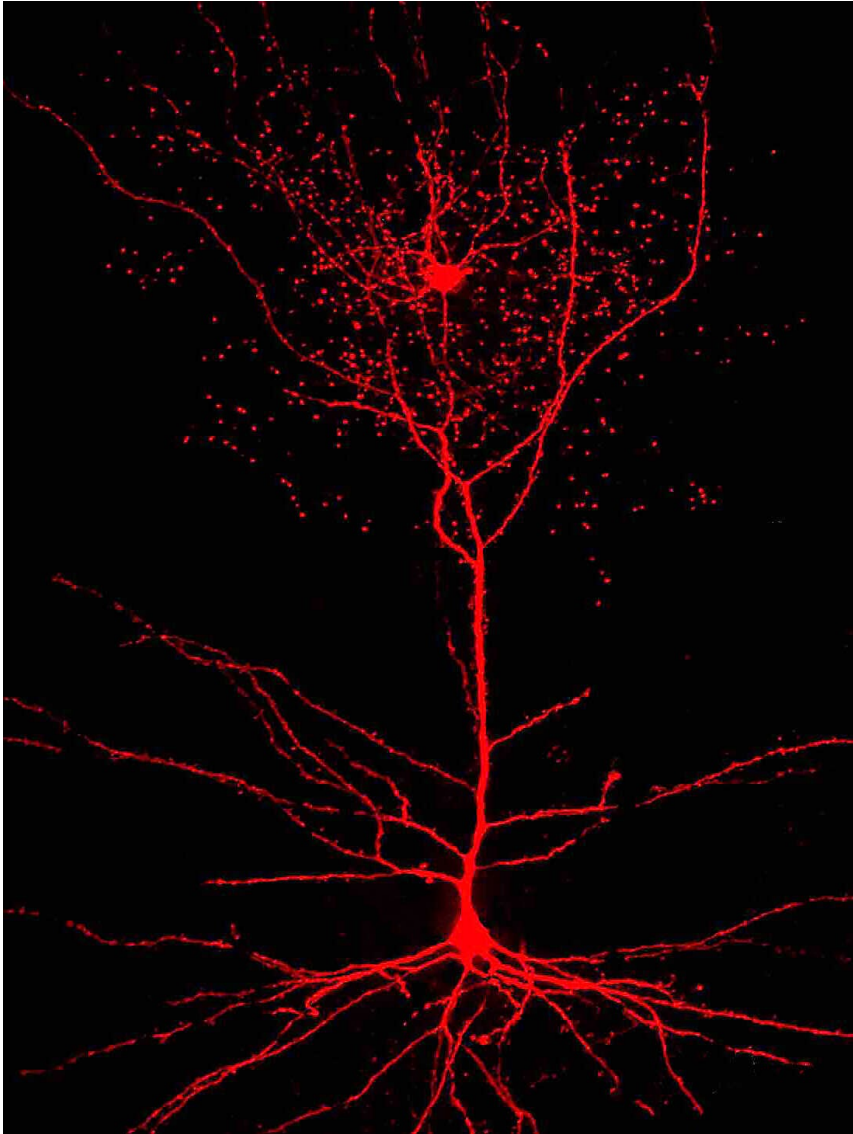


# NEUR 265

Wednesday, January 31<sup>st</sup>, 2024

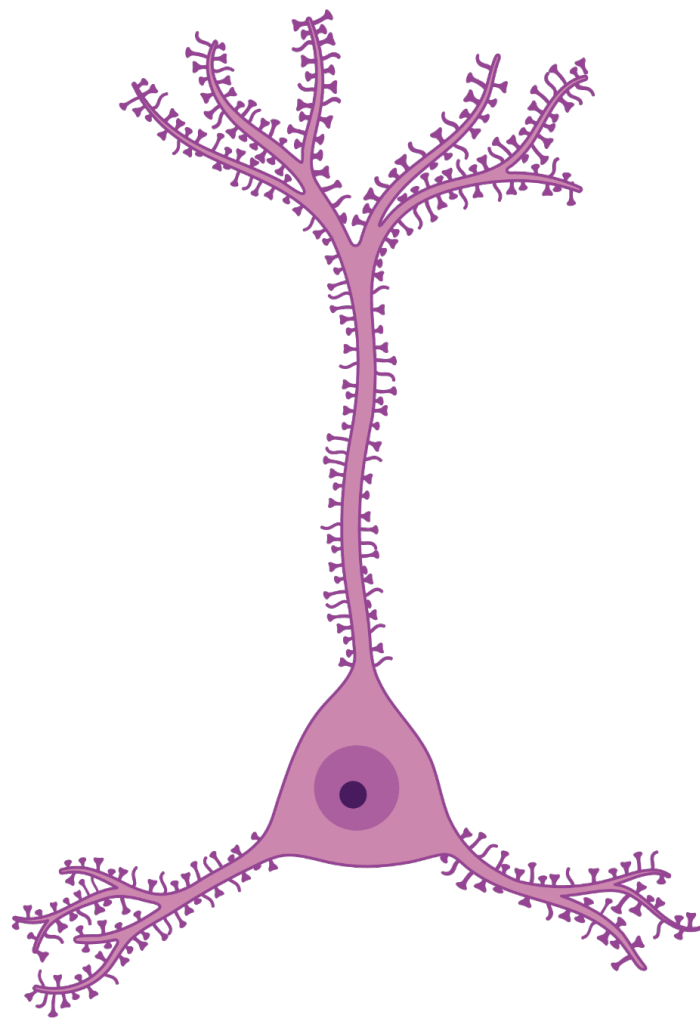
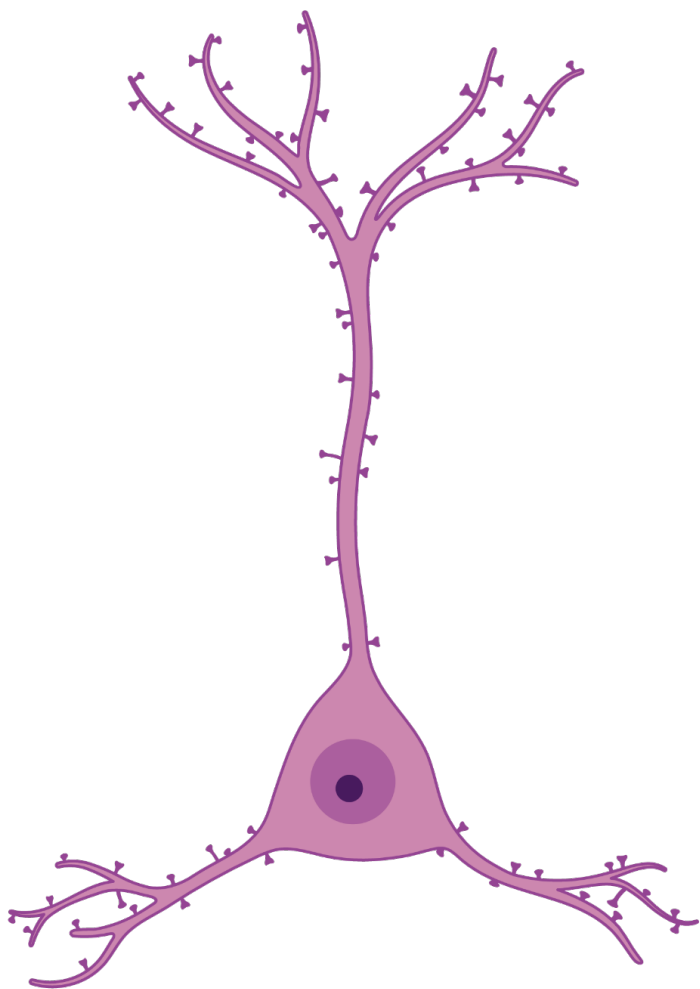


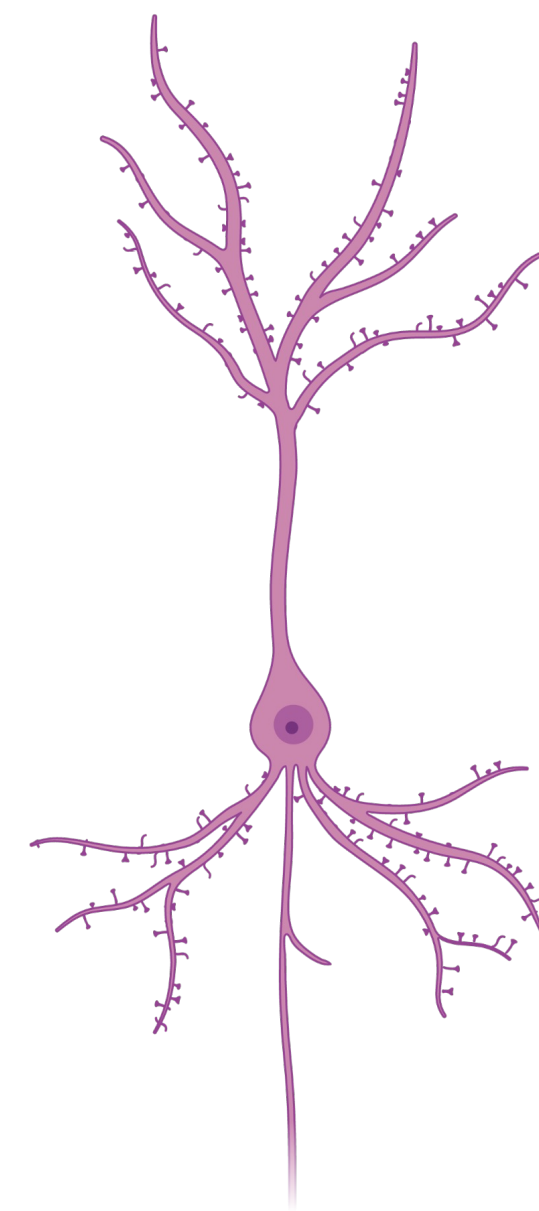
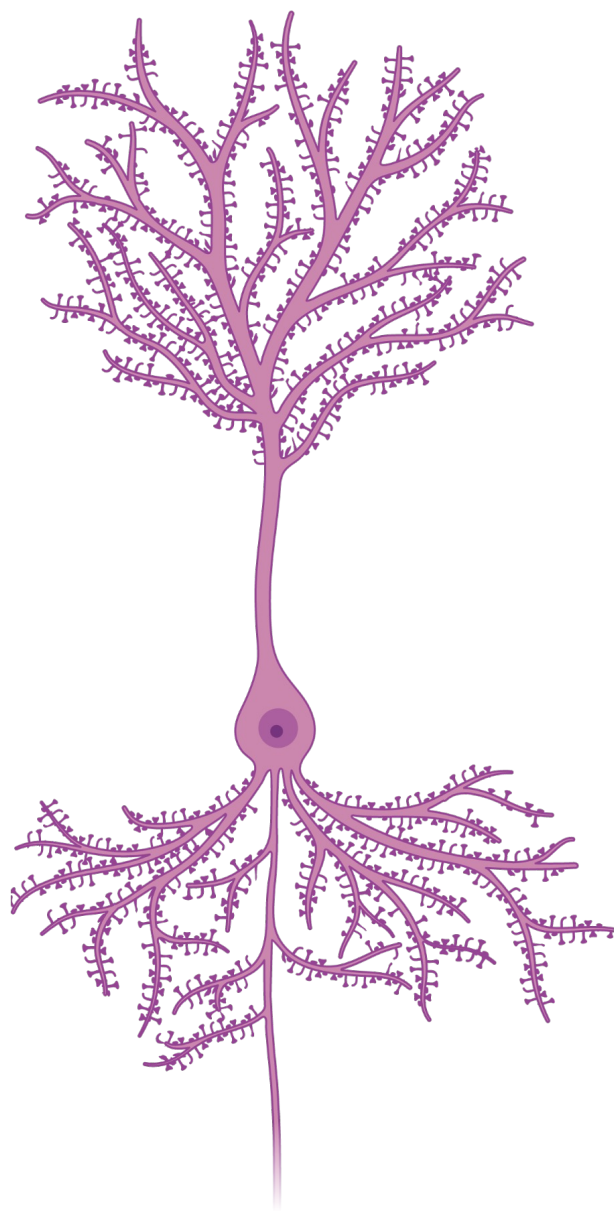
The brain is made up of many cells

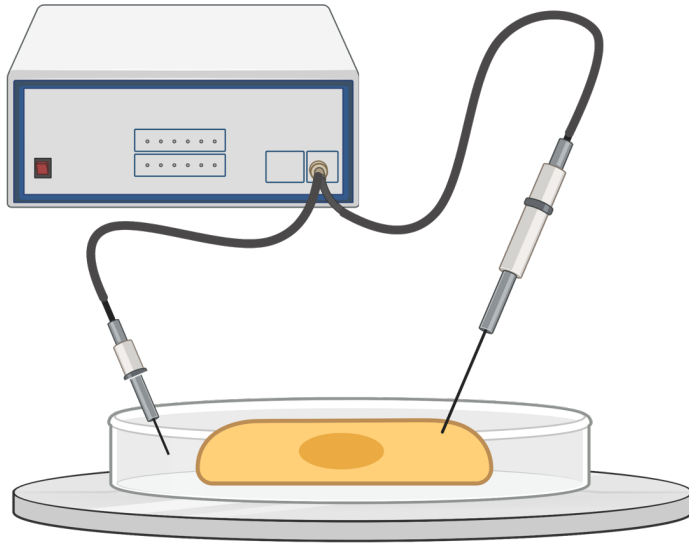
These cells are called **neurons**

Are all neurons the same?

**What are some attributes that neurons have?**





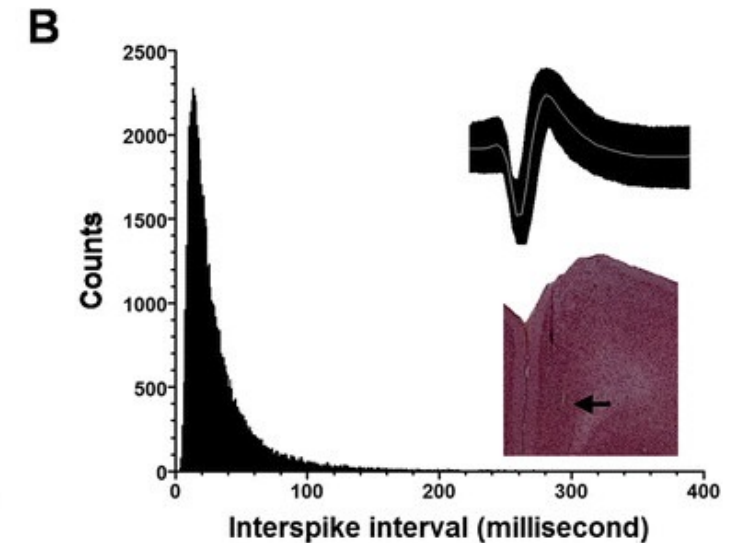
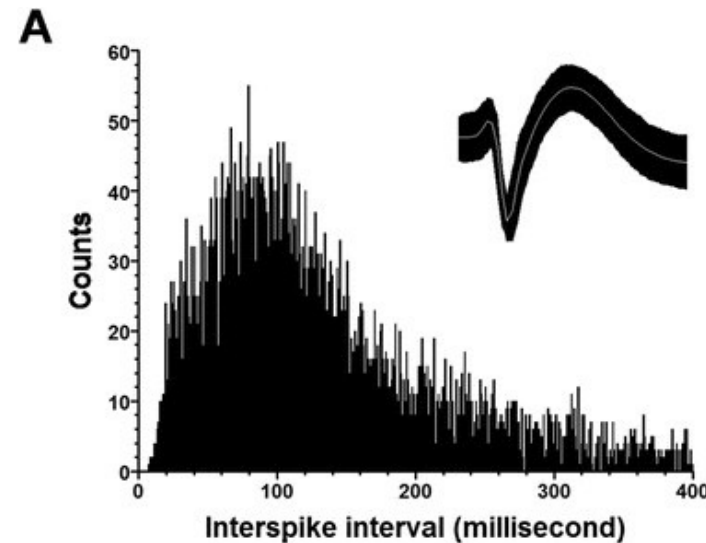


Physiological properties:

Action potentials

Post-synaptic potentials

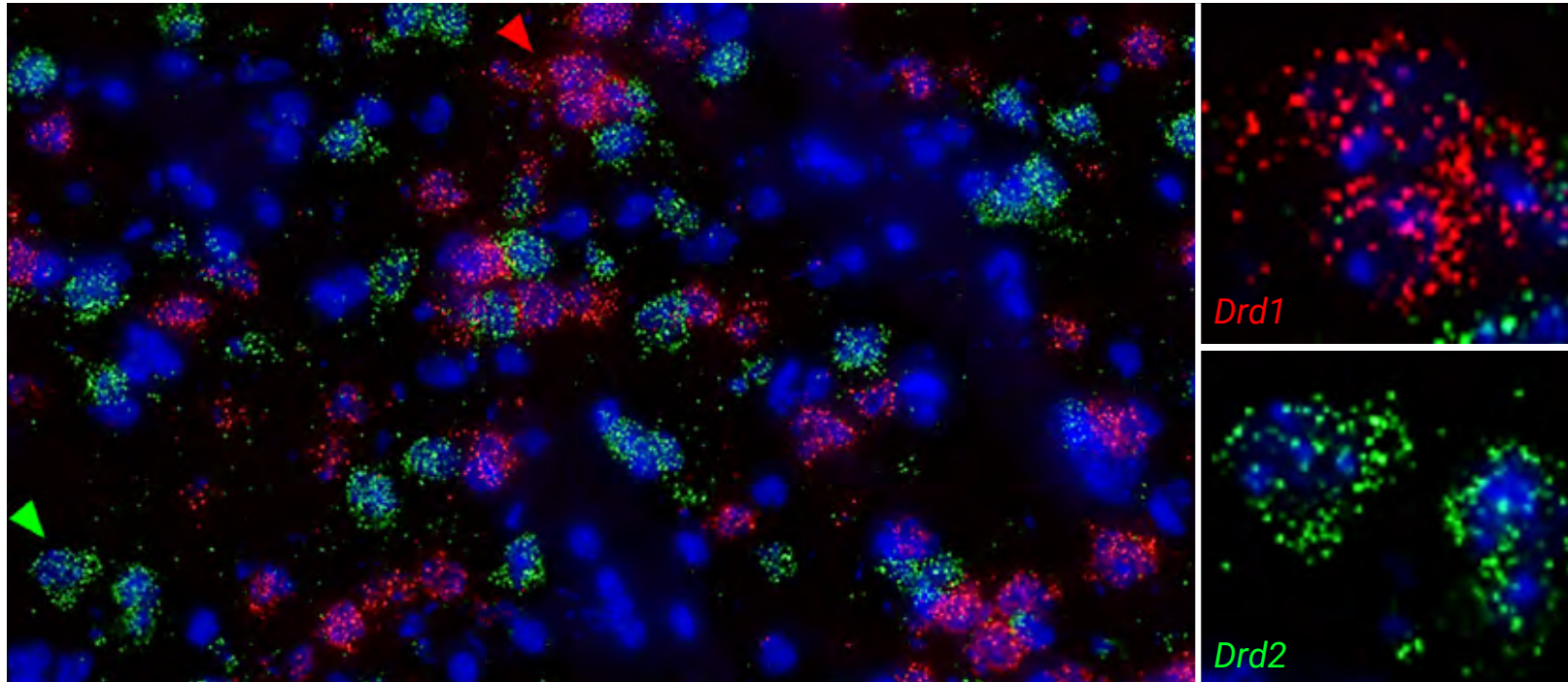
Resting potential



How to find these cells?

Cells also have unique patterns of gene expression

Many cells have **marker genes** – genes that are uniquely expressed in that “type” of cell



*Drd1* = D1 receptor-expressing cells in the striatum

*Drd2* = D2 receptor-expressing cells in the striatum



You can use marker genes to look at cell morphology and physiology

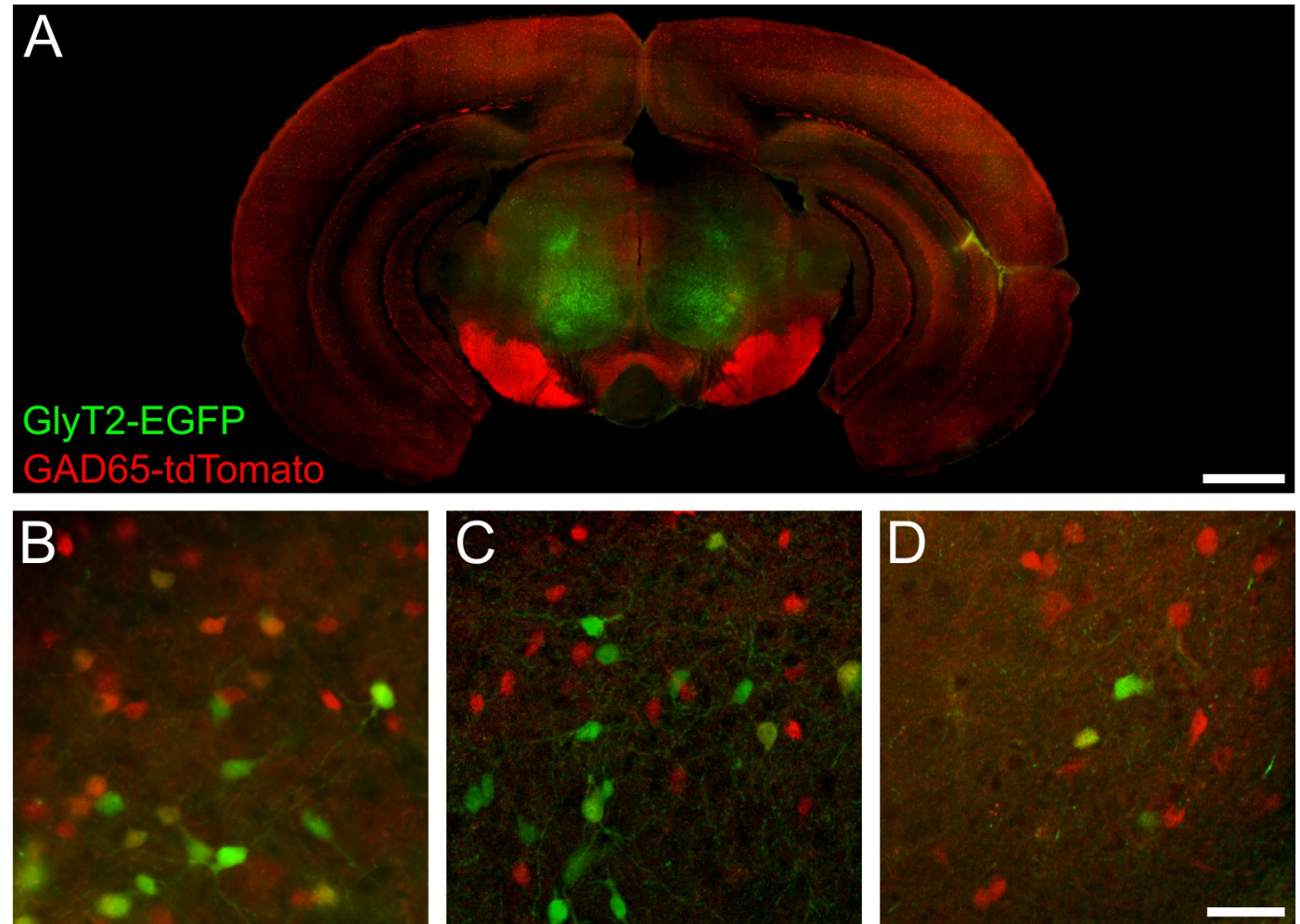
## Cre-lox recombination

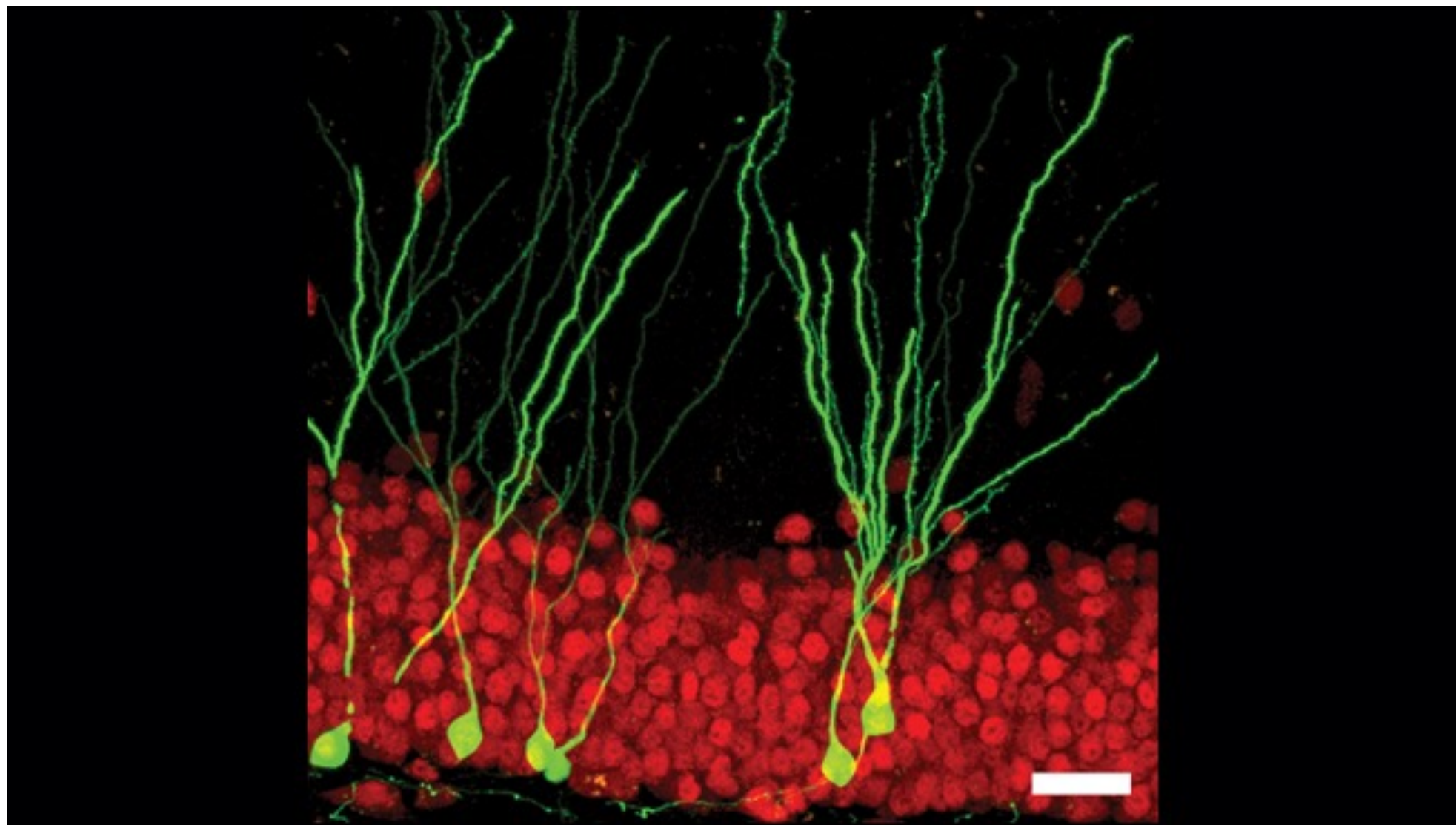
Make a mutant mouse that expresses Cre whenever a marker gene is also expressed

Inject a virus that codes for a fluorescent protein – like **GFP** or **tdTomato**

The gene that codes for this protein is flanked by sites that keep it from being transcribed

Cre is like a pair of scissors that cuts these sites off – so in cells that express Cre, the fluorescent protein is also expressed







## Questions:

I inject a virus that codes for **GFP** into an *Slc17a7*-Cre transgenic mouse (*Slc17a7* is a marker gene for neurons that release glutamate). The gene that codes for **GFP** in my virus is not flanked by loxP sites. Which neurons will express **GFP**?

I inject a virus that codes for **tdTomato** into a wild-type mouse (no Cre present). The gene that codes for **tdTomato** in my virus is flanked by loxP sites. Which neurons will express **tdTomato**?

I inject a virus that codes for **GFP** into a *Gad1*-Cre transgenic mouse (*Gad1* is a marker gene for neurons that release GABA). The gene that codes for **GFP** in my virus is flanked by loxP sites. Which neurons will express **GFP**?

I inject a virus that codes for **tdTomato**, and a virus that codes for **GFP** into a *Chat*-Cre transgenic mouse (*Chat* is a marker gene for neurons that release acetylcholine). The gene that codes for **tdTomato** is flanked by loxP sites. The gene that codes for **GFP** is not flanked by loxP sites. What color will *Chat*<sup>+</sup> neurons be? What color will *Chat*<sup>-</sup> neurons be?