

BIOGRAPHICAL SKETCH

NAME: Currà, Chiara

eRA COMMONS USER NAME: Currachi

POSITION TITLE: Researcher**EDUCATION/TRAINING:**

INSTITUTION AND LOCATION	DEGREE	Completion Date MM/YYYY	FIELD OF STUDY
University of Rome "La Sapienza", Italy	BS, with honors	10/2004	Biology
University of Rome "La Sapienza", Italy	Msc, with honors	07/2006	Biology applied to biomedical research
University of Montpellier 2, France and University of Torvergata, Italy	Joint double PHD degree	07/2010	Microbiology and immunology
University of Sao Paulo, Brazil	Postdoctoral	11/2012	Parasitology
Foundation for research and technology Hellas, Greece	Postdoctoral	05/2015	Parasitology
University of Sao Paulo, Brazil	Postdoctoral	10/2017	Parasitology
Foundation for research and technology Hellas, Greece	Researcher	01/2024	Molecular biology and parasitology

A. Personal Statement

I was recently appointed as Researcher at Italian National Institute of Health, Rome, Italy and my research interests are based mainly on molecular biology of *Apicomplexa* parasites, especially *Plasmodium* and *Toxoplasma*. Researchers in parasitology and in the malaria field are all strongly motivated by the immense impact on global health due to these parasites, with the overall goal to improve, directly or indirectly, available strategies for intervention and/or to develop novel approaches. Our group's effort is to understand basic cell biology of the parasite, which in the long term may contribute to this goal. Another reason to study these parasites is that *Plasmodium* and *Toxoplasma* parasites of the phylum Apicomplexa are evolutionary very distinct organisms with a unique life style, and thus research into these organisms gives us fascinating insights into the evolution of eukaryotic life.

During the last ten years we are investigating the three **Oocyst Rupture Proteins (ORPs)** that we discovered as having essential roles during the rupture of the oocyst (1). Finally, we are involved in efforts to develop novel tools to control malaria (2). We recently focused on oocyst stage of *Plasmodium* development, since oocyst rupture is poorly studied but essential step for transmission to humans (3).

After completing my Ph.D. in the Ponzi/Braun-Breton labs (ISS, Rome joint to Montpellier 2, France) I joined the IMBB malaria group in 2013 as a Marie Curie post-doctoral fellow. I then continued my post-doctoral training at the University of Sao Paulo Brazil, where I initiated work on the ORP proteins. I was awarded a Stavros Niarchos Foundation fellowship at IMBB in 2018 to continue work on this project. From the beginning of 2021 the project is supported by an HFRI

post-doctoral grant (€180000). My multidisciplinary and international research trajectory has allowed me to solidly develop my organizational, management and leadership capacities and demonstrates my self-motivation to develop interdisciplinary approaches to explore new research pathways. Recently, I attended the EMBO leadership training course, and learned many aspects in interacting with group members and possible solutions for problem solving. During my career I have obtained a solid knowledge of both the experimental approaches necessary for my research and management of the project and personnel, as well as experience of grant applications and manuscript preparation. I have developed my own network of collaborations with different international groups in order to combine diverse expertise in investigating the ORP proteins. I have already supervised three master students, four bachelor students, several Erasmus visiting students, and one PhD student. Currently, within the HFRI budget, I hired a PhD student coming from Senegal.

I am well integrated in international and national networks. Upon my return to Italy, I participated to the Italian Society of Parasitology biannual meeting (Padova, 18-21, 2024) establishing good connection with other Italian scientists working on parasitology. In summary, I have the expertise, leadership, training, and motivation necessary to successfully carry out the running and starting new projects.

Ongoing and recently completed projects that I would like to highlight include:

Hellenic Foundation for Research and Innovation, Greece. Contract number 29168-22102020 Currà (PI), 02/01/21-07/31/24

Histone-fold domain proteins with divergent functions of *Plasmodium* as target for drug development and transmission blocking strategies

Citations:

1. **Curà C**, Gessmann R, Pace T et al. 2016. Release of *Plasmodium* sporozoites requires proteins with histone fold dimerization domains. **Nature Communications**, 7:13846.
2. Deligianni E[#], Pizzi E[#], Kavelaki I, Siden-Kiamos I, Sapienza FU, Fioravanti R, Garzoli S, Pace T, Ponzi M, Ragno R^{*} and **Curà C^{*}**. 2023. Screening of the activity of sixty essential oils against *Plasmodium* early mosquito stages in vitro and machine learning analysis reveals new putative inhibitors of malaria parasites. **IJP drug and drug resistance**, 23:87-93.
3. Claude Marie François Preira[#], Elisabetta Pizzi[#], Federica Fratini, Felicia Grasso, Stefania Mochi, Guido Favia, Daniela Boccolini, Elena Piselli, Claudia Damiani, Inga Siden-Kiamos, Marta Ponzi, **Chiara Curà^{*}**. 2024. A time point proteomic analysis reveals protein dynamics of *Plasmodium* oocysts. **Mol Cell Proteomics**, 9:100736.

B. Positions, Scientific Appointments, and Honors

Positions and Scientific Appointments

01/2024 - Present	Researcher, Department of infectious diseases, Italian National Institute of Health, Rome, Italy
2021 - 01/2024	Researcher, Institute of Molecular Biology and Biotechnology, Foundation for Research and Technology Hellas, Heraklion, Crete, Greece.
2018 - 2021	Stavros Niarchos Foundation Research fellow, Institute of Molecular Biology and Biotechnology, Foundation for Research and Technology Hellas, Heraklion, Crete, Greece.
09 -11/2020	EMBO short term fellow, University of Camerino, Italy.
2017 – 2018	Post doctoral researcher, University of Perugia, Italy

2016 – 2017	FAPESP post-doctoral fellow. Institute of Biosciences, Dept of Physiology, University of San Paolo, Brazil.
2013 – 2015	Marie Curie post-doctoral fellow. Institute of Molecular Biology and Biotechnology. Foundation for Research and Technology Hellas, Heraklion, Crete, Greece.
08/2013	EVIMALAR awarded fellow for the participation to the training course on “Advanced microscopy on <i>Plasmodium</i> parasites”, University of Sydney, Australia. 5-20 th 08/2013.
2012	FAPESP post-doctoral fellow. Institute of Biosciences, Dept of Physiology, University of San Paolo, Brazil.
2010 – 2012	Post doctoral researcher, Italian National Institute of Health, Rome, Italy and University of Torino, Italy
2024 - present	Member of Italian Society of Parasitology
2023 - present	Member of SIROE (Italian society for research on essential oils)
2018 - present	Member of the American Society of Microbiology (ASM)
2011 - present	Member of SIB, Italian Society of Biochemistry

Honors

2018 Marie Curie Seal of Excellence, project NANOCYST submitted as Individual fellowship

2017 Marie Curie Seal of Excellence, project EVOplasm submitted as Individual fellowship

C. Contributions to Science

1. During my early studies as a post-doc, I contributed to discover the mechanisms of cellular trafficking within *Plasmodium* infected red blood cells. I analysed the expression profile of transmembrane proteins (SEP1-3) in blood (Curra' *et al.*, 2012) and mosquito stages (Curra' *et al.*, 2013). Through the generation of mutant parasites, I managed to tag SEPs and did many pull-down experiments followed by mass spectrometry with the aim to identify possible interactors. I also did studies on cellular trafficking in the human *P. falciparum* parasites and I identified molecules imported inside the infected red blood cells (Lalle *et al.* 2011). I visited European labs (Siden-Kiamos in Crete and Maria Mota in Lisbon) where I learnt basic techniques for mosquito manipulation and liver cells infection of sporozoites. Through the collaboration with Dr. Bruno Arcà (Sapienza University of Rome) I characterized specific proteins of *Anopheles* salivary glands (Lombardo *et al.* 2009).

a) Currà C, Pace T, Picci L, Bertuccini L, Ponzi M. 2012. Erythrocyte remodeling in *Plasmodium berghei* infection: the contribution of SEP family members. **Traffic**. 13: 388-99.

b) Currà C, di Luca M, Picci L, Silva Gomes dos Santos C, Siden-Kiamos I, Pace T, Ponzi M. 2013. The ETRAMP family member SEP2 is expressed throughout *Plasmodium berghei* life cycle and is released during sporozoite gliding motility. **PlosONE**, 8:e67238.

c) Lalle M, Currà C, Ciccarone F, Pace T, Cecchetti S, Fantozzi L, Ay B, Braun-Breton C and Ponzi M. 2011. Dematin, a component of erythrocyte membrane-skeleton, is internalized by the malaria parasite and associates with *Plasmodium* 14-3-3. **J Biol Chem**. 286:1227-36.

d) Lombardo F, Ronca R, Rizzo C, Mestres-Simòn M, Lanfrancotti A, Currà C, Fiorentino G, Bourgouin C, Ribeiro JM, Petrarca V, Ponzi M, Coluzzi M, Arcà B. 2009. The *Anopheles gambiae* salivary protein gSG6: an anopheline-specific protein with a blood-feeding role. **Insect Biochem Mol Biol**. 39:457-66.

2. I started my journey abroad because I wanted to learn different cultures, languages, and laboratory experiences. During my post-doc in Brazil, I managed to set-up the murine model in the lab, not present in the lab, and I generated mutant strains with the goal to study cellular mechanisms of gametocyte formation (*Moraes et al 2017*). Also, I generated mutant lines for the study of NF-YB transcription factor (NFY-B) (*Curra' et al. 2016*). I started my interaction with Brazilian scientists (prof. Claudio Marinho, Stephania Epiphania, Margaret Capurro) and Italian researchers (Prof. Marco Nardini, Guido Favia). I applied for grants by writing proposals and won a Marie Curie fellowship that conducted me to Crete, Greece. I participated in the proteomic studies of stage specific malaria parasite lipid rafts (*Fratini et al. 2017*), selected and generated mutants for the study of proteins important during gametogenesis (*Curra' et al. 2019*). Keeping a strong collaboration with the Brazilian lab, I focused on NFYC protein, named Oocyst Rupture Protein 2 (ORP2) and generated mutants to test protein function during oocyst development in mosquito midgut (*Siden-Kiamos et al. 2018*).

- a) Moraes SM, Budu A, Singh KM, Borges-Pereira L, Levano-Garcia J, **Curra' C** et al. 2017. *Plasmodium falciparum* GPCR-like receptor SR25 mediates extracellular K⁺ sensing coupled to Ca²⁺ signaling and stress survival. **Scientific reports**. 7(1):9545.
- b) **Curra' C**, Gessmann R, Pace T et al. 2016. Release of *Plasmodium* sporozoites requires proteins with histone fold dimerization domains. **Nature Communications**, 7:13846.
- c) Fratini F, Raggi C, Sferra G, Birago C, Sansone A, Grasso F, **Curra' C** et al. 2017. An integrated approach to explore composition and dynamics of cholesterol-rich membrane microdomains in sexual stages of malaria parasite. **Molecular Cellular Proteomics**. 16(10):1801-1814.
- d) **Curra' C**, Kehrer J, Lemgruber L, Silva P, Bertuccini L et al. 2019. Malaria transmission through the mosquito requires the function of the OMD protein. **PLOS ONE**, 14(9):e0222226
- e) Siden-Kiamos I, Pace T, Klonizakis A, Nardini M, Garcia RSC, **Curra' C***. 2018. Identification of *Plasmodium berghei* Oocyst Rupture Protein 2 (ORP2) domains involved in sporozoite egress from the oocyst. **Int J Para** doi: 10.1016/j.ijpara.2018.09.004.

3. As previous Stavros Niarchos foundation grant recipient I published as corresponding author two manuscripts: the role of Gamete Egress Protein in gametocytes (*Andreadaki et al. 2020*) and a new method for oocyst purification recently developed in the lab (*Siden-Kiamos et al. 2020*)

My research line aims to explore the oocyst, the most long-lived stage of the malaria parasite. A recent paper investigating oocyst dynamic through a proteomic approach on different time points of development was recently published (*Preira et al. 2024*). We are also testing ORP dimerization inhibitor molecules *in vivo* to block oocyst rupture.

I collaborate with scientists in Uganda, National Livestock Resources Research Institute, on the identification of vaccine targets against *Theileria parvum* (*Ndawula et al 2024*).

Recently I also started new projects on *Toxoplasma gondii*. The main interest is the characterization of the mechanisms leading to latent parasites reactivation, cyst rupture, motility and egress. Two papers are in preparation.

- a) Andreadaki M, Pace T, Grasso F, Siden-Kiamos I, Mochi S, Picci L, Bertuccini L, Ponzi M and **Curra' C***. 2020. *Plasmodium berghei* Gamete Egress Protein is a novel factor required for fertility of both genders. **MicrobiologyOpen**, 9:e1038.
- b) Siden-Kiamos I, Spanos L, **Curra' C***. 2020. A method for purification of *Plasmodium* oocysts from mosquito midguts. **Scientific reports**, 10:7262

- c) Claude Marie François Preira, Elisabetta Pizzi, Federica Fratini, Felicia Grasso, Stefania Mochi, Guido Favia, Elena Piselli, Claudia Damiani, Inga Siden-Kiamos, Marta Ponzi, **Chiara Currà**.* 2024. A time point proteomic analysis reveals protein dynamics of Plasmodium oocysts. Mol Cell Proteomics. Feb 9:100736.
- d) Ndawula C. Jr, Emudong P, Muwereza N, **Currà C**. 2024. Insights into *Theileria* transmission-blocking vaccines for East Coast fever control: a disease with "an outdated vaccination approach" Ticks and tick-borne diseases, accepted for publication

Complete List of Published Work in MyBibliography:

<https://www.ncbi.nlm.nih.gov/myncbi/chiara.curra.1/bibliography/public/>