultivos de interés. (ACCDES)” (Ref. 0998/0406). Company: ResBioAgro. Dates: from 01/12/2010 to 31/12/2013. Amount of funding: 14160 €. Principal Investigator: Antonio Miguel Gil Serrano (University of Seville).

#### **C.4. Patents and other IPR**

- “Método para la producción de poli- $\beta$ -1,3- $\beta$ -1,4-D-glucano”. **Tipo de propiedad industrial:** Patente de invención. **Investigadores/autores/obtentores:** D. Perez Mendoza, L. Romero Jiménez, D. Rodríguez Carbonell, M. A. Rodríguez Carvajal, M. T. Gallegos Fernández, J. Sanjuan Pinilla. **Cód. de referencia/registro:** ES1641.952. **Número de solicitud:** P201431133.

#### **C.5, C.6, C.7... Other**

##### **Supervised thesis:**

- Contreras Sánchez Matamoros, Rocío. “Estudio estructural de polisacáridos superficiales de bacterias PGPR y su efecto en la rizodeposición de plantas de arroz”. Tesis Doctoral. 2011. Universidad de Sevilla.
- Fernandez de Cordoba Martin, Francisco Jose. “Estudio estructural de polisacáridos superficiales y factores de nodulación producidos por Sinorhizobium fredii SMH12”. Tesis Doctoral. 2007. Universidad de Sevilla.

##### **Management of scientific activity**

Head of the NMR Facilities at the General Research Services of the University of Seville from november of 2014.