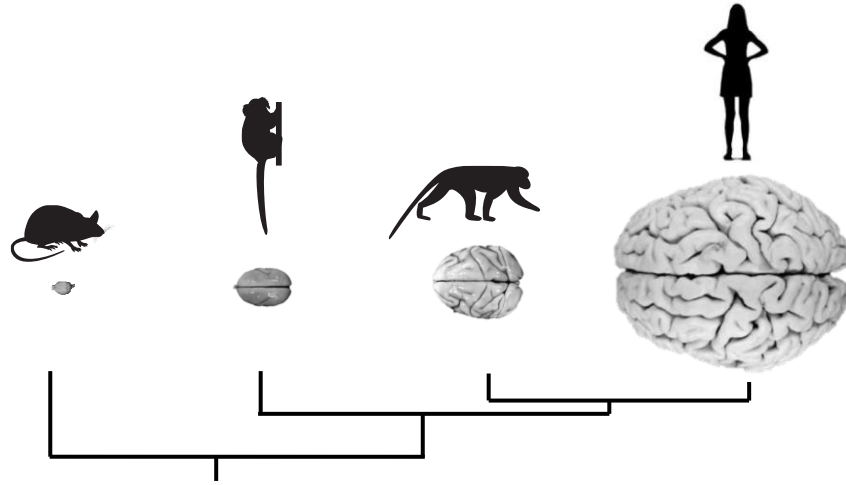


Biological innovations in primate brains



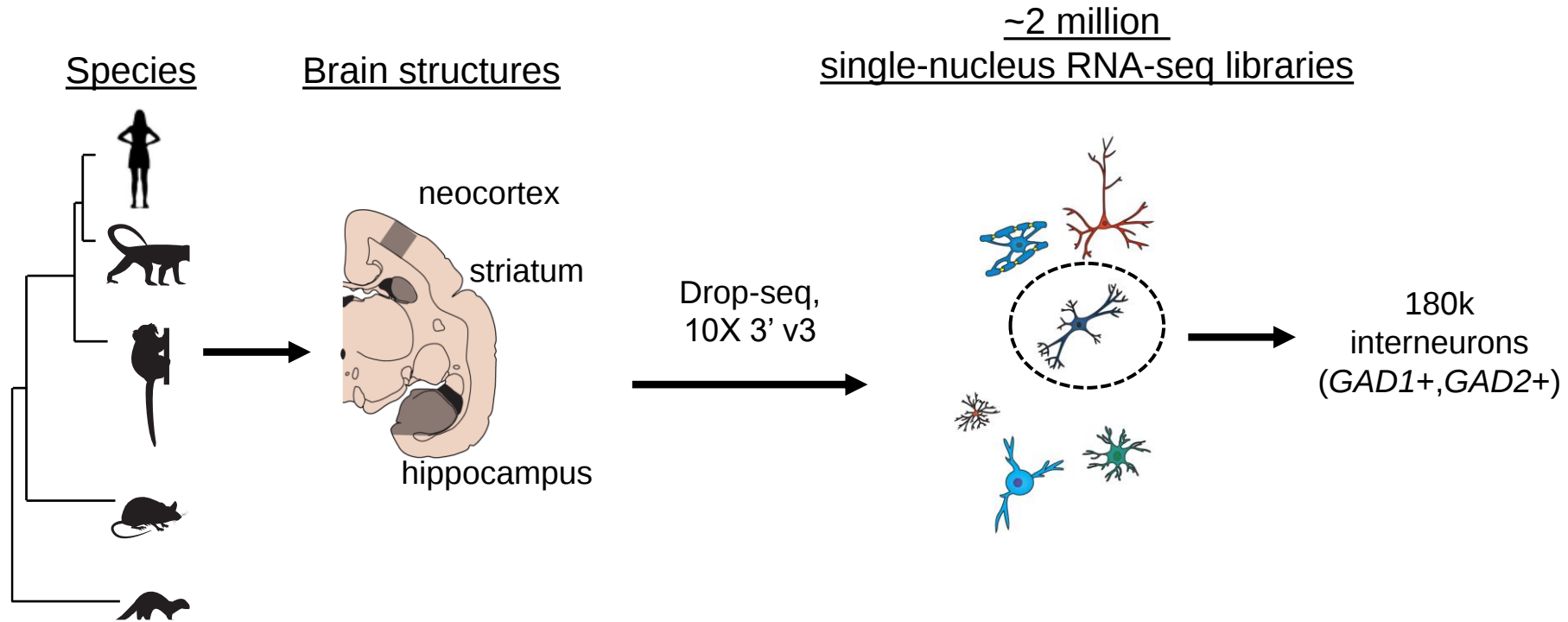
NASEM Workshop
10.06.21

Fenna Krienen, PhD
Postdoctoral Fellow, McCarroll Lab
Genetics @ Harvard Medical School
& The Broad Institute

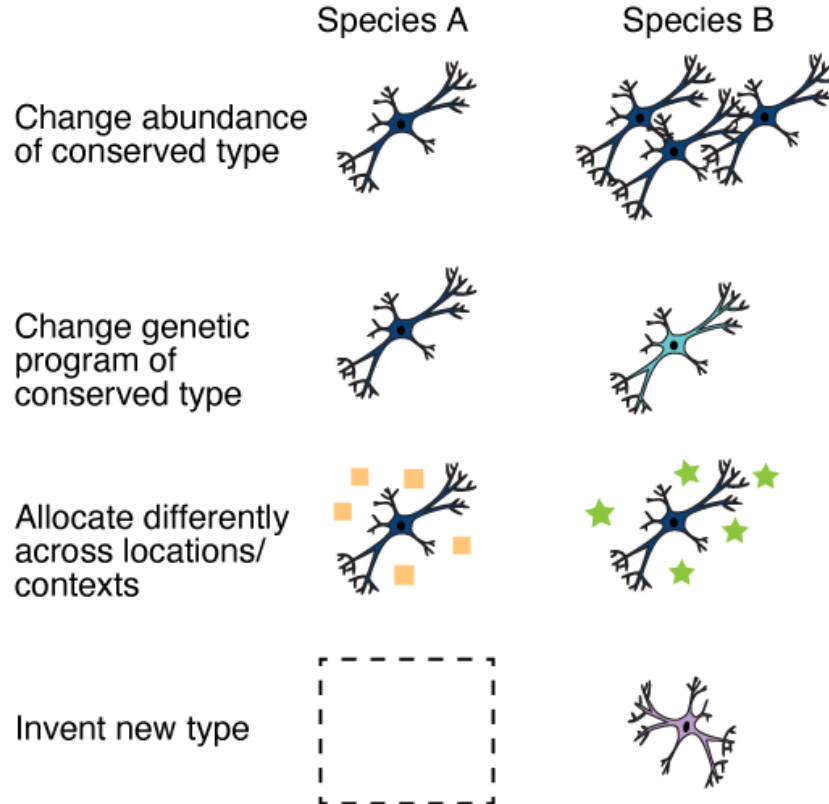
The challenge of modeling human brain biology



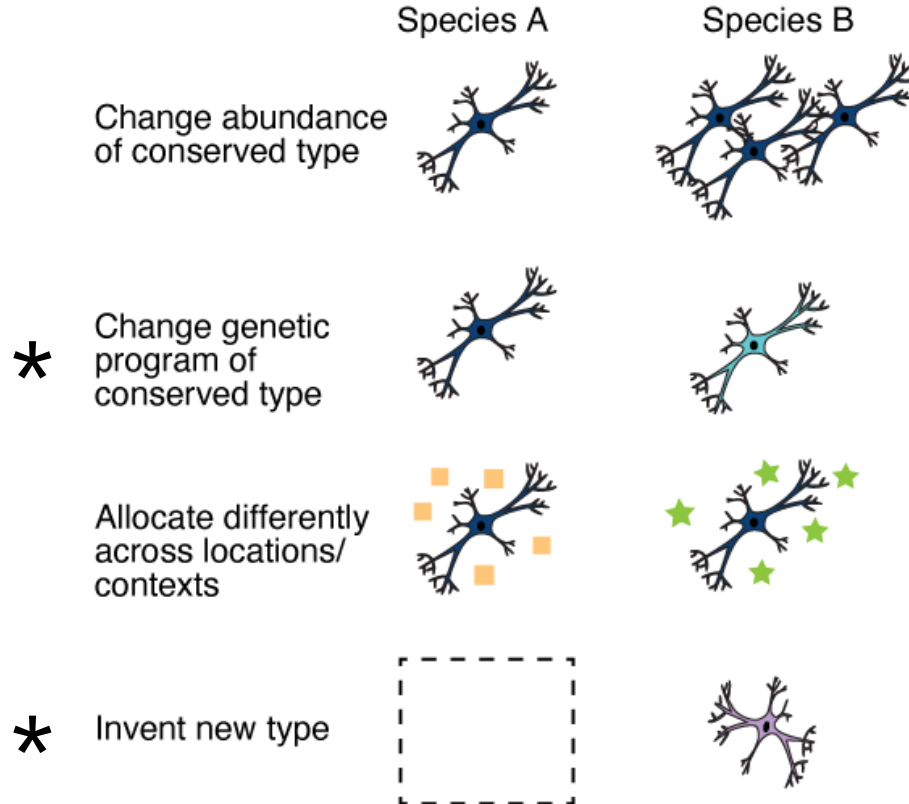
Comparative insights from single cell RNA sequencing



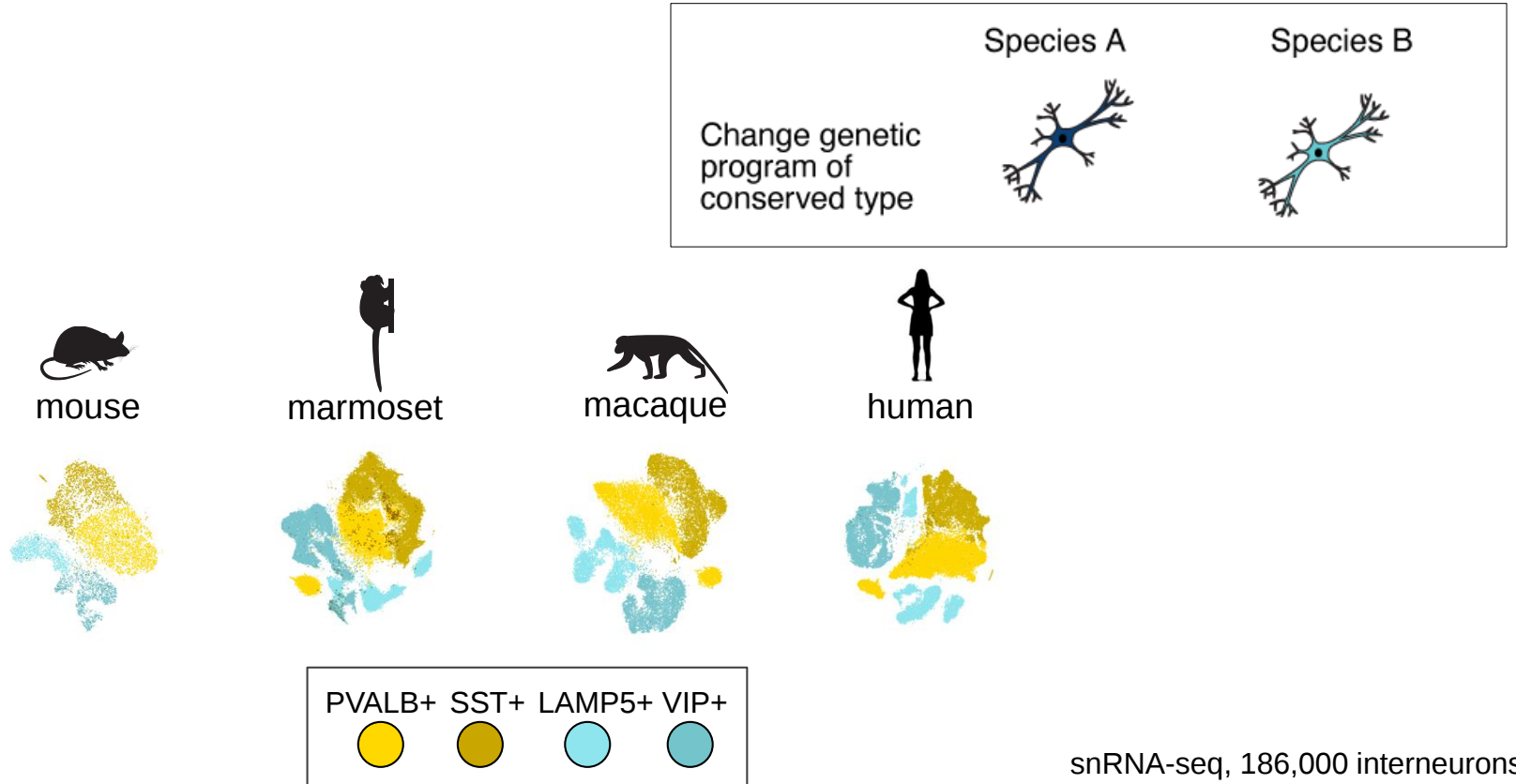
How might brain cell types evolve?



How might brain cell types evolve?

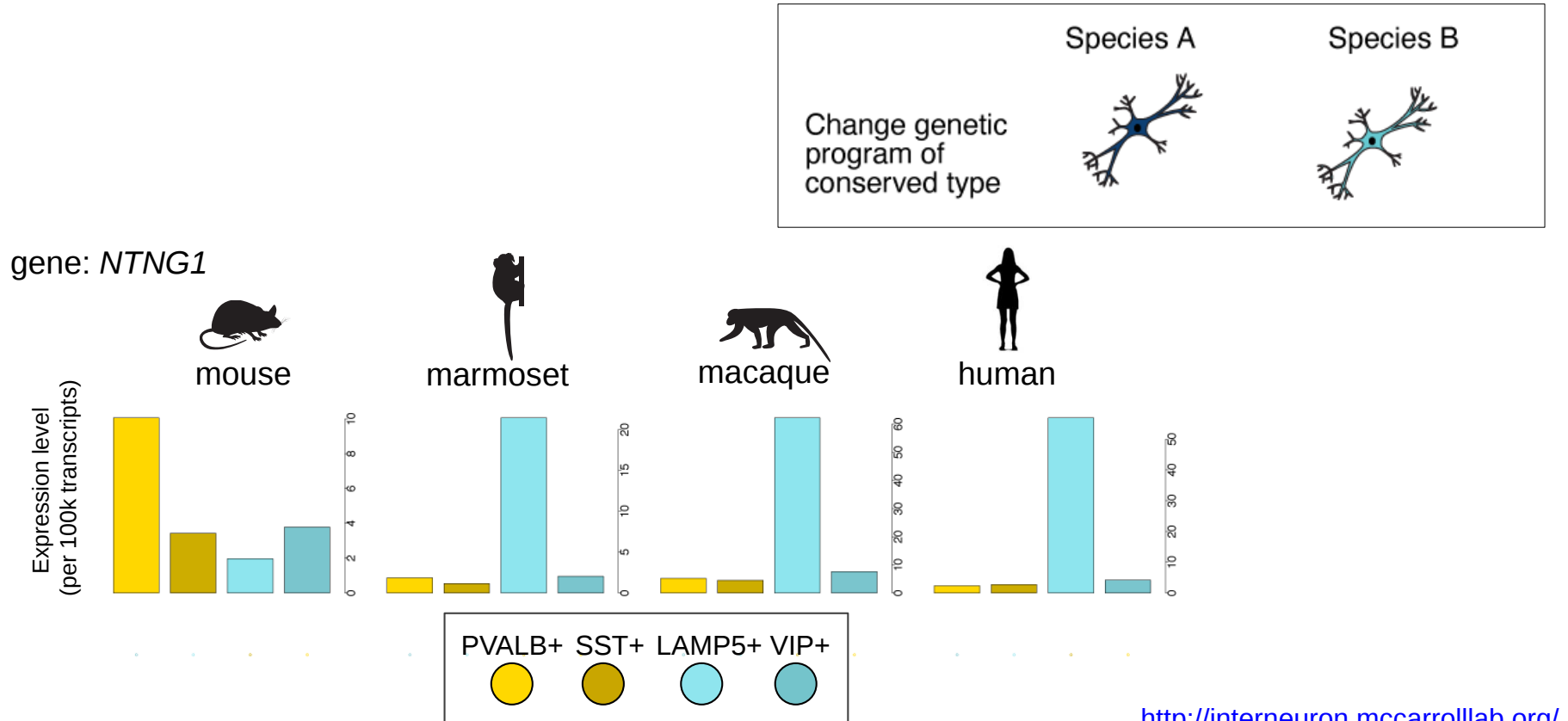


How might brain cell types vary across species?

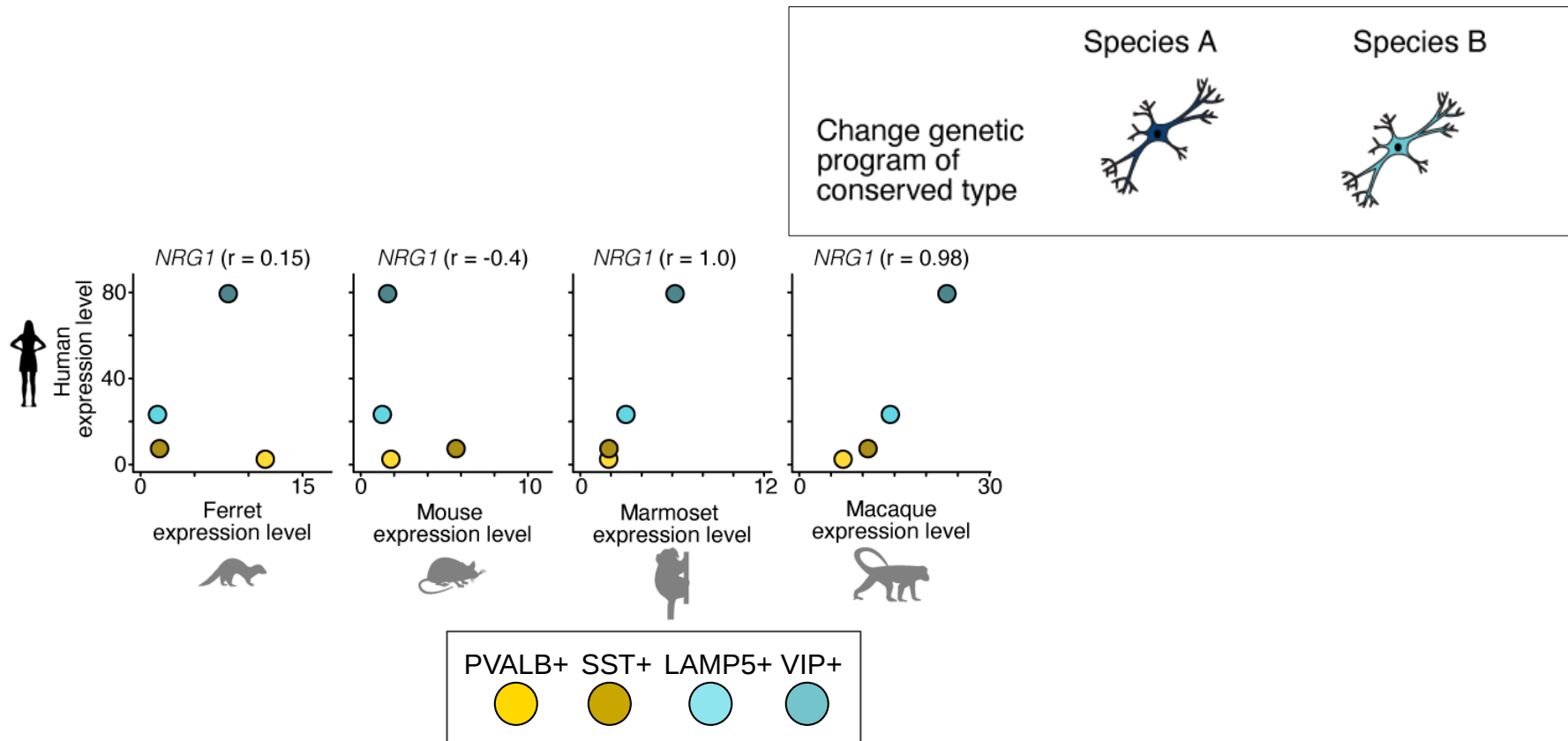


snRNA-seq, 186,000 interneurons
Krienen et al. (2020) *Nature*

How might brain cell types vary across species?

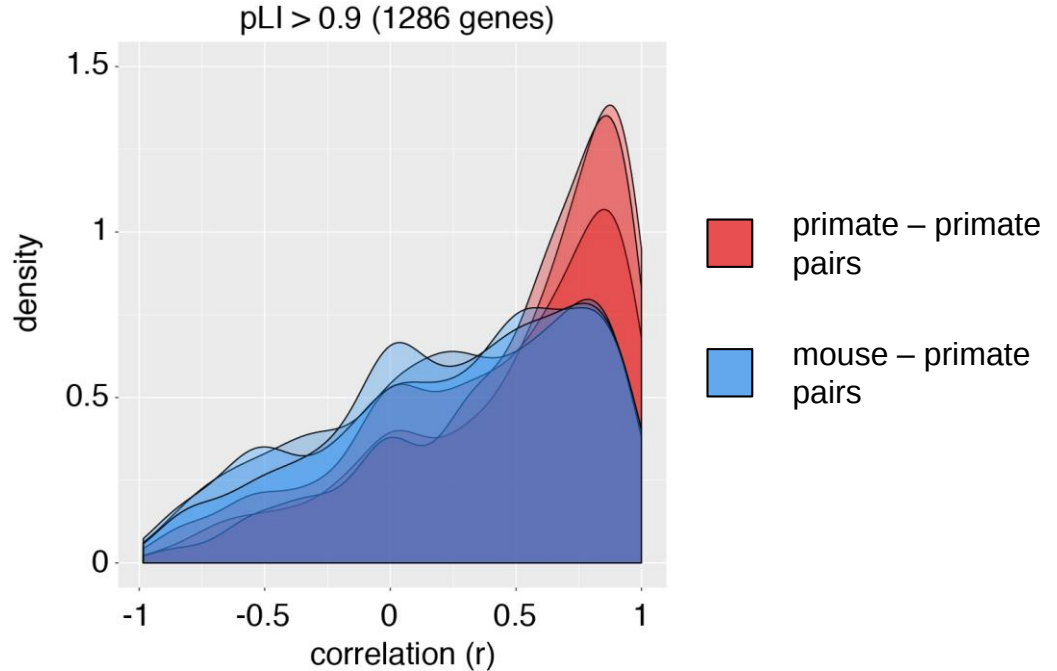


How might brain cell types vary across species?

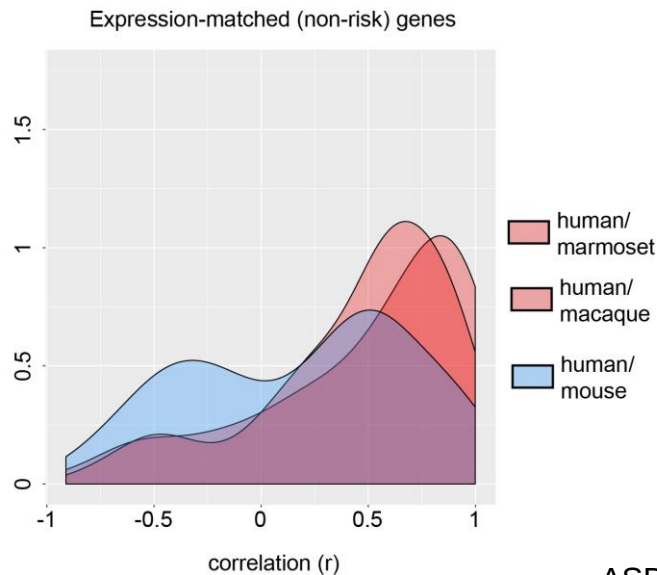
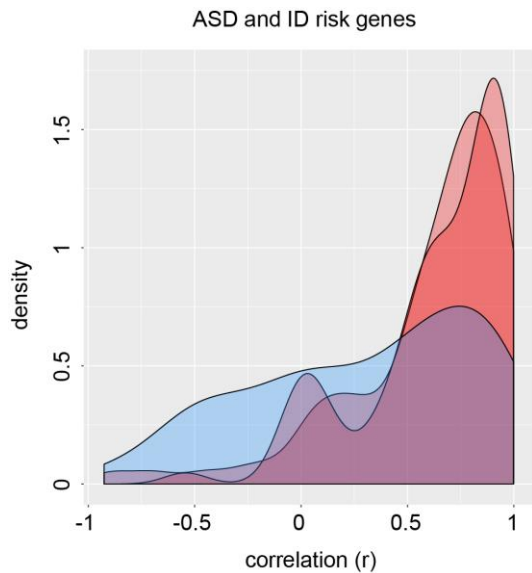
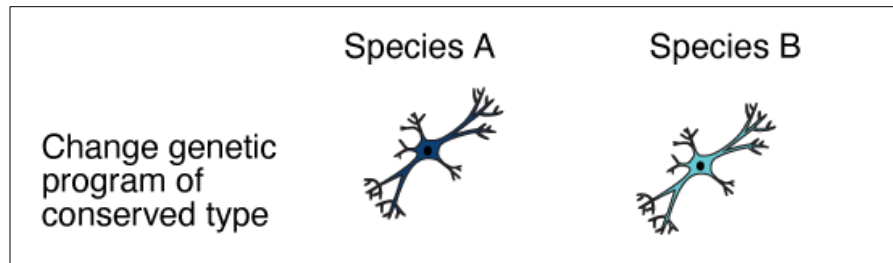


How might brain cell types vary across species?

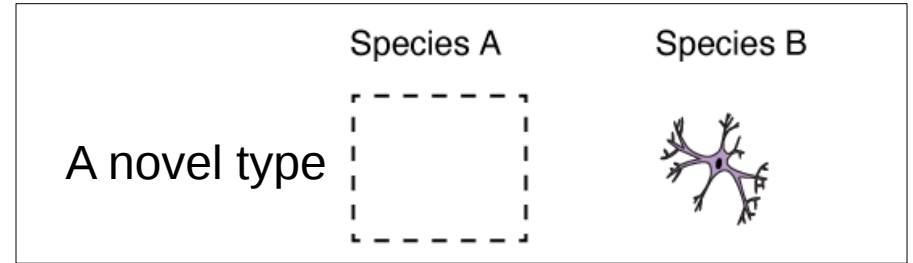
Evolution constrains quantitative expression levels of loss-of-function intolerant genes, especially at the shorter evolutionary distances among primates



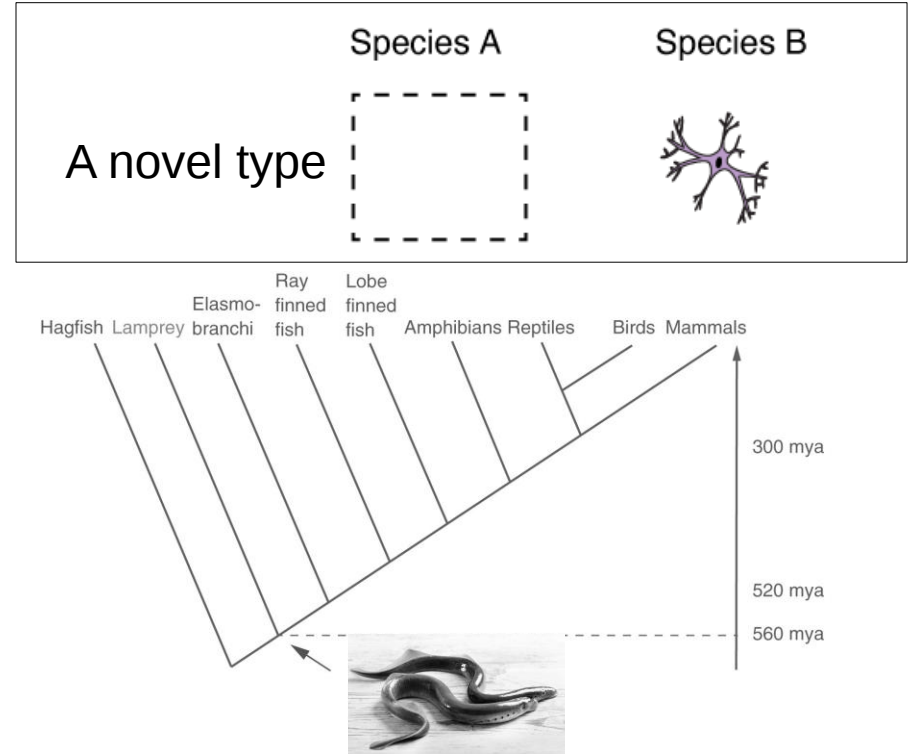
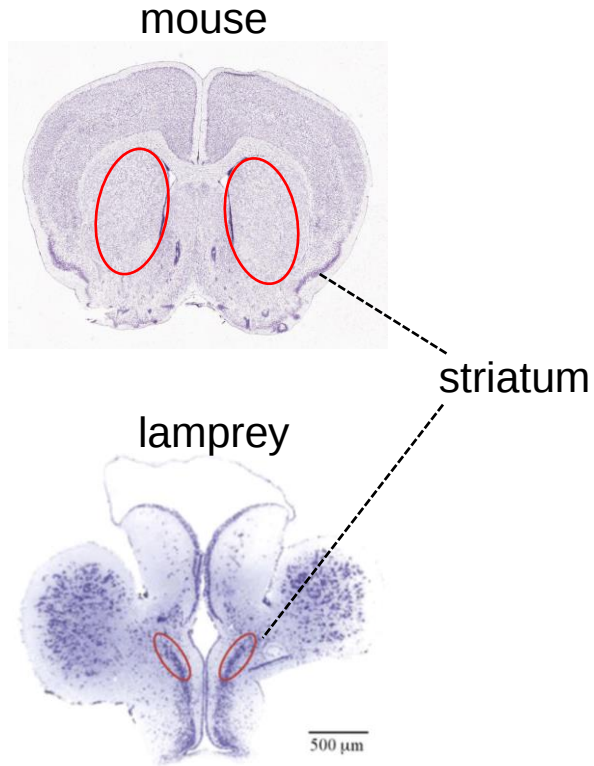
How might brain cell types vary across species?



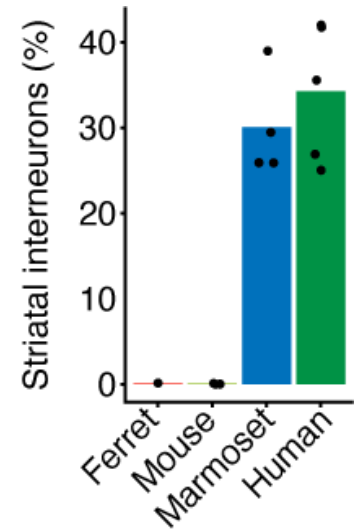
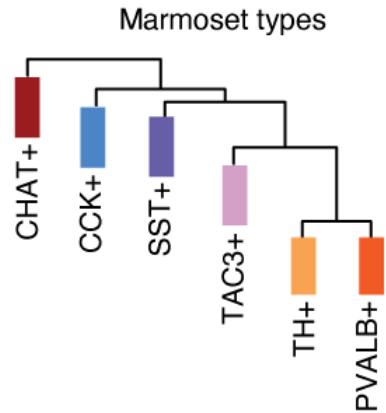
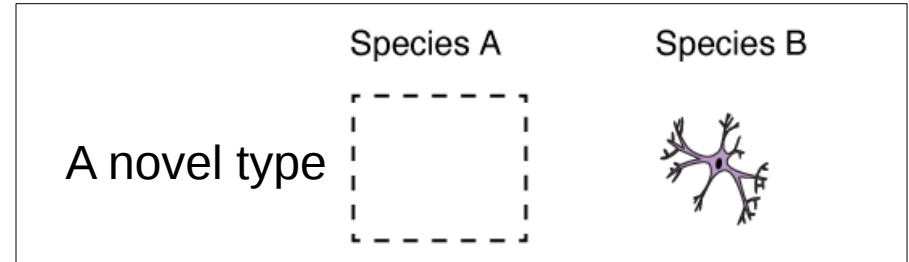
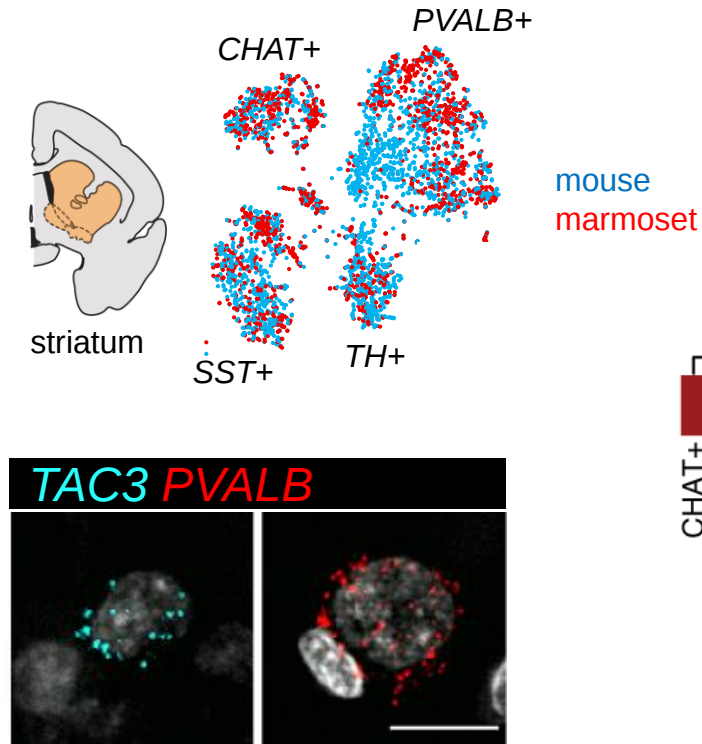
How might brain cell types vary across species?



Conservation of the basal ganglia over 500 million years

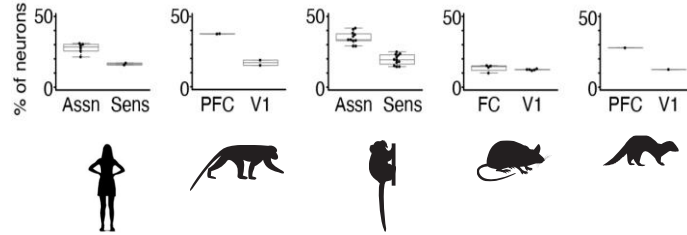


How might brain cell types vary across species?

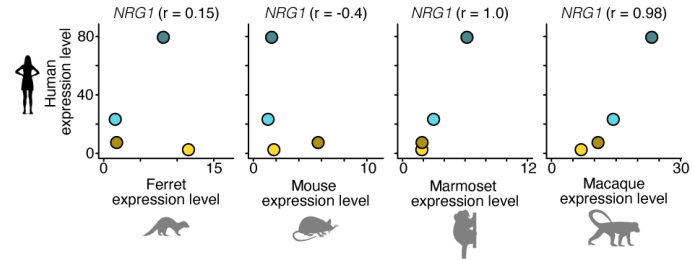


Summary

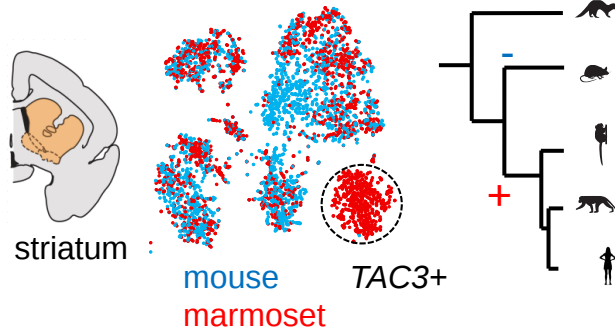
Abundances



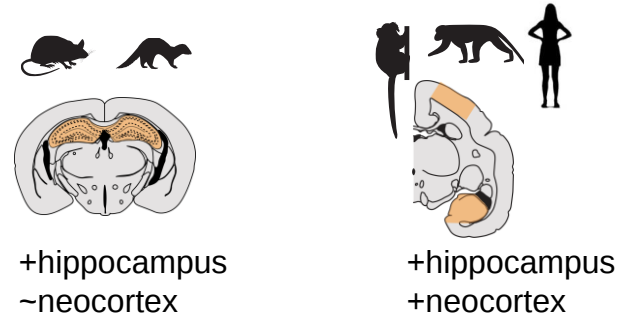
Molecular composition



Novel type



Regional Allocation



Addressing a need: tools to enable precise cell type access in primates



collaboration between McCarroll (Harvard),
Feng (MIT) & Mitra (CSHL) labs

McCarroll Lab (HMS/Broad)

Steve McCarroll
Ricardo del Rosario
Arpiar Saunders
Alyssa Lutservitz
Marta Florio
Jim Nemesh
Alec Wysoker
Melissa Goldman
Chris Mullally
Nora Reed
Curtis Mello
David Kulp
Nolan Kamataki
Christina Usher



Collaborators

Feng Lab (MIT/Broad)

Guoping Feng
Martin Wienisch
Qiangge Zhang
Carolyn Wu
Kirsten Levandowski
Heather Zaniwski

Fishell Lab (HMS/Broad)

Gord Fishell
Marian Fernandez-Otero

Rudy Lab (NYU Langone)

Bernardo Rudy
Rob Machold
Ben Schuman

Walsh Lab (Boston

Children's)

Chris Walsh
Rich Smith

Kean Lab (Boston Children's)

Leslie Kean
Victor Tkachev



Marmoset Atlas
NIH BRAIN
Initiative
BICCN



Krienen lab opens 2022

