Dr. Maria Antonietta Tosches

Assistant Professor

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EDUCATION AND PROFESSIONAL EXPERIENCE

2019 – present	**Assistant Professor, Columbia University**, Department of Biological Sciences (USA) Affiliate Member, Zuckerman Mind Brain and Behavior Institute, Columbia University
2014 –2019	**Postdoc, Max Planck Institute for Brain Research**, Frankfurt (DE) Advisor: Dr. Gilles Laurent
2012 – 2014	**Postdoc, EMBL**, Developmental Biology Unit, Heidelberg (DE) Advisor: Dr. Detlev Arendt
2007 – 2012	**Ph.D., EMBL and Heidelberg University**, Heidelberg (DE) Advisor: Dr. Detlev Arendt Thesis committee: J. Wittbrodt, A. Ephrussi, D. Gilmour, H. Steinbeisser Thesis: "Development and function of brain photoreceptors in the annelid *Platynereis dumerilii*"; Grade: 1.0, *magna cum laude*
2002 – 2007	**Diploma di Licenza, Scuola Normale Superiore**, Pisa (IT) Main subjects: molecular biology and neuroscience, Grade: 70/70 *cum laude*
2005 – 2007	**Master's Degree in Biomolecular Science and Technology, University of Pisa** (IT) Thesis: "Role of RNA-binding proteins in *Xenopus* retinal development" Grade: 110/110 *cum laude* and distinctions ("abbraccio accademico")
2002 – 2005	**Bachelor's Degree in Molecular biology, University of Pisa** (IT) Grade: 110/110 *cum laude*

HONORS AND AWARDS

2020	McKnight Scholar Award in Neuroscience
2019	Keynote speaker, ninth European Conference on Comparative Neurobiology
2018	Next Generation Leader, Allen Institute for Brain Science (Seattle, USA)
2018	Scientific Discovery Award, Max Planck Institute for Brain Research
2018	*FRM Foundation pour la Recherche Médicale* installation grant (300K euro, declined)
2017	Poster Presentation Award, Brain Conference "Cortex Evolution and Development"
2016	Boehringer-Ingelheim Travel Grant (4220 euro)
2007	EMBL International Ph.D. Program Fellowship
2007	University of Pisa Gold Medal for outstanding curricular achievements
2002 – 2007	Scuola Normale Superiore undergraduate scholarship, renewed yearly for 5 years

PUBLICATIONS

Since at Columbia

Tosches MA. (2021) – "From cell types to an integrated understanding of brain evolution: the case of the cerebral cortex" – ***Annual Review in Cell and Developmental Biology***. 37:22.1–22.23

Tosches MA. (2021) – "Different origins for similar brain circuits" – ***Science***. Feb 12;371(6530):676-677.

Yuste R, Hawrylycz M, Aalling N, Aguilar-Valles A, Arendt D, Armañanzas R, Ascoli GA, Bielza C, Bokharaie V, Bergmann TB, Bystron I, Capogna M, Chang Y, Clemens A, de Kock CPJ, DeFelipe J, Dos Santos SE, Dunville K, Feldmeyer D, Fiáth R, Fishell GJ, Foggetti A, Gao X, Ghaderi P, Goriounova NA, Güntürkün O, Hagihara K, Hall VJ, Helmstaedter M, Herculano-Houzel S, Hilscher MM, Hirase H, Hjerling-Leffler J, Hodge R, Huang J, Huda R, Khodosevich K, Kiehn O, Koch H, Kuebler ES, Kühnemund M, Larrañaga P, Lelieveldt B, Louth EL, Lui JH, Mansvelder HD, Marin O, Martinez-Trujillo J, Chameh HM, Mohapatra AN, Munguba H, Nedergaard M, Němec P, Ofer N, Pfisterer UG, Pontes S, Redmond W, Rossier J, Sanes JR, Scheuermann RH, Serrano-Saiz E, Staiger JF, Somogyi P, Tamás G, Tolias AS, Tosches MA, García MT, Wozny C, Wuttke TV, Liu Y, Yuan J, Zeng H, Lein E. (2020) – "A community-based transcriptomics classification and nomenclature of neocortical cell types" – ***Nature Neuroscience*** 23(12):1456-1468

Research at the Max Planck Institute for Brain Research

Schede HH, Schneider CG, Stergiadou J, Borm LE, Ranjak A, Yamawaki TM, David FPA, Lönnerberg P, Laurent G, Tosches MA, Codeluppi S, La Manno G. (2021) – "Spatial tissue profiling by imaging-free molecular tomography" – ***Nature Biotechnology***; 39: 968–977

Norimoto H, Fenk L, Li H-H., Tosches MA, Gallego-Flores T, Hain D, Reiter S, Kobayashi R, Macias A, Arends A, Klinkmann M, Laurent G (2020) – "A claustrum in reptiles and its role in slow-wave sleep" – ***Nature*** 578: 413–418

Tosches MA, Laurent G (2019) – "Evolution of neuronal identity in the cerebral cortex" – ***Current Opinion in Neurobiology*** 56: 199-208

Silver D, Rakic P, Grove EA, Haydar TF, Hensch TK, Huttner WB, Molnar Z, Rubenstein J, Sestan N, Stryker MP, Sur M, Tosches MA, Walsh CA (2019) – "Evolution and Ontogenetic Development of Cortical Structures" – in ***The Neocortex***, edited by W. Singer, T. Sejnowski and P. Rakic, Strüngmann Forum Reports, The MIT Press

Tosches MA#*, Yamawaki TM*, Naumann RK, Jacobi A, Tushev G, Laurent G# (2018) – "Evolution of pallium, hippocampus and cortical cell types revealed by single-cell transcriptomics in reptiles" – ***Science*** 360(6391):881-888 * shared first authorship #co-corresponding authors

Martinez-Cerdeño V, Garcia-Moreno F, Tosches MA, Csillag A, Manger PR, Molnar Z (2017) – "Update on forebrain evolution: From neurogenesis to thermogenesis" – ***Seminars in Cell and Developmental Biology*** S1084-9521(17)30211

Tosches MA (2017) – "Developmental and genetic mechanisms of neural circuit evolution" – ***Developmental Biology*** 431(1): 16-25

Laurent G, Fournier J, Hemberger M, Müller C, Naumann RK, Ondracek JM, Pammer L, Reiter S, Shein-Idelson M, Tosches MA, Yamawaki TM. (2016) – "Cortical evolution: introduction to the reptilian cortex" – in ***Micro-, Meso- and Macro-Dynamics of the Brain***, Edited by G. Buzsaki and Y. Christen, Research and Perspectives in Neurosciences, Cham (CH): Springer

Naumann RK, Ondracek JM, Reiter S, Shein-Idelson M, Tosches MA, Yamawaki TM, Laurent G. (2015) – "The reptilian brain" – ***Current Biology*** 25(8):R317-21

Research at EMBL

Vopalensky P, Tosches MA, Achim K, Handberg-Thorsager M, Arendt D (2019) – "From spiral cleavage to bilateral symmetry: the developmental cell lineage of the annelid brain" – ***BMC Biology*** 17:81

Martinez-Vergara H, Bertucci PY, Hantz P, Tosches MA, Achim K, Vopalensky P, Arendt D (2017) – "A whole-organism cellular gene expression atlas reveals conserved cell types in the ventral nerve cord of *Platynereis dumerilii*" – ***Proceedings of the National Academy of Sciences*** 114(23):5878-5885

Arendt D, Tosches MA, Marlow H. (2016) – "From nerve ring to nerve cord and brain - evolution of the nervous system" – ***Nature Reviews Neuroscience*** 17(1), 61-72

Tosches MA#, Bucher D, Vopalensky P, Arendt D#. (2014) – "Melatonin signaling controls circadian swimming in marine zooplankton" – ***Cell*** 159(1):46-57 #co-corresponding authors

*Featured in: **The New York Times**, Cell (Cell 159(1):9-10), Nature "Research Highlights", Science Signalling (Sci. Signal. 7, ec278), Faculty of 1000, Science News, Inside Science and others.*

Marlow H, Tosches MA, Tomer R, Steinmetz PR, Lauri A, Larsson T, Arendt D. (2014) – "Larval body patterning and apical organs are conserved in animal evolution" - ***BMC Biology*** 12:7

Tosches MA, Arendt D. (2013) – "The bilaterian forebrain: an evolutionary chimaera" – ***Current Opinion in Neurobiology*** 23(6):1080-9

PRESENTATIONS

* postponed from 2020 because of COVID-19

Invited talks (selected)

2023 *Gordon Research Conference "Neuroethology: Behavior, Evolution and Neurobiology" – Vermont (USA)
2022 *Gordon Research Conference "Neural Development" – Newport (USA)
10th European Conference on Comparative Neurobiology – Prague (CZ) - **Scientific committee member**
Conference "Neurogenesis in health and disease" – Ascona (CH)
*Cortical Development Conference, "Neural Stem Cells to Neural Circuits" – Milazzo (IT)
*Symposium "Neural Dynamics Across Species: Looking Back and Thinking Ahead" – Frankfurt (DE)
*8th meeting of the European society for Evolutionary Developmental Biology – Naples (IT)
2021 Karger Workshop – J B Johnston Club, satellite of SfN Meeting (virtual)
NIH Neuroscience Seminar Series – Bethesda (USA)
"3rd Latin American School & Symposium on Brain & Mind Evolution" (virtual)
Trainee-sponsored seminar, Memorial Sloan Kettering Cancer Center – New York (USA)
EMBL Symposium "Identity and Evolution of Cell Types" – Heidelberg (DE) – **Co-organizer**
Developing Neural Circuits Course, OIST Okinawa (JP)
Seminar, Brown University – Providence (US)
Society for Neuroscience (SfN) Global Connectome (virtual)
2020 Seminar, University of Massachusetts – Amherst (USA)
Virtual Seminar on WorldWideNeuro.com (global, hosted by Geneva University)
Seminar, New York University, Neuroscience Institute – New York (USA)
Seminar, "Evolution at Columbia" supergroup, Columbia University
Seminar, Instituto de Neurociencias de Alicante – Alicante (ES)
2019 Allen Institute Showcase Symposium 2019 – Seattle (USA)
Seminar, Brooklyn College, CUNY – New York (USA)
University Seminar in Integrative Animal Behavior, Columbia University – New York (USA)
EMBO/EMBL Symposium "Identity and Evolution of Cell Types" – Heidelberg (DE)
9th European Conference on Comparative Neurobiology – Murcia (SP) – **Keynote speaker**
2018 FENS-Brain Conference "The Necessity of Cell Types for Brain Function" – Copenhagen (DK)
Seminar, Department of Biology, University of Pisa – Pisa (IT)
Symposium on "Neuronal Circuit Research", Friedrich Miescher Institute – Basel (CH)
SfN virtual conference "Advances in Single Cell Genomics to Study Brain Cell Types"
Janelia Conference "Neuro-Evo: A Comparative Approach to Cracking Circuit Function II" – Janelia Research Campus – Ashburn (USA)

Ernst Strüngmann Forum "Cerebral cortex 3.0" – Frankfurt (DE)
Seminar, Institute of Science and Technology (IST) – Vienna (AT)
2017 Seminar, Department of Biological Sciences, Columbia University – New York (USA)
FENS-Brain Conference "Cortex Evolution and Development" – Copenhagen (DK)
Seminar, Institute de Biologie de l'Ecole Normale Superieure – Paris (FR)
2016 Seminar, Department of Neuroscience and Physiology, New York University – New York (USA)
6th meeting of the European society for Evolutionary Developmental Biology – Uppsala (SE)
Janelia Conference "Neuro-Evo: A Comparative Approach to Cracking Circuit Function" – Janelia Research Campus, Ashburn (USA)
8th European Conference on Comparative Neurobiology – Munich (DE)

Other presentations (talks selected from abstracts, if not indicated otherwise)

2017 EMBL-EMBO Symposium "Neural Circuits in the Past, Present and Future" – Heidelberg (DE)
Janelia Conference "Control of Neuronal identity II" – Janelia Research Campus (USA) (poster)
2015 "Single Cell Genomics" Conference – Utrecht (NL) (poster)
2014 EMBO Workshop "Decoding neural circuit structure and function" – Istanbul (TR) (poster)
Fifth meeting of the European society for Evolutionary Developmental Biology – Vienna (AT)
2013 CDB Symposium "The making of a vertebrate" – RIKEN, Kobe (JP)
2012 Fourth meeting of the European society for Evolutionary Developmental Biology – Lisbon (PT)
CNRS Monod Conference "Emergence and evolution of developmental patterns" – Roscoff (FR)
2011 EMBO Meeting "Frontiers in Sensory Development" – Barcelona (SP)

PROFESSIONAL SERVICE

Scientific Advisory Board
2018-2021 Allen Institute for Brain Science, Next Generation Leaders council

Journal Referee
Science, Nature Review Neuroscience, Current Biology, *eLife*, *Nature Communications*, *Nature Ecology and Evolution*, *Scientific Reports*.

Conference Organizer
2022 Scientific committee member (with Z. Molnar, M. Wullimann, P. Vernier, H. ten Donkelaar, P. Nemec), 10th European Conference on Comparative Neurobiology – Prague (CZ)
2021 Co-organizer (with D. Arendt, G. Wagner and C. Baker), "Identity and Evolution of Cell Types" – Heidelberg (DE)
2020 Co-organizer (with D. Stern and A. Cardona), "Neuro-Evo: A Comparative Approach to Cracking Circuit Function III", Janelia Research Campus, Ashburn (USA) (postponed because of Covid-19)
2020 Co-organizer (with H. Cline, L. Sweeney, A. Yamaguchi, D. Kelley and M. Shein-Idelson), "Expanding the species range of the vertebrate viral toolbox", Marine Biological Laboratory, Woods Hole (USA) (postponed because of Covid-19)
2008 Co-organizer, 10th EMBL International Ph.D. Symposium "Decision making in biology", Heidelberg (DE)

SCIENCE OUTREACH

Classes for high-school students
2015-2016 Design of the PCR module for the Teaching Lab of the MPI for Brain Research
Teaching basic molecular biology techniques (enzyme digestions, PCR, agarose gel electrophoresis) to high-school students in the Teaching Lab of the MPI for Brain Research

Public lectures
Jun 27th, 2017 Public lecture "From genes to mind: the mystery of brain evolution", Bar Cafuchico, Frankfurt
Jun 8th, 2018 Public lecture "From genes to mind: the mystery of brain evolution", Frankfurt Night of Science
Sept 13th, 2018 Public lecture "From genes to mind: the mystery of brain evolution", Café Crumble, Frankfurt

Art performance
Jun 3rd, 2016 Acting in "The Max Planck Horror Picture Show", Frankfurt Night of Science

Podcast
Oct 13th, 2020 Guest of the science podcast "This Week in Neuroscience (TWiN)"

TEACHING AND MENTORING

Teaching

Since at Columbia
- Guest lecturer, Methods in neuroscience course, NB&B Graduate Program, Columbia University (2021)
- Guest lecturer, Developing Neural Circuits Course, OIST, Okinawa, Japan (2021)
- Guest lecturer, Research Foundations in Genetics and Genomics, University of Chicago (2020)
- Guest lecturer, GR6055: Survey Neuroscience II, NB&B Graduate Program, Columbia University (2020, 2021)
- Guest lecturer, NSBV BC 1001: Introduction to Neuroscience, Barnard College (2020, 2021)
- Guest lecturer, BIOL GR9301: Pre-research seminar, Biological Sciences PhD program, Columbia University (2019, 2020)

Before Columbia
- Lecturer and lab practicals for the "Molecular neurobiology" class, IMPRS Max Planck Graduate program (2016 and 2017)
- Lecturer for the EMBL Predoc Course, Basic Biology Module (2011)
- Lab practicals for the EMBL Predoc Course, Developmental Biology Module (2009)
- Teaching assistant, EMBO-Zoonet Practical Course "Molecular approaches to evolution and development" – Kristineberg Marine Research Station, Sweden (2008)

Mentoring

At Columbia
- Staff Associate: Jamie Woych (from October 2019)
- Graduate Students:
    - Eliza Jaeger (Columbia Biological Sciences) from Jan 2020, **NSF GRFP Fellowship**
    - Alonso Ortega-Gurrola (Columbia Neurobiology and Behavior) from Jan 2020, **Fulbright Fellowship**
    - Elias Gumnit (Columbia Biological Sciences) from Apr 2021
- Postdocs
    - Lu Xu, from 2021 (joint with Stuart Firestein and Elizabeth Hillman)
    - Astrid Deryckere, from Feb 2021
    - Andrew Matheson, starting in Dec 2021
- Undergraduates
    - Dreyton Amador (Columbia Biomedical Engineering), since Summer 2021
    - Kimberly Tufton (Columbia Neurobiology), Summer 2021
    - Boldizsar Jekely (Columbia Environmental Biology), since Fall 2021
- Rotation Students:
    - Xinyue Chen (Columbia Neurobiology and Behavior), Spring 2020
    - Jiacheng Gu (Columbia Biological Sciences), Summer 2020
    - Gianluca Merello (Columbia Biological Sciences), Spring 2021
    - Britt Bistis (Columbia Biological Sciences), Fall 2021

Before Columbia
At EMBL: supervision and mentoring of two undergraduate students (University of Heidelberg)
At MPI for Brain Research: supervision and mentoring of:
- Helena Dominguez-Moreno (Goethe University, 9 months, now Ph.D. student at LMU Munich)
- Ariel Jacobi (UPenn, 1 year, now MD/Ph.D. student at UC Davis, co-author in Tosches et al *Science* 2018)
- David Hain (Goethe University, Master student, Nov 2017 - June 2019; now Ph.D. student at MPI for Brain Research)

- Tatiana Gallego-Flores (Research Assistant, Nov 2017 - June 2019; now Ph.D. student at MPI for Brain Research)
- Helena Winterberg (University of Heidelberg, Master student, Nov 2018- May 2019, now Ph.D. student in Paris)