CURRICULUM VITAE

Prof. Nicola Franchi

PhD

Details
Via Cicognara, 5
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Citizenship Italian

Languages Italian (native), English

Bibliometric indicators and scientific productivity Author of 39 publications, 4 book chapters, 712 citations, H-index=16 (Scopus metrics, from 2005 to January 2024).

Education

Ph.D in Evolutionary Biology
Department of Biology, University of Padova (2007-2010)
Thesis supervisor: Prof.ssa Ester Piccinni
Thesis project: Identification and characterization of detoxifying related molecules and methallotioneins in ascidians

Master's degree in Evolutionary Biology, graduate *Summa cum laude (110/110L)*
Department of Biology, University of Padova (1999-2005)
Thesis supervisor: Prof. Loriano Ballarin
Thesis project: A rhamnose-binding lectin from the compound ascidian *Botryllus schlosseri:* biochemical and molecular analyses and phylogenetic comparison

Awards

2016 - Short term fellowship EMBO

2015 - Senior post-doc at University of Padova

2013 - Expert in Zoology and Comparative Immunology from Department of Biology, University of Padova

2010 - Young researcher award from Italian Zoologist Union (UZI)

2009 - Young researcher award from Italian Association of Developmental and Comparative Immunology (IADCI)

Research

Personal profile

NF is a researcher with over 15 years of experience in the field of comparative immunology. Since completing his degree, his focus has been on identifying and characterizing molecules with immunomodulatory activity in non-model organisms. His research, conducted with a comparative approach, has also delved into studying correlations among molecular, cellular, and tissue-level immune defense systems in non-model organisms such as the solitary ascidian *Ciona intestinalis*, the colonial organism *Botryllus schlosseri*, the Gastropod Pomacea canaliculata and other vertebrates, including humans.
Their recent focus has been on exploring cell-to-cell communication and studying the evolution of the Complement System, particularly in the transition from innate to adaptive immunity. He investigate how this system orchestrates not only immune responses but also developmental mechanisms and self-recognition. NF possesses expertise in microscopic techniques of histology and cytology, molecular localization techniques such as immunocytochemistry, immunohistochemistry, and *in situ* hybridization, as well as biochemical techniques, protein purification, and molecular biology. Additionally, NF has successfully engaged in teaching and scientific outreach endeavors.

Main active research line

The Complement System (CS) is the primary mechanism of humoral innate immunity. As part of the innate immunity, it is deeply rooted in the tree of life, present in organisms as simple as coral and jellyfish. Throughout evolution, this mechanism has become highly complex, closely interacting with adaptive immunity in vertebrates, effectively orchestrating a significant portion of the immune response. Its primary role in eliminating cells deemed unfit for the organism during development and regeneration has been hypothesized but never proven.

One particular mechanism involves the participation of CS molecules, i.e., synaptic pruning, but as of today, this process remains far from fully understood. During the maturation of the central nervous system, specific synaptic connections are precisely removed, yet the exact mechanism is still unclear.

My hypothesis and research project propose that an ancient cell recognition and targeting mechanism involving the complement system underlies synaptic pruning, already in invertebrates. This mechanism would use complement regulators as "self-tag" molecules, since their presence on a cell membrane deactivates the CS, rendering it ineffective and preventing lysis and/or phagocytosis of that cell. However, if a “self-tag” is absent, cell elimination becomes immediately possible.

To support this hypothesis, I aim to first demonstrate the hyper-variability of complement regulators and their tissue/cell specific localization in various model organisms. Thanks to the FAR 2022 grant from the Department of Life Sciences, I have acquired the Nanopore sequencer and could unveil the hyper-variability and tissue-specific localization of complement regulator variants in the Gastropod Pomacea canaliculata. Additionally, I am already in contact with laboratories in Verona to commence experiments on the model organism Danio rerio.
Unveiling the role and mechanisms of the complement regulators in regulating and shaping neuronal cells could open up new horizons for pharmacological strategies aiming to improve diseases such as Alzheimer’s, multiple sclerosis, schizophrenia, and certain forms of autism, all of which are associated with improper synaptic pruning.

Research positions

01 September 2024 - Associate Professor in Comparative Anatomy, Cell Biology and Developmental Biology (BIOS-04/A) at the Dept. of Life Sciences, University of Modena and Reggio Emilia

2021 - 2024 - Bio/06 Type B Researcher at Dept. of Life Sciences, University of Modena and Reggio Emilia

2017- 2021 - Term contract and Adjunct Professor at Department of Biology and Department of Chemistry, University of Padova

2015-2017 - Senior post-doctoral fellow at Department of Biology, University of Padova
Project director: Prof. Loriano Ballarin
Project: Complement system in colonial tunicates: evolution beyond basic research.

2013-2015 - Post-doctoral Fellow at Department of Biology, University of Padova
Project director: Prof. Loriano Ballarin
Project: Insight into the evolution of the complement system in chordates. Clues from the colonial ascidian *Botryllus schlosseri*

2012-2013 - Post-doctoral Fellow at Department of Chemical and Pharmaceutical Science and Biological Technology, University of Palermo
Project director: Prof. Nicolò Parrinello
Project: Morfo-functional aspects of adult protochordates tissues and cells examined through pro inflammatory molecules expression

2012 - FSE Post-doctoral Fellow at Department of Biology, University of Padova
Project director: Prof.ssa Paola Venier
Project: Experimental valuation of nanoparticles in the solitary ascidian *C. intestinalis*

Research activities abroad

Guest Scientist Internship, George Washington University, Washington DC, USA (2016)
Project director: Prof. Courtney Smith
Project: Characterization of Factor H/RCA-like genes and mRNAs in *S. purpuratus* using molecular biology techniques.

Grants and fellowship as Principal investigator

Senior post-doc at University of Padova: Complement system in colonial Tunicates: evoluzione beyond basic research

Short-felloship EMBO at George Washington University, Washington DC, USA : Characterization of Factor H/RCA-like genes and mRNAs in *S. purpuratus* using molecular biology techniques.

Relevant projects' partecipation

2013-2016 – PRIN: Genes and molecules of invertebrate immunity. Structure, functions, evolutionary precursors and transferability in applied research. PI: Prof. L. Ballarin

2009-2012 – CARIPARO: The colonial ascidian *Botryllus schlosseri* as a new chordate animal model for the study of differentiation and regeneration of the cardiovascular and nervous systems. PI: Prof. L. Ballarin

2008-2010 : Grant dell'Università di Padova - Death and life in the colonial blastogenetic cycle of the ascidian *Botryllus schlosseri*.

2006-2008: PRIN: The lectin repertoire in protochordates. Evolution of recognition mechanisms and innate immunity.
Local project: Lectins and immunomodulation in colonial ascidian *Botryllus schlosseri*. PI: Prof. N. Parrinello

2004-2006: PRIN: Evolution of innate immunity. Components of the inflammatory reaction of sea squirts and molecular phylogeny of Chordates. Local project: Innate immunity and immunomodulation in the colonial ascidian Botryllus schlosseri. PI: Prof. N. Parrinello

National/International active collaborations

- Department of Chemical and Pharmaceutical Science and Biological Technology, University of Palermo (Italy)
- Department of Biotechnologies and Life Science, University of Insubria (Varese, Italy)
- Natural Science Cluster, University of Kochi, Department of Applied Sciences University of Kochi (Japan)
- Columbian college of Arts and Sciences, George Washington University, Department of Biological Sciences, Washington DC (USA)
- Department of Life sciences, University of Trieste, Italy

Teaching experience

Courses/modules as responsible:

- **Professor** (2022-…). Department of Life Sciences, University of Modena and Reggio Emilia
Degree: Biology
Course: Cellular Biology and Developmental Biology

- **Professor** (2021-…). Department of Life Sciences, University of Modena and Reggio Emilia
Degree: Biology
Course: Cytology and Histology

- **Adjunct Professor** (2016 - 2021). Department of Chemistry, University of Padova
Degree: Environmental Science and Technology
Course: Animal biology

- **Adjunct Professor** (2017 - Today). Department of Biology, University of Padova
Degree: Biology
Course: Zoology

Lectures

- Lectures (May 2013). Department of Animal Biology, University of Modena and Reggio Emilia
Topic: Fish immunity
- Lectures (May 2013). Department of Animal Biology, University of Modena and Reggio Emilia
Topic: Tunicates immunity
- Lectures (September 2013). 1st summer school in zoology. Marine biological station and Didactic pole of the Department of Biology, University of Padova, Chioggia.
Topic: Experimental approaches and in vivo reaction during *Ciona intestinalis* inflammatory response.
- Lectures (September 2014). 2nd summer school in zoology. Marine biological station and Didactic pole of the Department of Biology, University of Padova, Chioggia.
Topic: Practical course on *Botryllus schlosseri* immunobiology

Other teaching activities

Tutor and Co-tutor in more than 40 Master and bachelor thesis in Biology and Scienze e Tecnologie per l'Ambiente (STAM) at the University of Padova and Biology ate the University of Modena and Reggio Emilia.

Other

Educational training

- 2011 - Workshop "How to measure and preserve biodiversity". UZI. May 20-22, Venice
- 2008 - Workshop "Generation of cDNA Libraries by Primer Extension". March 31 - April 4 Marine Genomics Europe at Max-Planck Institute for Molecular Genetics, Berlin
- 2006 - Confocal microscopy course. September 16-18. University of Modena and Reggio Emilia
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Service

- "Summer school in Zoology" organizer "An integrated approach to marine invertebrate biodiversity: evolutionary and functional adaptations. Chioggia, June 22, 2013
- "Summer school in Zoology" organizer "An integrated approach to marine invertebrate biodiversity: evolutionary and functional adaptations. Chioggia, September 13, 2014

Professional memberships

- Società Italiana di Immunobiologia comparata e dello sviluppo (SIICS), **Member of the Board**
- Unione degli Zoologi Italiani (UZI)

Ad hoc reviewer

- Fish and Shellfish immunology
- Developmental and Comparative immunology
- Molecules
- Invertebrate survival journal

Internationals conferences	more than 20
National conferences	more than 50

Modena, 22-07-2024 **Sign**