

# MIREIA COSCOLLA, Ph.D.

Tuberculosis Research Unit. Swiss Tropical and Public Health Institute.

Address: Socinstrasse 57, 4002 Basel. phone: +41(0) 612848198.

e-mail: [mireia.coscolla@unibas.ch](mailto:mireia.coscolla@unibas.ch)

Web page: <http://www.mireiacoscolla.com/>

## RESEARCH EXPERIENCE

### Swiss Tropical and Public Health Institute (Basel, Switzerland)

#### *Senior Scientific Collaborator*

Jan 2015 – Present

#### *Post-Doctoral Fellow*

June 2010 – Dec 2014

- Studied the impact of *Mycobacterium tuberculosis* genomic diversity in disease
- Established pipelines for genomic and transcriptomic analysis from Illumina sequencing using bash, perl python and R programming languages
- Managed genome sequence analysis in six global collaborative projects with institutions from USA, Argentina, Germany, Spain, UK, Ghana, Gambia, Tanzania, China and Singapore
- Supervised two Masters students, including laboratory research, data analysis, and writing of Masters thesis
- Ten co-authored papers, six first author papers and two first author review. Currently one manuscripts as first author submitted.
- **Professional Service:** Reviewer for Plos One and for Infection Genetics and Evolution journals.

### Pompeu Fabra University (Barcelona, Spain)

Jan 2010 - May 2010

#### *Research Associate*

- Studied the impact of skin microorganisms in psoriasis using skin metagenomics approach
- Established techniques for DNA extraction and sequencing. Metagenomic analysis of skin microbiome
- Two co-authored papers

### Center for Public Health Research (Valencia, Spain)

Oct 2008 - Dec 2009

#### *Molecular Epidemiology Investigator*

- Identified the source of *Legionella pneumophila* outbreaks in Valencia, Spain for the public health department
- Performed molecular epidemiology of *L. pneumophila* clinical samples and environmental isolates
- First and corresponding author of one paper

### Evolutionary genetics group of Cavanilles Institute of Biodiversity and Evolutionary Biology, University of Valencia (Valencia, Spain)

Sep 2005 – Sep 2008

#### *Doctoral Student*

- Established population genetic analysis pipeline for molecular epidemiology of *L. pneumophila*
- Developed DNA extraction techniques from clinical samples (sputum, bronchoalveolar lavage) without culturing
- Supervised three bachelor students in research projects
- Five papers as first author

### Evolutionary genetics group of Cavanilles Institute of Biodiversity and Evolutionary Biology, University of Valencia (Valencia, Spain)

Sep 2002 - Sep 2003

#### *Bachelor's Student, collaborator investigator*

- Performed molecular epidemiology of HCV and RNA extraction from blood, <sup>Rt</sup>PCR, PCR, sanger sequencing and sequence analysis of viral genomic regions

- One co-authored paper

## EDUCATION

- University of Valencia, PhD (Valencia, Spain)** 2005 - 2009  
 PhD thesis: Population genetics and molecular epidemiology of *Legionella pneumophila*
- Five papers as first author;
  - “Extraordinary Prize” for medical sciences thesis at University of Valencia
- University of Barcelona, Post-Graduate Course (Barcelona, Spain)** 2004  
 Genealogies and DNA phylogenies
- University of Valencia, Bachelor’s in Biology (Valencia, Spain)** 1998 - 2003
- Languages:** Fluent in English; Native Spanish and Catalan speaker; Basic German.

## AWARDS & HONORS

- “Extraordinary Prize” of the University of Valencia for thesis in medical sciences 2012  
 Postdoctoral Fellowship, Generalitat Valenciana, Valencia Government, Spain 2010  
 2nd prize in the 1st International Legionella Prize from the company ALCORA SA 2006  
 Doctoral Fellowship Generalitat Valenciana, Valencia Government, Spain 2005  
 Bachelor fellowship Ministry of Education, Spanish Government 2002

## TEACHING EXPERIENCE

- Master degree in Infection Biology, University of Basel 2012 - 2013  
 Bachelor’s degree in Biology and Medicine, University of Basel 2010 - 2012  
 Bachelor’s degree in Biology, Population genetics, University of Valencia 2006 - 2008  
 Bachelor's degree in Biology, Genetics, University of Valencia 2006 - 2008

## ORAL COMMUNICATIONS

- 9th European Congress on Tropical Medicine and International Health. Basel, Switzerland. Sep 2015  
**“Identification of potential tuberculosis vaccine antigens by integrating population genomics and immunology”**
- Keystone Symposia Tuberculosis: Understanding the Enemy, British Columbia, Canada. Mar 2013  
**“Adaptive Evolution in Different Lineages of the *Mycobacterium tuberculosis* Complex”**
- Legionella: de l'environnement à l'homme. Lyon, France (Invited talk). **Genomics and population structure in *Legionella pneumophila*** Nov 2011
- Legionella, Institute Pasteur, Paris. **Multiple *Legionella* strains infection detected by sequence analysis directly from respiratory samples** Oct 2009
- XVI Seminars of population genetics and evolution, Spain. **Estructura genético-poblacional de aislados ambientales de *Legionella pneumophila*** Oct 2006
- XII Congress of the Spanish Society of Research in Clinical Microbiology, Spain. **Genética de poblaciones, epidemiología molecular y evolución de *Legionella pneumophila* en Alcoy** Jun 2006

## PEER-REVIEWED PUBLICATIONS

- Coscollá M, Copin R, Sutherland J, Gehre F, de Jong B, Owolabi O, Mbayo G, Giardina F, Gagneux S, Ernst JD. M. tuberculosis T Cell Epitope Analysis Reveals Paucity of Antigenic Variation and Identifies Rare Variable TB Antigens. Cell Host and microbe. In press.

- Sánchez-Busó L, Coscollà M, Palero F, Camaró ML, Gimeno A, Moreno P, Escribano I, López Perezagua MM, Colomina J, Vanaclocha H, González-Candelas F. Geographical and Temporal Structures of *Legionella pneumophila* Sequence Types in Comunitat Valenciana (Spain), 1998 to 2013. *Appl Environ Microbiol.* 2015 Oct 15;81(20):7106-13. doi: 10.1128/AEM.02196-15. Epub 2015 Jul 31. PubMed PMID: 26231651; PubMed Central PMCID: PMC4579446.
- Young DC, Layre E, Pan SJ, Tapley A, Adamson J, Seshadri C, Wu Z, Buter J, Minnaard AJ, Coscolla M, Gagneux S, Copin R, Ernst JD, Bishai WR, Snider BB, Moody DB. In vivo biosynthesis of terpene nucleosides provides unique chemical markers of *Mycobacterium tuberculosis* infection. *Chem Biol.* 2015 Apr 23;22(4):516-26. doi: 10.1016/j.chembiol.2015.03.015. PubMed PMID: 25910243; PubMed Central PMCID: PMC4432472.
- Rock JM, Lang UF, Chase MR, Ford CB, Gerrick ER, Gawande R, Coscolla M, Gagneux S, Fortune SM, Lamers MH. DNA replication fidelity in *Mycobacterium tuberculosis* is mediated by an ancestral prokaryotic proofreader. *Nat Genet.* 2015 Jun;47(6):677-81. doi: 10.1038/ng.3269. Epub 2015 Apr 20. PubMed PMID: 25894501; PubMed Central PMCID: PMC4449270.
- Coscolla M, Barry PM, Oeltmann JE, Koshinsky H, Shaw T, Cilnis M, Posey J, Rose J, Weber T, Fofanov VY, Gagneux S, Kato-Maeda M, Metcalfe JZ. Genomic epidemiology of multidrug-resistant *Mycobacterium tuberculosis* during transcontinental spread. *J Infect Dis.* 2015 Jul 15;212(2):302-10. doi: 10.1093/infdis/jiv025. Epub 2015 Jan 18. PubMed PMID: 25601940; PubMed Central PMCID: PMC4490235.
- Coscolla M, Gagneux S. Consequences of genomic diversity in *Mycobacterium tuberculosis*. *Semin Immunol.* 2014 Dec;26(6):431-44. doi: 10.1016/j.smim.2014.09.012. Epub 2014 Oct 22. Review. PubMed PMID: 25453224; PubMed Central PMCID: PMC4314449. 6
- Stucki D, Ballif M, Bodmer T, Coscolla M, Maurer AM, Droz S, Butz C, Borrell S, Längle C, Feldmann J, Furrer H, Mordasini C, Helbling P, Rieder HL, Egger M, Gagneux S, Fenner L. Tracking a tuberculosis outbreak over 21 years: strain-specific single-nucleotide polymorphism typing combined with targeted whole-genome sequencing. *J Infect Dis.* 2015 Apr 15;211(8):1306-16. doi: 10.1093/infdis/jiu601. Epub 2014 Oct 30. PubMed PMID: 25362193; PubMed Central PMCID: PMC4447836. 7
- Steiner A, Stucki D, Coscolla M, Borrell S, Gagneux S. KvarQ: targeted and direct variant calling from fastq reads of bacterial genomes. *BMC Genomics.* 2014 Oct 9;15:881. doi: 10.1186/1471-2164-15-881. PubMed PMID: 25297886; PubMed Central PMCID: PMC4197298. 8
- Portevin D, Sukumar S, Coscolla M, Shui G, Li B, Guan XL, Bendt AK, Young D, Gagneux S, Wenk MR. Lipidomics and genomics of *Mycobacterium tuberculosis* reveal lineage-specific trends in mycolic acid biosynthesis. *Microbiologyopen.* 2014 Dec;3(6):823-35. doi: 10.1002/mbo3.193. Epub 2014 Sep 19. PubMed PMID: 25238051; PubMed Central PMCID: PMC4263507.
- Copin R, Coscollá M, Efstathiadis E, Gagneux S, Ernst JD. Impact of in vitro evolution on antigenic diversity of *Mycobacterium bovis* bacillus Calmette-Guerin (BCG). *Vaccine.* 2014 Oct 14;32(45):5998-6004. doi: 10.1016/j.vaccine.2014.07.113. Epub 2014 Sep 6. PubMed PMID: 25211768; PubMed Central PMCID: PMC4539939.
- Bos KI, Harkins KM, Herbig A, Coscolla M, Weber N, Comas I, Forrest SA, Bryant JM, Harris SR, Schuenemann VJ, Campbell TJ, Majander K, Wilbur AK, Guichon RA, Wolfe Steadman DL, Cook DC, Niemann S, Behr MA, Zumarraga M, Bastida R, Huson D, Nieselt K, Young D, Parkhill J, Buikstra JE, Gagneux S, Stone AC, Krause J. Pre-Columbian mycobacterial genomes reveal seals as a source of New World human tuberculosis. *Nature.* 2014 Oct 23;514(7523):494-7. doi: 10.1038/nature13591. Epub 2014 Aug 20. PubMed PMID: 25141181; PubMed Central PMCID: PMC4550673.
- Copin R, Coscollá M, Seiffert SN, Bothamley G, Sutherland J, Mbayo G, Gagneux S, Ernst JD. Sequence diversity in the *pe\_pgrs* genes of *Mycobacterium tuberculosis* is independent of human T cell recognition. *MBio.* 2014 Jan 14;5(1):e00960-13. doi: 10.1128/mBio.00960-13. PubMed PMID: 24425732; PubMed Central PMCID: PMC3903279.
- Coscollá M, Fernández C, Colomina J, Sánchez-Busó L, González-Candelas F. Mixed infection by *Legionella pneumophila* in outbreak patients. *Int J Med Microbiol.* 2014 May;304(3-4):307-13. doi: 10.1016/j.ijmm.2013.11.002. Epub 2013 Nov 14. PubMed PMID: 24309206. 13

- Rose G, Cortes T, Comas I, Coscolla M, Gagneux S, Young DB. Mapping of genotype-phenotype diversity among clinical isolates of mycobacterium tuberculosis by sequence-based transcriptional profiling. *Genome Biol Evol.* 2013;5(10):1849-62. doi: 10.1093/gbe/evt138. PubMed PMID: 24115728; PubMed Central PMCID: PMC3814196.
- Garcia-Garcerà M, Garcia-Etxebarria K, Coscollà M, Latorre A, Calafell F. A new method for extracting skin microbes allows metagenomic analysis of whole-deep skin. *PLoS One.* 2013 Sep 20;8(9):e74914. doi: 10.1371/journal.pone.0074914. eCollection 2013. PubMed PMID: 24073227; PubMed Central PMCID: PMC3779245.
- Comas I, Coscolla M, Luo T, Borrell S, Holt KE, Kato-Maeda M, Parkhill J, Malla B, Berg S, Thwaites G, Yeboah-Manu D, Bothamley G, Mei J, Wei L, Bentley S, Harris SR, Niemann S, Diel R, Aseffa A, Gao Q, Young D, Gagneux S. Out-of-Africa migration and Neolithic coexpansion of *Mycobacterium tuberculosis* with modern humans. *Nat Genet.* 2013 Oct;45(10):1176-82. doi: 10.1038/ng.2744. Epub 2013 Sep 1. PubMed PMID: 23995134; PubMed Central PMCID: PMC3800747.
- Coscolla M, Lewin A, Metzger S, Maetz-Renning K, Calvignac-Spencer S, Nitsche A, Dabrowski PW, Radonic A, Niemann S, Parkhill J, Couacy-Hymann E, Feldman J, Comas I, Boesch C, Gagneux S, Leendertz FH. Novel *Mycobacterium tuberculosis* complex isolate from a wild chimpanzee. *Emerg Infect Dis.* 2013 Jun;19(6):969-76. doi: 10.3201/eid1906.121012. PubMed PMID: 23735084; PubMed Central PMCID: PMC3713819.
- Sánchez-Busó L, Coscollà M, Pinto-Carbó M, Catalán V, González-Candelas F. Genetic Characterization of *Legionella pneumophila* Isolated from a Common Watershed in Comunidad Valenciana, Spain. *PLoS One.* 2013 Apr 25;8(4):e61564. doi: 10.1371/journal.pone.0061564. Print 2013. PubMed PMID: 23634210; PubMed Central PMCID: PMC3636276.
- Ballif M, Harino P, Ley S, Coscolla M, Niemann S, Carter R, Coulter C, Borrell S, Siba P, Phuanukoonnon S, Gagneux S, Beck HP. Drug resistance-conferring mutations in *Mycobacterium tuberculosis* from Madang, Papua New Guinea. *BMC Microbiol.* 2012 Sep 4;12:191. doi: 10.1186/1471-2180-12-191. PubMed PMID: 22943573; PubMed Central PMCID: PMC3478209.
- Stucki D, Malla B, Hostettler S, Huna T, Feldmann J, Yeboah-Manu D, Borrell S, Fenner L, Comas I, Coscollà M, Gagneux S. Two new rapid SNP-typing methods for classifying *Mycobacterium tuberculosis* complex into the main phylogenetic lineages. *PLoS One.* 2012;7(7):e41253. doi: 10.1371/journal.pone.0041253. Epub 2012 Jul 20. PubMed PMID: 22911768; PubMed Central PMCID: PMC3401130.
- Kato-Maeda M, Shanley CA, Ackart D, Jarlsberg LG, Shang S, Obregon-Henao A, Harton M, Basaraba RJ, Henao-Tamayo M, Barrozo JC, Rose J, Kawamura LM, Coscolla M, Fofanov VY, Koshinsky H, Gagneux S, Hopewell PC, Ordway DJ, Orme IM. Beijing sublineages of *Mycobacterium tuberculosis* differ in pathogenicity in the guinea pig. *Clin Vaccine Immunol.* 2012 Aug;19(8):1227-37. doi: 10.1128/CVI.00250-12. Epub 2012 Jun 20. PubMed PMID: 22718126; PubMed Central PMCID: PMC3416080.
- Garcia-Garcerà M, Coscollà M, Garcia-Etxebarria K, Martín-Caballero J, González-Candelas F, Latorre A, Calafell F. *Staphylococcus* prevails in the skin microbiota of long-term immunodeficient mice. *Environ Microbiol.* 2012 Aug;14(8):2087-98. doi: 10.1111/j.1462-2920.2012.02756.x. Epub 2012 Apr 24. PubMed PMID: 22524615.
- Coscolla M, Gagneux S. Does *M. tuberculosis* genomic diversity explain disease diversity? *Drug Discov Today Dis Mech.* 2010 Spring;7(1):e43-e59. PubMed PMID: 21076640; PubMed Central PMCID: PMC2976975.
- Coscollà M, Comas I, González-Candelas F. Quantifying nonvertical inheritance in the evolution of *Legionella pneumophila*. *Mol Biol Evol.* 2011 Feb;28(2):985-1001. doi: 10.1093/molbev/msq278. Epub 2010 Oct 20. PubMed PMID: 20961962.
- Coscollà M, Fenollar J, Escribano I, González-Candelas F. Legionellosis outbreak associated with asphalt paving machine, Spain, 2009. *Emerg Infect Dis.* 2010 Sep;16(9):1381-7. doi: 10.3201/eid1609.100248. PubMed PMID: 20735921; PubMed Central PMCID: PMC3294975.
- Coscollà M, González-Candelas F. Direct sequencing of *Legionella pneumophila* from respiratory samples for sequence-based typing analysis. *J Clin Microbiol.* 2009 Sep;47(9):2901-5. doi:

10.1128/JCM.00268-09. Epub 2009 Jul 15. PubMed PMID: 19605573; PubMed Central PMCID: PMC2738094.

- Coscollá M, González-Candelas F. Comparison of clinical and environmental samples of *Legionella pneumophila* at the nucleotide sequence level. *Infect Genet Evol.* 2009 Sep;9(5):882-8. doi: 10.1016/j.meegid.2009.05.013. Epub 2009 May 22. PubMed PMID: 19465160.
- Coscollá M, González-Candelas F. Population structure and recombination in environmental isolates of *Legionella pneumophila*. *Environ Microbiol.* 2007 Mar;9(3):643-56. PubMed PMID: 17298365.
- Coscollá M, Gosalbes MJ, Catalán V, González-Candelas F. Genetic variability in environmental isolates of *Legionella pneumophila* from Comunidad Valenciana (Spain). *Environ Microbiol.* 2006 Jun;8(6):1056-63. PubMed PMID: 16689726.
- López-Labrador FX, Bracho MA, Berenguer M, Coscollà M, Rayón JM, Prieto M, Carrasco D, Gómez MD, Moya A, González-Candelas F. Genetic similarity of hepatitis C virus and fibrosis progression in chronic and recurrent infection after liver transplantation. *J Viral Hepat.* 2006 Feb;13(2):104-15. PubMed PMID: 16436128.

### **NON PEER-REVIEWED PUBLICATIONS**

- Coscollá, M.; Comas, I.; González-Candelas, F. Book chapter: Relevancia de la herencia no vertical en bacterias. Book title: *Adaptación y Evolución: 150 años después del Origen de las Especies*. SESBE. En Dopazo, H. y Navarro, A. (eds). 2009.
- Coscolla, M. Uncommon Legionellosis. A city in Spain experiences an outbreak in legionnaires' disease. *Pennsylvania Borough News*, February 2011.

### **RESEARCH REPORTS TO PUBLIC INSTITUTIONS**

- Technical report to health authorities of Valencia Government: Molecular epidemiology of the legionellosis outbreak in Alcoy in 2009.
- Technical report to health authorities of Valencia Government: Molecular epidemiology of the legionellosis outbreak in Carcaixent-Alzira in 2008.