David Fernando Plaza, PhD

EDUCATION

06/2010 - 06/2014 **ETH Zurich. Zurich, Switzerland.** PhD in Microbiology and Immunology. Institute of Microbiology. Group Prof. Dr. Markus Aebi and Dr. Markus Künzler. Thesis title: "Regulation and specificity of the *Coprinopsis cinerea* defensome against nematodes ".

09/2008 - 05/2010 **Uppsala University. Uppsala, Sweden.** MSc in Biology (Immunology and Infection Biology). Faculty of Science and Technology. Group Prof. Dr. Sandra Kleinau. Thesis title: "Understanding the mechanisms by which B-cells escape self-tolerance: The role of CD35 and CD21 in the pathogenesis of collagen-induced arthritis".

02/2002 - 12/2006 **Universidad Nacional de Colombia. Bogotá, Colombia.** BSc in Biology. Department of Biology. Faculty of Science. Group Prof. Dr. Lucy Gabriela Delgado. Thesis title: "Characterizing the effect of pentamidine isethionate on the immune system using mouse splenocytes as an experimental model".

RESEARCH AND TEACHING EXPERIENCE

09/2021- 2025 **Karolinska Institutet. Assistant Professor.** Department of Medicine, Solna. Division of Infectious Diseases. Project title: "Development of strain-transcending vaccines against malaria using mRNA as an antigen delivery platform"

09/2019- 2025 **Karolinska Institutet. Postdoctoral scientist.** Department of Medicine, Solna. Division of Infectious Diseases. Group Dr. Christopher Sundling. Project title: "Molecular epidemiology of *P. falciparum* and evaluation of memory B cell responses to merozoite surface proteins"

04/2018- 08/2019 **Fundación instituto de inmunología de Colombia (FIDIC). Postdoctoral fellow.** Department of Molecular Biology. Group Prof. Dr. Carlos Suarez. Project title: "Identification of novel receptors on the erythrocyte surface for *Plasmodium falciparum* invasion proteins"

11/2014- 11/2017 **Harvard university. Postdoctoral fellow.** Department of Molecular and Cellular Biology. Group Prof. Dr. Susan Mango. Project title: "Unveiling novel factors regulating nuclear architecture and embryonic development".

06/2010 - 06/2014 **ETH Zurich. Research and teaching assistant.** Institute of Microbiology. Thesis title: "Fungus-nematode antagonistic interactions: genetic diversity and regulation of gene expression". Two master projects supervised.

07/2006 - 06/2008 **Fundación instituto de inmunología de Colombia (FIDIC). Research assistant.** Department of tuberculosis molecular biology. Project title: "Functional characterization of anti-tuberculosis peptide-based vaccine candidates".

PROFESSIONAL SKILLS

Wet lab and preclinical *in vitro*
Extensive experience in cell culture and cell-based assays • design, execution and analysis of in vitro toxicity and efficacy assays (including Caenorhabditis elegans models) • maintenance and experimental handling of cell lines • development and optimization of ELISA and Western blot assays for protein detection and quantification • FACS-based phenotyping and functional readouts • qRT-PCR for quantitative gene expression analysis • Next-Generation Sequencing (NGS: long-read amplicon sequencing using circular consensus sequencing and RNA-seq experiments) • recombinant protein expression and purification in Pichia pastoris and Escherichia coli using FPLC (ÄKTA) • microscopy-based analysis of cells and tissues (light microscopy • fluorescence microscopy • confocal fluorescence microscopy • immunoelectron microscopy) • animal husbandry.

Genomics, bioanalytics and data analysis
NGS data analysis for amplicon sequencing and RNA-seq • statistical analysis and visualization of preclinical and bioanalytical data in R • workflow development and execution in Galaxy • genomic context inspection with UCSC Genome Browser • flow cytometry data analysis with CellQuest • sequence design and cloning analysis with Clone Manager and Serial Cloner • glycan and structural analysis with GlycoWorkbench and PyMOL • clustering and heatmap generation with Cluster 3 and Java Tree View • image analysis with Zeiss Zen and ImageJ • figure preparation and quantitative data analysis with Prism.

Languages
English (bilingual proficiency) • Swedish (intermediate proficiency) • German (elementary proficiency) • Spanish (native speaker).

GRANTS AND AWARDS

2024 OE och Edla Johanssons Vetenskapliga Stiftelse (Project Grant, main applicant).
2023 Tore Nilsons Stiftelse för Medicinsk Forskning (Project Grant, main applicant).
2023 Stiftelsen Clas Groschinskys Minnesfond (Project Grant, main applicant).
2020 Karolinska Institutets Forskningsstiftelser

2013 MIM PhD Program Travel Grant. Life Science Zurich Graduate School.

2011 Best Poster Award/MIM PhD program retreat. Life Science Zurich Graduate School.

2008 Colfuturo Scholarship for MSc studies

CONGRESSES AND MEETINGS

Speaker

- **Plaza DF.** A genomic surveillance platform for indel-rich genes from Plasmodium spp. using long-read amplicon sequencing. *Genomic Epidemiology of Malaria*. Wellcome Genome Campus, UK. 2021.

COMPLEMENTARY INFORMATION

Other Training

2024 Teaching and learning in higher education, distance (GHPD). Karolinska Institutet.

2023 GK4 – Introductory Doctoral Supervision Course. Karolinska Institutet

2022 International Vaccinology Course. International Vaccine Institute.

2022 Life Science Entrepreneurship and Innovation. SmiLe Venture Hub. Lund.

2009 Laboratory Animal Science (FELASA cat-C). Division of Comparative Medicine. Department of Neuroscience. Uppsala University.

2007 Summer School "Complexity in Living Systems". Center for Basic and Applied Interdisciplinary Studies in Complexity. Physics Department. Faculty of Science. Universidad Nacional de Colombia.

Project supervision

10/2022 - 05/2023 Lucille Margerie. **Master project:** "MSP2-specific antibody response and epitope mapping in Swedish travelers with acute Plasmodium falciparum malaria". Department of Medicine Solna. Karolinska Institutet.

11/2020 - present Julia Zerebinski, **Master/PhD project:** “Sequence Diversity and Antibody Response to Autologous and Heterologous MSP2 Antigens in a Prospective Malaria Immunology Cohort”. Karolinska Insitutet and Uppsala Universitet.

06/2018 - 08/2019 Jessica Molina-Franky, **PhD project:** “Identification of novel erythrocyte receptors involved in the invasion of *Plasmodium* to its human host”. FIDIC.

09/2012 - 12/2012 Esther Ketelaars. **Master project:** "Expression and characterization of a *Coprinopsis cinerea* Osmotin and short-term transcriptional regulation in *C. cinerea* after nematode feeding". Institute of Microbiology. ETH Zurich.

01/2011 - 04/2011 Caroline Lanz. **Master project 1:** "Enrichment of glycoproteins from *Caenorhabditis elegans* binding to the fungal lectins RedA (CCL2) and CGL2". **Master project 2: "**Cloning and characterization of a *Laccaria bicolor* RedA (CCL2) homolog". Institute of Microbiology. ETH Zurich.

Teaching

2024 Frontiers in Translational Medicine (5MT012, 13 credits). Master's programme in Molecular Techniques in Life Science. Department of Medicine Solna. Karolinska Institute. Lecture: “Structural-basis of natural resistance to malaria”.

2021-2025 Clinical and Molecular Parasitology and Mycology (5234, 1.5 credits)**.** Doctoral Program in Allergy, Immunology and Inflammation. Department of Microbiology, Tumor and Cell Biology. Karolinska Institutet. Lecture: “AI-assisted structural vaccinology and the challenges of a strain-transcending malaria vaccine”. Main course organizer.

2019-2022 Basic Immunology (5229, 3.0 credits). Doctoral Program in Allergy, Immunology and Inflammation. Department of Medicine Solna. Karolinska Institute. Lecture: “Immune Response to Protozoan Infection”.

2019-2025 Molecular Medicine: Cardiometabolic and Infectious Diseases (1BI048, 15 credits). Bachelor Program in Biomedicine. Department of Medicine Solna. Karolinska Institutet. Coordinator of the Research Application and Scientific Writing Assignment.

Organizations

01/2016 - 01/2017 American Heart Association. Council of Functional Genomics and Translational Biology. Member

PUBLICATION LIST

1. **Plaza DF†**. STAR Protocol for genomic surveillance of Plasmodium falciparum antigens using amplicon-based PacBio long-read sequencing. *Cell Press STAR Protocols*. 2025. 2025 Sep 15;6(4):104093
2. Braeken R, Margerie L, Osterholz H, Zerebinski J, Tamm KP, Färnert A, Sundling C, Hanke L, Chan SCL, **Plaza DF†**. Antigenic and Structural Diversity of the Intrinsically Disordered Malaria Vaccine Candidates CSP and MSP2. *SSRN Preprints with the Lancet*. 2025 Aug 8. http://dx.doi.org/10.2139/ssrn.5373745.
3. Zerebinski J, Broumou I, Kimenyi KM, Aklilu E, Andrade CM, Babiker H, Bejon P, Cherif MK, Crompton PD, Fançony C, Foroogh F, Gil JP, Kapulu M, Kiwuwa SM, Kweku MA, Liljander A, Lopes D, Marsh K, Mutemi DD, Ngasala B, Normark J, Orikiiriza J, Persson KEM, Portugal S, Ribacke U, Sirima SB, Sondén K, de Sousa TN, Traore B, Tijani MK, Eckerdal N, Villner P, Ochola-Oyier LI, **Plaza DF**, Färnert A. Uncovering the genetic diversity of the malaria parasite antigen MSP2 across Sub-Saharan Africa. *bioRxiv*. 2025. https://doi.org/10.1101/2025.07.23.666329.
4. Schmieder SS, Cordara G, Kersten F, Steiner K, Samin CH, **Plaza DF**, Ahmad AA, Boggild A, Karlsen JL, Sokolowska BO, Boesen T, Krengel U, Kunzler M. Structure and function of a fungal AB toxin-like chimerolectin involved in anti-nematode defense. *bioRxiv*. 2025. doi: https://doi.org/10.1101/2025.07.23.666329.
5. Zerebinski J, Margerie L, Han NS, Moll M, Ritvos M, Jahnmatz P, Ahlborg N, Ngasala B, Rooth I, Sjöberg R, Sundling C, Yman V, Färnert A, **Plaza DF†**. Naturally acquired IgG responses to *Plasmodium falciparum* do not target the conserved termini of the malaria vaccine candidate Merozoite Surface Protein 2. *Front Immunol*. 2024 Dec 9;15:1501700.
6. Zerebinski J, **Plaza DF†**. Progress in malaria genomic surveillance using long-read sequencing. *Trends Parasito*l. 2024 Nov;40(11):956-958.
7. **Plaza DF†**, Zerebinski J, Broumou I, Lautenbach MJ, Ngasala B, Sundling C, Färnert A. A genomic platform for epidemiological surveillance and vaccine antigen discovery using long-read amplicon sequencing. *Cell Rep Methods.* 2023 Sep 25;3(9):100574
8. Broumou I, **Plaza DF**, Färnert A. Genotyping of *Plasmodium falciparum* to Assess Clone Composition in Parasite Cultures. *Methods Mol Biol*. 2022;2470:51-68
9. Renko M, Zupan T, **Plaza DF**, Schmieder SS, Perišić Nanut M, Kos J, Turk D, Künzler M, Sabotič J. Cocaprins, β-Trefoil Fold Inhibitors of Cysteine and Aspartic Proteases from *Coprinopsis cinerea*. *Int J Mol Sci*. 2022 Apr 28; 23(9):4916.
10. Lautenbach JM, Yman V, Kadri N, **Plaza DF**, Angenendt S, Sonden K, Farnert A, Sundling C. Systems analysis shows a role of cytophilic antibodies in shaping innate tolerance to malaria. *Cell Rep*. 2021. 2022 Apr 19; 39(3):110709.
11. Bleuler-Martinez S, Varrot A, Olieric V, Schubert M, Vogt E, Fetz C, Wohlschlager T, **Plaza DF**, Wälti M, Duport Y, Capitani G, Aebi M, Künzler M. Structure-function relationship of a novel fucoside-binding fruiting body lectin with nematotoxic activity from *Coprinopsis cinerea*. *Glycobiology*. 2022 Jun 13; 32(7):600-615.
12. Molina-Franky J, **Plaza DF#**, Merali C, Merali S, Barrero C, Arévalo-Pinzón G, Patarroyo ME, Patarroyo MA. A novel platform for peptide-mediated affinity capture and LC-MS/MS identification of host receptors involved in *Plasmodium* invasion. *J Proteomics*. 2020. Oct 9; 231: 104002.
13. **Plaza DF**, Gómez MF, Manuel A. Patarroyo MA. NHP-Immunome: A translational research-oriented database of non-human primate immune system proteins. *Cell Immunol.* 2020, Jan; 347: 103999*****.
14. Solano-Varela DM, Barrios-Vidales EM, **Plaza DF#**, Riveros WM, Guzmán J, Chica CE, Patarroyo MA. Immunocompetent patient with a brain abscess caused by *Nocardia beijingensis* in Latin America: A case report. *Medicine (Baltimore)*. 2019, Mar; 98(11): e14879*****.
15. Tayyrov A, Schmieder SS, Bleuler-Martinez S, **Plaza DF**, Künzler M. Toxicity of potential fungal defense proteins towards the fungivorous nematodes *Aphelenchus avenae* and *Bursaphelenchus okinawaensis*. *Appl Environ Microbiol*. 2018, Sep 21*****.
16. Stöckli M, Lin CW, Sieber R, **Plaza DF**, Ohm RA, Künzler M. *Coprinopsis cinerea* intracellular lactonases hydrolyze quorum sensing molecules of Gram-negative bacteria. *Fungal Genet Biol*. 2016, pii: S1087-1845(16)30081-0*****.
17. **Plaza DF**, Schmieder SS, Lipzen A, Lindquist E, Künzler. Identification of a novel nematotoxic protein by challenging the model mushroom *Coprinopsis cinerea* with a fungivorous nematode. *G3 (Bethesda)*. 2015, 6(1): 87-98*****.
18. **Plaza DF**, Chia-Wei L, van der Velden NSJ, Aebi M, Künzler M. Comparative transcriptomics of the model mushroom Coprinopsis cinerea reveals tissue-specific armories and a conserved circuitry for sexual development. *BMC Genomics*. 2014, 15: 492*****.
19. Yan S, Bleuler-Martinez S, **Plaza DF**, Künzler M, Aebi M, Joachim A, Razzazi-Fazeli E, Jantsch V, Geyer R, Wilson IB, Paschinger K. Galactosylated fucose epitopes in nematodes: increased expression in a Caenorhabditis mutant associated with altered lectin sensitivity and occurrence in parasitic species. *J Biol Chem*. 2012, 287: 28276-28290.
20. Delgado G, Sánchez Y, **Plaza D**, Mariño A, Granados D. An experimental approach to studying the effectiveness and safety of meglumine antimoniate formulations. *Biomed Pharmacother*. 2011, 65: 569-577.
21. Patarroyo ME, Curtidor H, **Plaza DF**, Ocampo M, Reyes C, Saboya O, Barrera G, Patarroyo MA. Peptides derived from the Mycobacterium tuberculosis Rv1490 surface protein implicated in inhibition of epithelial cell entry: potential vaccine candidates? *Vaccine*. 2008, 26: 4387-4395.
22. Patarroyo MA, **Plaza DF**, Ocampo M, Curtidor H, Forero M, Rodríguez LE, Patarroyo ME. Functional characterization of the Mycobacterium tuberculosis Rv2969c membrane protein. *Biochem Biophys Res Commun*. 2008, 372: 935-940.
23. Chapeton-Montes JA, **Plaza DF**, Curtidor H, Forero M, Vanegas M, Patarroyo ME, Patarroyo MA. Characterising the *Mycobacterium tuberculosis* Rv2707 protein and determining its sequences which specifically bind to two human cell lines. *Protein Sci*. 2008, 17: 342-351.
24. Chapeton JA, **Plaza DF**, Barrero CA., Patarroyo MA. Quantitative flow cytometric monitoring of invasion of epithelial cells by *Mycobacterium tuberculosis*. *Front Biosci*. 2008, 13: 650-656.
25. **Plaza DF**, Mariño A, Delgado G. Characterizing the effect of pentamidine isethionate on the immune system, using mouse splenocytes as experimental model. *Journal of Immunotoxicology*. 2007, 4: 279-285.
26. **Plaza DF**, Curtidor H, Patarroyo MA, Chapeton-Montes JA, Reyes C, Barreto J, Patarroyo ME. The *Mycobacterium tuberculosis* membrane protein Rv2560: biochemical and functional studies. *FEBS Journal*. 2007, 274: 6352-6364.

 # First/Shared first co-authorship **† Corresponding authorship**