

This document was created to introduce users to the Cell Type Knowledge Explorer and to provide an example use case of the tool and how to accomplish it.

Vignette Type: Experimental Design

Specific Example: Mouse Primary Motor Cortex

User:

Career: Undergraduate Students | **Graduate Students** | **Post-Docs** | Senior Scientists/PI | Teachers

Experience of Cell Types: Novice | **Advanced Beginner** | Intermediate | Expert

Research: Basic | **Translational**

Research Type: Computational | **Molecular** | Behavior

Experimental Model: **Mouse** | Rat | Non-Human Primate | Human | Invertebrate | Non-Traditional Vertebrate

A researcher studies a mouse model of ALS and uses electrophysiological recordings to assess how cells are impacted by disease. The researcher notices that some of the layer 5 ET neurons are affected, but not all. To figure out the identity of the affected cells, they go to the Cell Type Knowledge Explorer (CTKE).

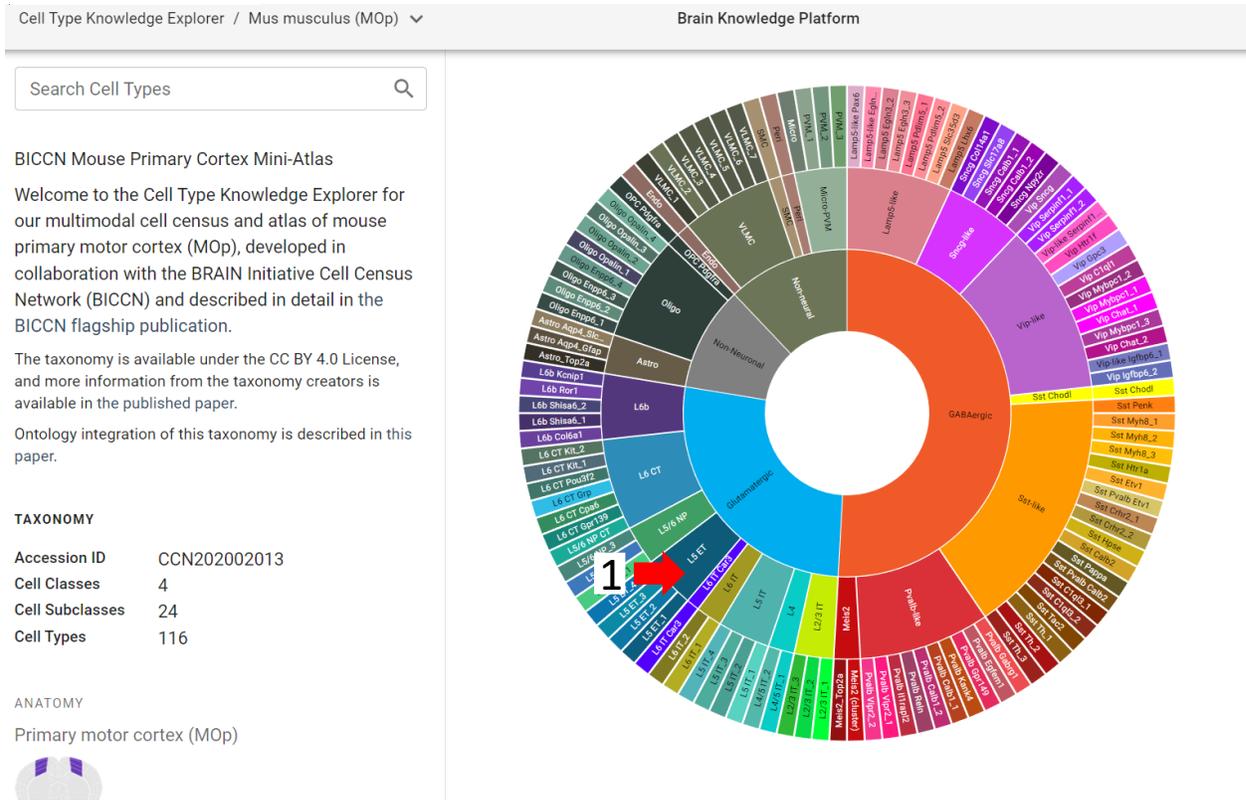
- To look at the mouse cell taxonomy, the researcher clicks on the “Mus Musculus (MOp)” button (step 1) on the main CTKE page. [Click to view in the CTKE](#)



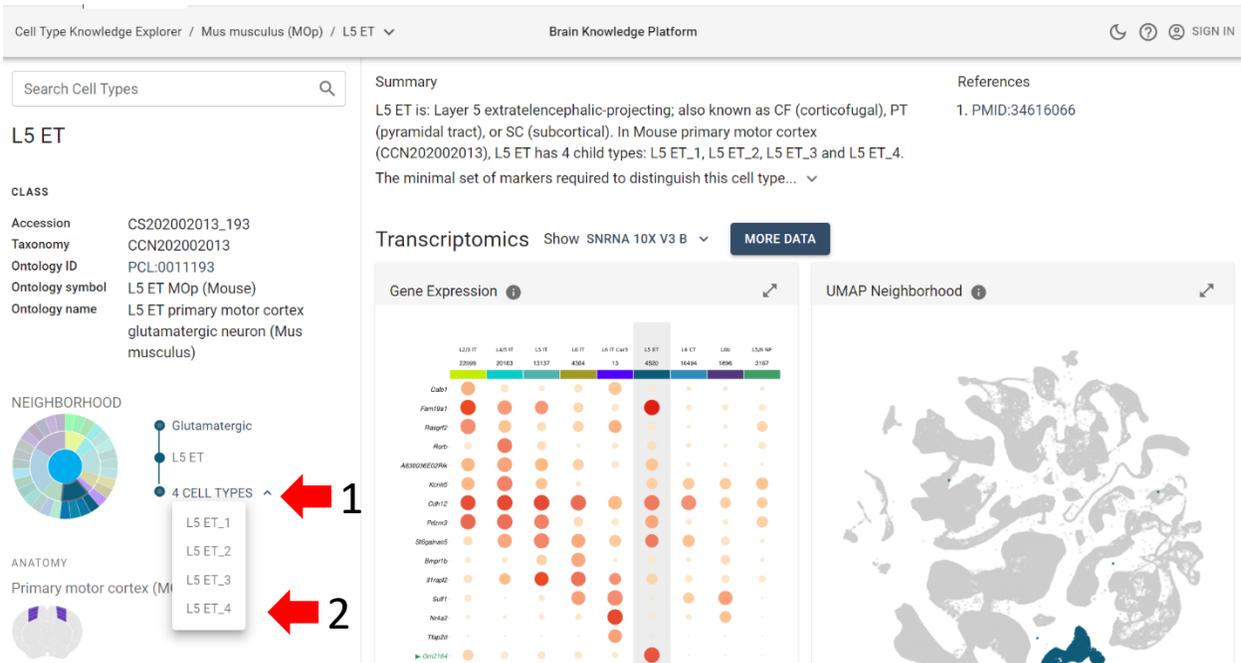
The screenshot displays the Cell Type Knowledge Explorer (CTKE) interface. On the left, a hierarchical cell taxonomy tree is shown with a color scale from 0.4 to 1.0. The tree is organized into three main sections corresponding to the species: Callithrix jacchus (top), Homo sapiens (middle), and Mus musculus (bottom). The Mus musculus section is highlighted with a red arrow and a '1' next to the 'MUS MUSCULUS (MOP)' button. On the right, there are three circular charts representing cell type distributions for each species. The top chart is for Callithrix jacchus (Accession Id: CCN201912132, Cell Types: 94, Age: 2.3y & 3.1y). The middle chart is for Homo sapiens (Accession Id: CCN201912131, Cell Types: 128, Age: 18-68 years old). The bottom chart is for Mus musculus (Accession Id: CCN202002013, Cell Types: 116). A 'SIGN IN' button is visible in the top right corner.

Welcome to the Cell Type Knowledge Explorer for our multimodal cell census and atlas of primary motor cortex, developed in collaboration with the BRAIN Initiative Cell Census Network (BICCN) and described in detail in the BICCN flagship publication. This page is the entry point for exploration of individual cell type taxonomies for human, marmoset and mouse primary motor cortex. High-

- To look at data from the L5 ET subclass, the researcher clicks on the L5 ET portion (step 1) of the sunburst plot. [Click to view in the CTKE](#)

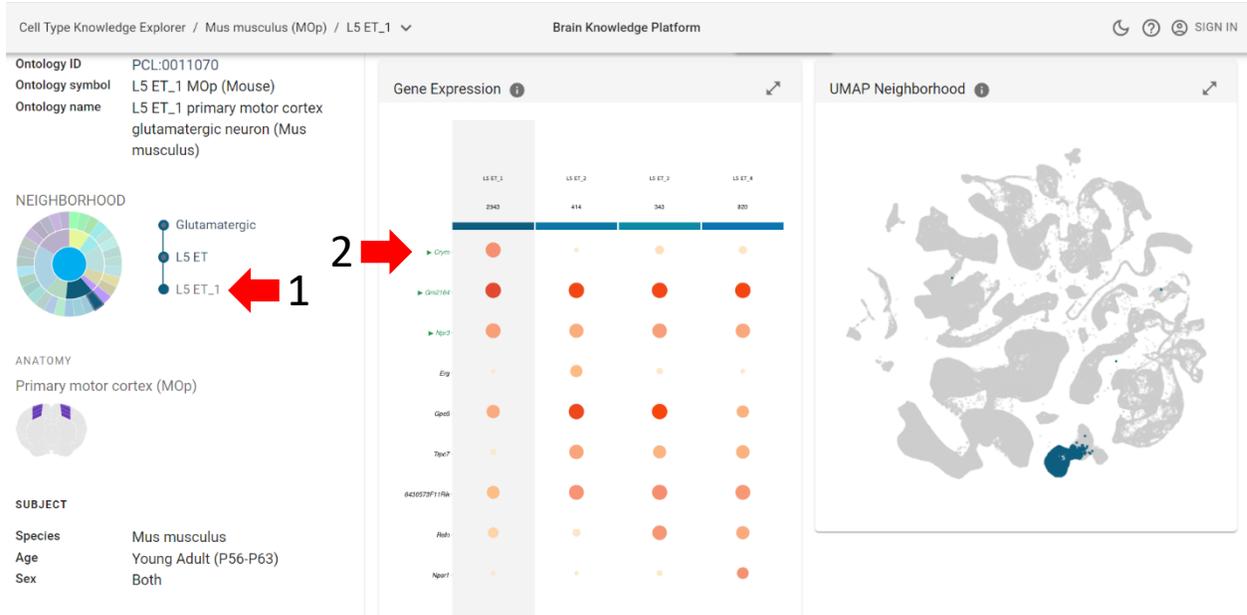


- Here the researcher can see which marker genes were used to identify the L5 ET subclass, morphological reconstructions, electrophysiological data, spatial transcriptomic data and more. To look at data for individual cell types within the L ET subclass, the researcher clicks on the arrow next to “4 Cell Types” (step 1) and then clicks on the individual cell types listed (step 2). [Click to view in the CTKE](#)



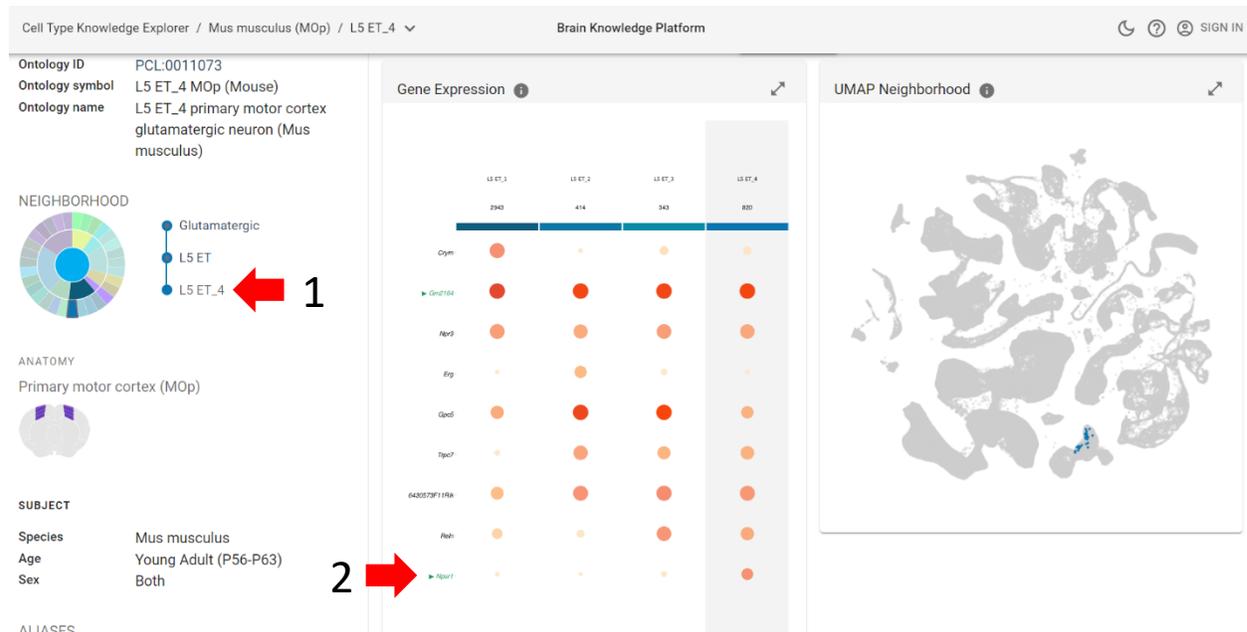
4. While looking at the L5 ET_1 cell type (step 1), the researcher can see that the marker gene “*Crym*” is highly expressed in this cell type compared to the other three L5 ET cell types (step 2).

[Click to view in the CTKE](#)



5. While looking at the L5 ET_4 cell type (step 1), the researcher can see that the marker gene “*Nspr1*” is highly expressed in this cell type compared to the other three L5 ET cell types (step 2).

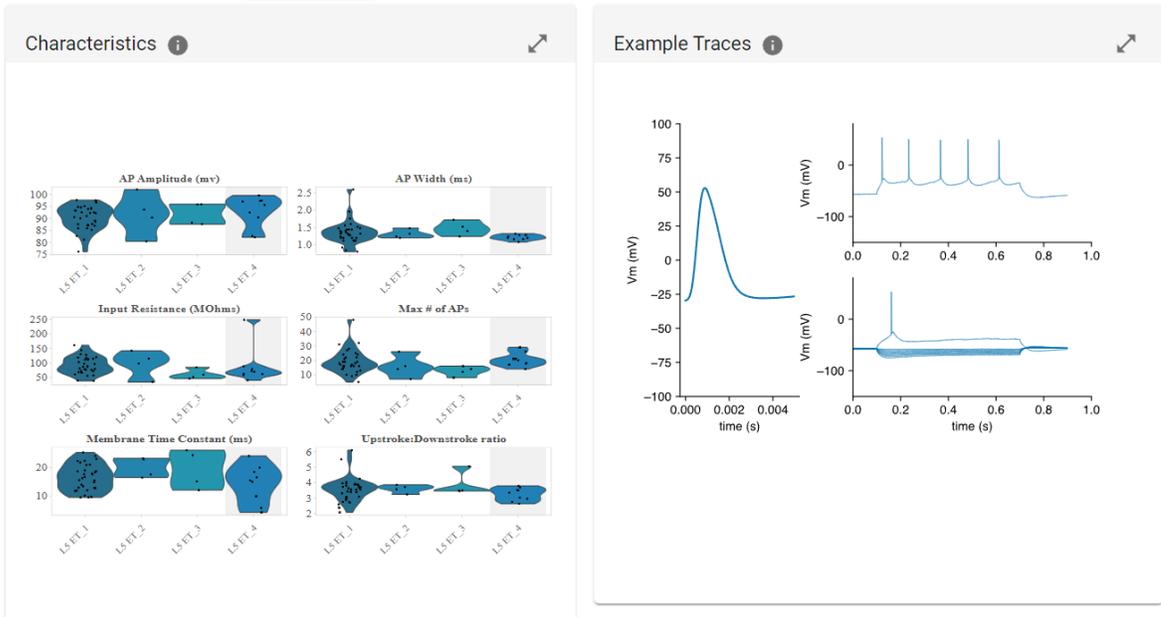
[Click to view in the CTKE](#)



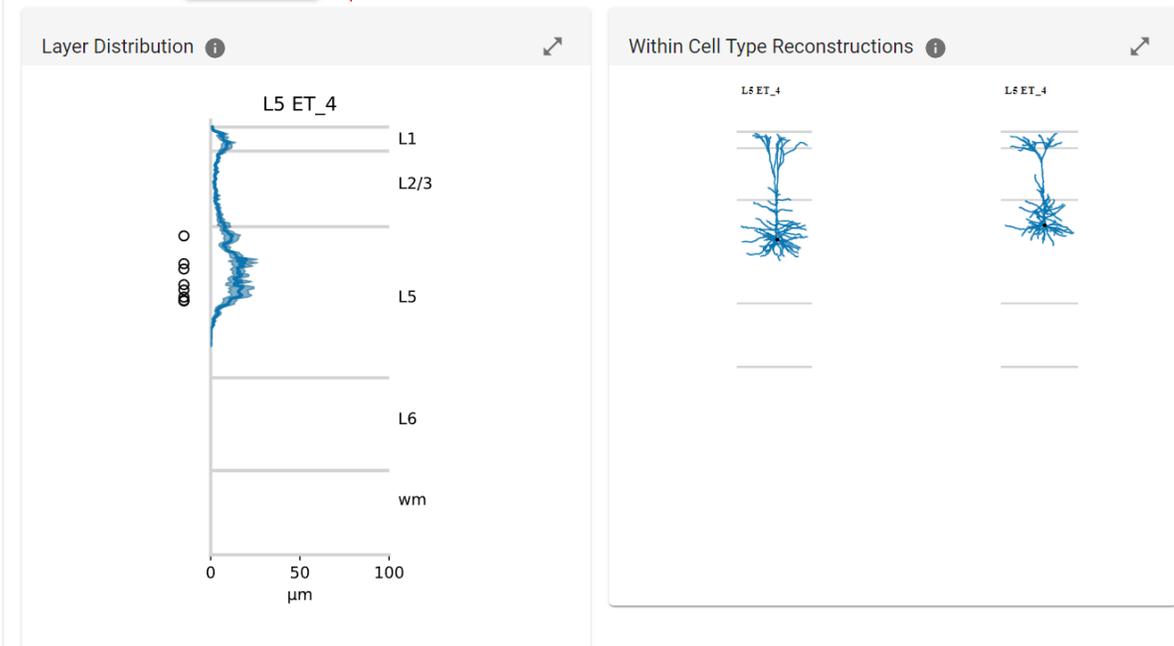
6. Now that the researcher knows that these genes are differentially expressed in these L5 ET cell types, they decide to do immunohistochemical staining with *Crym* and *Nspr1* antibodies to see if the affected cells in their ALS model are L5 ET_1 and/or L5 ET_4.

7. After staining, the researcher learns that the affected cells are unique to the L5 ET_4 class. Next, they scroll down to the electrophysiological and morphological data sections (step 1) to see how their ALS cells compare to the L5 ET_4 cells in a healthy control mouse. To download the raw data, they click on the “more data” button (step 2). [Click to view in the CTKE](#)

1 → Electrophysiology **MORE DATA** ← 2



1 → Morphology **MORE DATA** ← 2



8. Now the researcher starts to plan future experiments based on their new knowledge about the L5 ET_4 cell type.