

The Evolution of Cell Types in the Cerebral Cortex

October 3

Tuesday, 12:30 pm

Billings Building—Rosedale Room

SPEAKER:



**Maria Antonietta Tosches,
Ph.D.**

*Assistant Professor
Department of Biological Sciences
Columbia University*

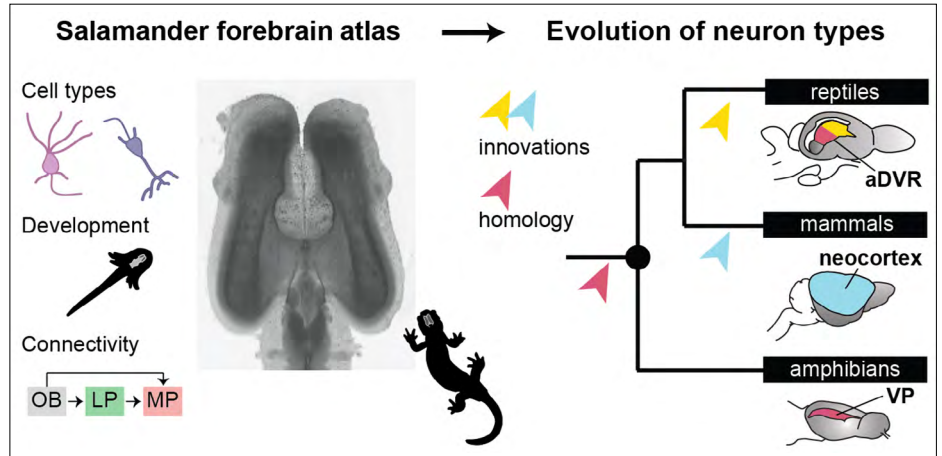
Host: Vibhu Sahni, Ph.D.

For more information contact
Darlene White
daw9085@med.cornell.edu

Abstract

The cerebral cortex is arguably the brain area that underwent the most profound transformations in vertebrate brain evolution. The expansion of the cerebral cortex in mammals was accompanied by an explosion of neuronal diversity. To discover general principles underlying the evolution of neuron types and circuits, we study the simple cerebral cortices of non-mammalian vertebrates.

Our work on amphibians and reptiles indicates that the cerebral cortex of ancestral tetrapods was layered, with two main classes of neurons with distinct laminar positions, molecular identities, and long-range projections. In salamanders, these two layers are generated sequentially from multipotent progenitors in an outside-in sequence. We propose that in mammals new types of pyramidal neurons evolved from these two ancestral classes by diversification, through the emergence of novel gene regulatory interactions during neuronal differentiation.



Publications:

1. Woych J, Ortega Gurrola A, Deryckere A, Jaeger E, Gumnit E, Merello G, Gu J, Joven Araus A, Leigh N, Yun M, Simon A, Tosches MA (2022) – “Cell type profiling in salamanders identifies innovations in vertebrate forebrain evolution – Science 377(6610): 1063 eabp9186
2. Hain D, Gallego Flores T, Klinkmann M, Macias A, Ciirdaeva E, Arends A, Thum C, Tushev G, Kretschmer F, Tosches MA, Laurent G (2022) – “Molecular diversity and evolution of neuron types in the amniote brain” – Science 377(6610): 1060 eabp8202
3. 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