

# Gabriel Forn-Cuní

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## SUMMARY

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I am a postdoctoral researcher interested in the involvement of inflammation and autophagy processes in human diseases. I have multidisciplinary expertise in both wet lab research techniques, including molecular biology, histology, microbiology, confocal microscopy, and zebrafish models, as well as in the bioinformatic and programming skills needed for evolutionary and phylogenetic analyses, comparative genomics, and transcriptomics. I am enthusiastic about finding the biological origin of perturbations in large datasets and in creating interactive visual interfaces to ease the bioinformatic analysis of my colleagues.

## EDUCATION

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- Nov 2011 – Dec 2015 PhD: Methodology and Applications of Molecular Biology. University of Vigo.  
Dissertation: The zebrafish as inflammation model (*summa cum laude*).  
Supervision: Prof. Dr. Antonio Figueras Huerta and Dr. Beatriz Novoa García.
- Sept 2011 – June 2012 MSc: Methodology and Applications of Molecular Biology. University of Vigo.  
Master's degree thesis: Evolution of the c3 family in fish.  
Supervision: Dr. David Posada, Phylogenomics Lab, University of Vigo.
- Sept 2009 – June 2011 BSc: Biochemistry. University Rovira i Virgili.
- Sept 2007 – June 2011 BSc: Biotechnology. University Rovira i Virgili.

## RESEARCH EXPERIENCE

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- Nov 2017 – Nov 2019 MSCA Postdoctoral Fellow, Institute of Biology, Leiden University, The Netherlands.  
Postdoctoral fellow for the Marie Skłodowska-Curie COFUND action "LEaDing Fellows" at the Meijer lab.  
Studying the mechanisms of autophagic defence against Invasive Aspergillosis using the zebrafish model.
- Mar 2016 – July 2017 Postdoctoral researcher, Microbiology Department, University of Barcelona  
Postdoctoral researcher at the J. Tomás and S. Merino lab. Studying the role and virulence mechanisms of *Aeromonas* LPS biosynthesis and flagellar glycosylation through microscopy, microbiology and bioinformatics.
- Nov 2011 – Nov 2014 Research assistant, Immunology and Genomics Group, IIM – CSIC  
Research assistant for the EU-FP7 project "Controlling infectious diseases in oysters and mussels in Europe (BIVALIFE)", studying the parameters that may affect mortality outbreaks in bivalve molluscs (Nov 2011 – Nov 2013). Investigating the zebrafish and turbot transcriptomes against the VHS virus under the National-funded project INNATEFISH IMTRA-VAC "Role of the innate immune response in DNA vaccines against VHSV and transference to turbot model" (Nov 2013 – Nov 2014).
- Jan 2012 – June 2012 MSc Research Intern, Immunology and Genomics Group, IIM – CSIC  
We implemented state-of-the-art phylogenetic techniques to study the diversity and evolution of the c3 family in available fish genomes.
- Jan 2010 – July 2010 BSc Research Intern, Dept of Biochemistry and Biotechnology, University Rovira i Virgili  
The research collaboration involved the use of Hidden Markov Models to the computational analysis of epigenetic factors in human microRNA genes.

PEER-REVIEWED PUBLICATIONS

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1. **Forn-Cuní G**, Meijer AH, Varela M. (2019) Zebrafish in Inflammasome Research. *Cells* 2019, 8(8), 901
2. Novoa B, Pereiro P, Lopez-Muñoz A, Varela M, **Forn-Cuní G**, Anchelín M, et al. (2019) Rag1 immunodeficiency-induced early aging and senescence in zebrafish are dependent on chronic inflammation and oxidative stress. *Aging Cell*, Jul 26:e13020
3. Zhang R, Varela M, **Forn-Cuní G**, Wies Vallengoed, van der Vaart M, Meijer AH. (2019) The selective autophagy receptors Optineurin and p62 are both required for innate host defense against mycobacterial infection. *PLoS Pathog.* 15(2):e1007329.
4. Moreira R, Balseiro P, **Forn-Cuní G**, Milan M, Bargelloni L, Novoa B, et al. (2018) Bivalve immune transcriptomics reveal pathogen sequences underneath and a powerful differential immune response of the Mediterranean mussel (*Mytilus galloprovincialis*). *Mar Biol* 165:61.
5. Pereiro P, **Forn-Cuní G**, Dios S, Coll J, Figueras A, Novoa B. (2017) First evidence of interferon-independent antiviral activity of 25-hydroxycholesterol in a teleost fish. *Antiviral Res* 145:146–159.
6. **Forn-Cuní G**, Merino S, Tomás JM. (2017) Comparative genomics of the *Aeromonadaceae* LPS core oligosaccharide biosynthetic regions. *IJMS*. Feb 28;18(3):E519.
7. **Forn-Cuní G**, Varela M, Pereiro P, Novoa B, Figueras A. (2017) Conserved gene regulation during acute inflammation between zebrafish and mammals. *Sci. Rep.* 7; 14905.
8. Pereiro P, **Forn-Cuní G**, Figueras A, Novoa B. (2016) Pathogen-dependent role of turbot (*Scophthalmus maximus*) interferon-gamma. *Fish Shellfish Immunol.* 59:25-35.
9. Figueras A, Robledo D, Corvelo A, Hermida M, Pereiro P, Rubiolo JA, ... **Forn-Cuní G**, ... et al. (2016) Whole genome sequencing of turbot (*Scophthalmus maximus*; pleuronectiformes): a fish adapted to demersal life. *DNA Res.* 2016 Mar 6.
10. Varela M, **Forn-Cuní G**, Dios S, Figueras A, Novoa B. (2015) Proinflammatory Caspase A Activation and an Antiviral State Are Induced by a Zebrafish Perforin after Possible Cellular and Functional Diversification from a Myeloid Ancestor. *J Innate Immun.* 2015 Jun 18.
11. **Forn-Cuní G**, Varela M, Fernández-Rodríguez CM, Figueras A, Novoa B. (2015) Liver immune responses to inflammatory stimuli in a diet-induced obesity model of zebrafish. *J Endocrinol.* 2015 Feb;224(2):159–70.
12. Romero A, **Forn-Cuní G**, Moreira R, Milan M, Bargelloni L, Figueras A, et al. (2014) An immune-enriched oligo-microarray analysis of gene expression in Manila clam (*Venerupis philippinarum*) haemocytes after a *Perkinsus olseni* challenge. *Fish Shellfish Immunol.* 2014 Dec 30.
13. Varela M, Diaz-Rosales P, Pereiro P, **Forn-Cuní G**, Costa MM, Dios S, et al. (2014) Interferon-Induced Genes of the Expanded IFIT Family Show Conserved Antiviral Activities in Non-Mammalian Species. *PLoS ONE.* 2014 Jun 20;9(6):e100015.
14. **Forn-Cuní G**, Reis ES, Dios S, Posada D, Lambris JD, Figueras A, et al. (2014) The Evolution and Appearance of C3 Duplications in Fish Originate an Exclusive Teleost c3 Gene Form with Anti-Inflammatory Activity. *PLoS ONE.* 2014 Jun 13;9(6):e99673.
15. Romero A, Costa M, **Forn-Cuní G**, Balseiro P, Chamorro R, Dios S, et al. (2014) Occurrence, seasonality and infectivity of *Vibrio* strains in natural populations of mussels *Mytilus galloprovincialis*. *Dis Aquat Org.* 2014 Feb 19;108(2):149–63.
16. Costa MM, Saraceni PR, **Forn-Cuní G**, Dios S, Romero A, Figueras A, et al. (2013) IL-22 is a key player in the regulation of inflammation in fish and involves innate immune cells and PI3K signaling. *Dev Comp Immunol.* 2013 Dec 1;41(4):746–55.
17. Pereiro P, Balseiro P, Romero A, Dios S, **Forn-Cuní G**, Fuste B, et al. (2012) High-throughput sequence analysis of turbot (*Scophthalmus maximus*) transcriptome using 454-pyrosequencing for the discovery of antiviral immune genes. *PLoS ONE.* 2012;7(5):e35369.

Preprints and manuscripts in preparation:

1. Zhang R, Varela M, **Forn-Cuní G**, van der Vaart M, Meijer AH. (2019) *Dram 1* deficiency leads to increased susceptibility of zebrafish to mycobacterial infection due to activation of pyroptotic cell death in infected macrophages. *bioRxiv* doi: 10.1101/599266
2. **Forn-Cuní G**, Merino S, Tomás JM. Evolution and genomic organization of the flagellar glycosylation zones in *Aeromonas*.
3. **Forn-Cuní G**, Saraceni P, Pereiro P, Merino S, Figueras A, Tomás JM, Figueras A, Novoa B. Role of the polar flagellum and its glycosylation in gastroenteric *Aeromonas hydrophila* AH-3 strain virulence and immune stimulation.

#### BOOK CHAPTERS AND SCIENTIFIC ANNOUNCEMENTS

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1. **Forn-Cuní G**, Tavakkoliamol Z, Tomás JM. (2018) *Plesiomonas* (Chapter 35). In *Handbook of Foodborne Diseases*. Edited by Dongyou Liu. Taylor and Francis CRC Press.
2. **Forn-Cuní G**, Tomás JM, Merino S. (2016) Genome sequence of *A. hydrophila* AH-1 (Serotype O11). *Genome Announc.* 1;4(5):e00920-16.
3. **Forn-Cuní G**, Tomás JM, Merino S. (2016) Genome sequence of *A. hydrophila* AH-3 (Serotype O34). *Genome Announc.* 1;4(5):e00919-16.

#### FELLOWSHIPS AND AWARDS

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- Nov 2017      Personal postdoctoral fellowship, H2020 MSCA COFUND “LEaDing Fellows”.
- Feb 2015      Cover for the Journal of Endocrinology Volume 224: Issue 2.

#### MENTORING EXPERIENCE

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Supervision of bachelor, master and junior PhD students, including:

1. Co-direction of Masters Degree Thesis: “Estudio de la producción de  $\alpha$ -glucano superficial en *Aeromonas*” by Genoveva Arques Verdú. Advanced Microbiology Master, Universitat de Barcelona.
2. Co-direction of Masters Degree Thesis: “The role of *Dram1* in host defence against *A. fumigatus*” by Florence Stel. Advanced Microbiology Master, Institute of Biology, Leiden University.
3. Co-direction of Masters Degree Thesis: “The role of immunosuppressants in the host-defence against Invasive Aspergillosis in the zebrafish model” by Lieke Welvaarts. Advanced Microbiology Master, Institute of Biology, Leiden University.

#### SELECTED INVITED SEMINARS AND TALKS

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1. Enhancing antifungal innate immunity against *A. fumigatus* by stimulating the host autophagy machinery. April 2018. Internal Seminar. Erasmus MC, The Netherlands.
2. Should we trust the zebrafish as a model for human inflammatory diseases? March 2018. Invited Seminar. “In the Spotlight” Biology Seminars Leiden.
3. Enhancing innate immunity against Invasive Aspergillosis by stimulating the host autophagic defence. February 2018. IBL Animal Science and Health Cluster Meeting. Leiden University, The Netherlands.
4. The zebrafish as a research animal model. Nov 2016. Invited Seminar, Advanced Microbiology Master, Universitat de Barcelona, Barcelona.
5. Role of the polar flagellum and its glycosylation in gastroenteric *Aeromonas hydrophila* AH-3 strain virulence and immune stimulation. July 2016. Invited Seminar, Leiden University, Leiden.

#### ORGANIZATION OF INTERNATIONAL SCIENTIFIC MEETINGS

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- June 2013      First International Conference of Fish and Shellfish Immunology, Vigo, Spain.

## PERSONAL AND CO-AUTHOR PRESENTATIONS AT INTERNATIONAL SCIENTIFIC MEETINGS

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1. **Poster:** “Real-time in vivo visualization of autophagic defence against Invasive Aspergillosis”. 3<sup>rd</sup> Nordic Autophagy Conference. Utrecht, The Netherlands, 22<sup>th</sup> – 24<sup>th</sup> May **2019**.
2. **Talk:** “Role of the polar flagellum and its glycosylation in gastroenteric *Aeromonas hydrophila* AH-3 strain virulence and immune stimulation”. The 11<sup>th</sup> Zebrafish Disease Models Conference. Leiden, The Netherlands, 10<sup>th</sup> – 13<sup>th</sup> June **2018**.
3. **Poster:** “Real-time in vivo visualization of autophagic defence against Invasive Aspergillosis” The 11<sup>th</sup> Zebrafish Disease Models Conference. Leiden, The Netherlands, 10<sup>th</sup> – 13<sup>th</sup> June **2018**.
4. **Talk:** “Comparative of the *Aeromonadaceae* core oligosaccharide biosynthetic regions”. 12<sup>th</sup> International Symposium on *Aeromonas* & *Plesiomonas*. Mexico City, Mexico. 23<sup>th</sup> – 23<sup>th</sup> June **2017**.
5. **Talk:** “Bivalve hemocyte transcriptomes reveal a powerful differential immune response of Mediterranean mussel (*Mytilus galloprovincialis*)”. 2<sup>nd</sup> International Conference of Fish and Shellfish Immunology. Portland, Maine, USA. 26<sup>th</sup> – 30<sup>th</sup> June **2016**.
6. **Poster:** “The first characterization of an IFN-gamma gene in turbot (*Scophthalmus maximus*) reveals interesting questions about its immunomodulatory properties”. 17<sup>th</sup> EAFP International Conference on Diseases of Fish and Shellfish. Las Palmas de Gran Canaria, Spain. 07 – 09<sup>th</sup> September **2015**.
7. **Talk:** “Liver immune responses to inflammatory stimuli in a diet-obesity model of zebrafish”. 13<sup>th</sup> International Society of Developmental and Comparative Immunology (ISDCI) Congress. Murcia, Spain. 28<sup>th</sup> June – 3<sup>th</sup> July **2015**.
8. **Talk:** “Inflammasome activation and antiviral state induced by a zebrafish perforin after a possible cellular and functional diversification from a myeloid ancestor”. 13<sup>th</sup> International Society of Developmental and Comparative Immunology (ISDCI) Congress. Murcia, Spain. 28<sup>th</sup> June – 3<sup>th</sup> July **2015**.
9. **Poster:** “An immune-enriched oligo-microarray analysis of gene expression in Manila clam (*Venerupis philippinarum*) haemocytes after a *Perkinsus olseni* challenge”. 13<sup>th</sup> International Society of Developmental and Comparative Immunology (ISDCI) Congress. Murcia, Spain. 28<sup>th</sup> June – 3<sup>th</sup> July **2015**.
10. **Talk:** “Genome sequencing of the turbot (*Scophthalmus maximus*; pleuronectiformes), a flatfish of high aquaculture value”. The International Symposium On Genetics In Aquaculture XII. Santiago de Compostela, Spain. 21<sup>st</sup> – 24<sup>th</sup> June **2015**.
11. **Talk:** “Antiviral activities of a new family of interferon-induced genes in fish”. 9<sup>th</sup> International Symposium on Viruses of Lower Vertebrates. Málaga, Spain. 1<sup>st</sup> – 4<sup>th</sup> October **2014**.
12. **Poster:** “Effect of obesity in the transcriptomic liver response to an inflammatory stimulus using a zebrafish (*Danio rerio*) diet-induced obesity model”. XXXIX Congreso de la Asociación Española para el estudio del Hígado. Madrid, Spain. 19 – 21<sup>th</sup> February **2014**.
13. **Talk:** “IFITs: First description of a new family of interferon induced genes in fish”. 16<sup>th</sup> EAFP International Conference on Diseases of Fish and Shellfish. Tampere, Finland. 2<sup>nd</sup> – 6<sup>th</sup> September **2013**.
14. **Poster:** “Occurrence, seasonality and infectivity of *Vibrio* strains associated to natural populations of mussels (*Mytilus galloprovincialis*)”. Tampere, Finland. 2<sup>nd</sup> – 6<sup>th</sup> September **2013**.
15. **Poster:** “Complement C3 isoforms show differential pro-inflammatory potential in zebrafish”. 8<sup>th</sup> European Zebrafish Meeting. Barcelona, Spain. 9 – 13<sup>th</sup> July **2013**.
16. **Talk:** “IL-22 is a key player in the regulation of the inflammation in fish with the involvement of innate immune cells and PI3K signalling”. First International Conference of Fish and Shellfish Immunology. Vigo, Spain. 25<sup>th</sup> – 28<sup>th</sup> June **2013**.

## MEMBERSHIP OF SCIENTIFIC SOCIETIES

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- Joined October 2018      Member of the “Nordic Autophagic Society” (NAS).
- Joined June 2018        Member of the “Zebrafish Disease Models Society” (ZDM).

## SPECIALISED TRAINING

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- 2016 [Animal Experimentation Course – Function C](#). Organized by “Animalaria Formación y Gestión, SL”.
- 2014 [Genomics and Bioinformatics Workshop 2014](#). Organized by “The Marie Curie ITN Project FishForPharma (PITN-GA-2011-289209)” in ZF-Screens BV. Leiden, 2014.
- 2013 [Workshop Omics Technologies: NGS, RNA-seq & ChIP-Seq](#). Organized by “Campus do Mar” in Universidade de Vigo, Spain.
- 2012 [Microarray Design and Analysis](#). Group of Evolutive Immunology, Universitat Autònoma de Barcelona, Spain.

## RELEVANT EXTRA CURRICULAR COURSES AND SEMINARIES

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1. Online degree (≈400 hours) “Data Analyst Nanodegree”. Organized by Udacity and co-created by Facebook, mongoDB and the Zipfian Academy, 2015.
2. Online 4 weeks “Introduction to R for Data Science”. Taught by Filip Schouwenaars and organized by Microsoft in eDX, 2015.
3. Online 5 weeks “The Immune System: New Developments in Research - Part 1”. Taught by Prof. Masayuki Miyasaka and Prof. Shizuo Akira and organized by the Osaka University, in eDX, 2015.
4. Online 6 weeks “Finding Hidden Messages in DNA (Bioinformatics I)”. Taught by Prof. Pavel Prevezner and Dr. Phillip E. C. Compeau and organized by the University of California, San Diego in Coursera, 2015.
5. Online 4 weeks “R Programming”. Taught by Prof. Roger D. Peng and organized by the John Hopkins Bloomberg School of Public Health in Coursera, 2014.
6. Online 4 weeks “The Data Scientist’s Toolbox”. Taught by Prof. Jeff Leek and organized by the John Hopkins Bloomberg School of Public Health in Coursera, 2014.
7. Online 6 weeks “Bioinformatics Methods II”. Taught by Prof. Nicholas James Provar and organized by the University of Toronto in Coursera, 2014.
8. Online 6 weeks “Bioinformatics Methods I”. Taught by Prof. Nicholas James Provar and organized by the University of Toronto in Coursera, 2014.

## SCIENTIFIC COMMUNICATION AND OUTREACH

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Maintenance of the blog [bitsandgen.es](http://bitsandgen.es), in which I share information and code snippets regarding bioinformatics and evolutionary analysis on the zebrafish model.

October 2018 – Volunteer, Leiden Science Family Day.

February 2017 – Notice regarding the findings on the publication “Conserved gene regulation during acute inflammation between zebrafish and mammals”.

Original Title: “Demuestran que el pez cebra es un modelo idóneo para estudiar la inflamación en humanos”.

Published in local press, including *El Faro de Vigo*, *Correo Gallego*, and *El Progreso*.

March 2016 – Combined notice regarding the advances on Monica Varela’s and my PhD findings.

Original Title: “El CSIC avanza desde Galicia en la utilidad del pez cebra como modelo de investigación con los resultados de dos tesis doctorales”.

Published in at least 12 print and online newspapers, including *El Faro de Vigo*, *La Voz de Galicia*, *La Vanguardia*, *el Periodico*, and *ABC.es*.

February 2015 – Notice regarding the findings on the publication “Liver immune responses to inflammatory stimuli in a diet-induced obesity model of zebrafish”.

Original Title: “El hígado graso responde peor ante una infección bacteriana que uno sano”.

Published in several online media outlets, including *CSIC.es* and *El Faro de Vigo*.

Some of the code used in my research is freely available in <http://github.com/gabrifc>