Vignette Type: Scientific Knowledge

Specific Example: Whole Human Brain

User:

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

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

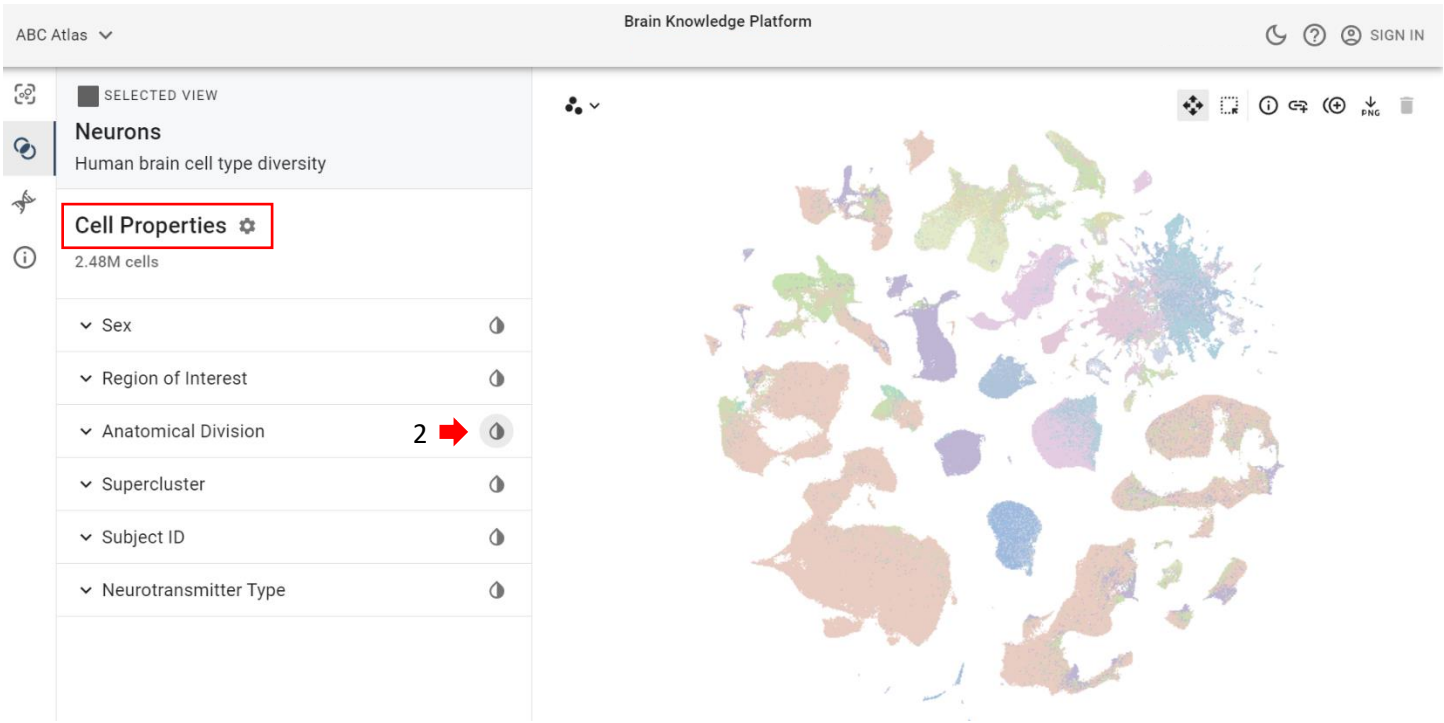
Research: **Basic** | Translational

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

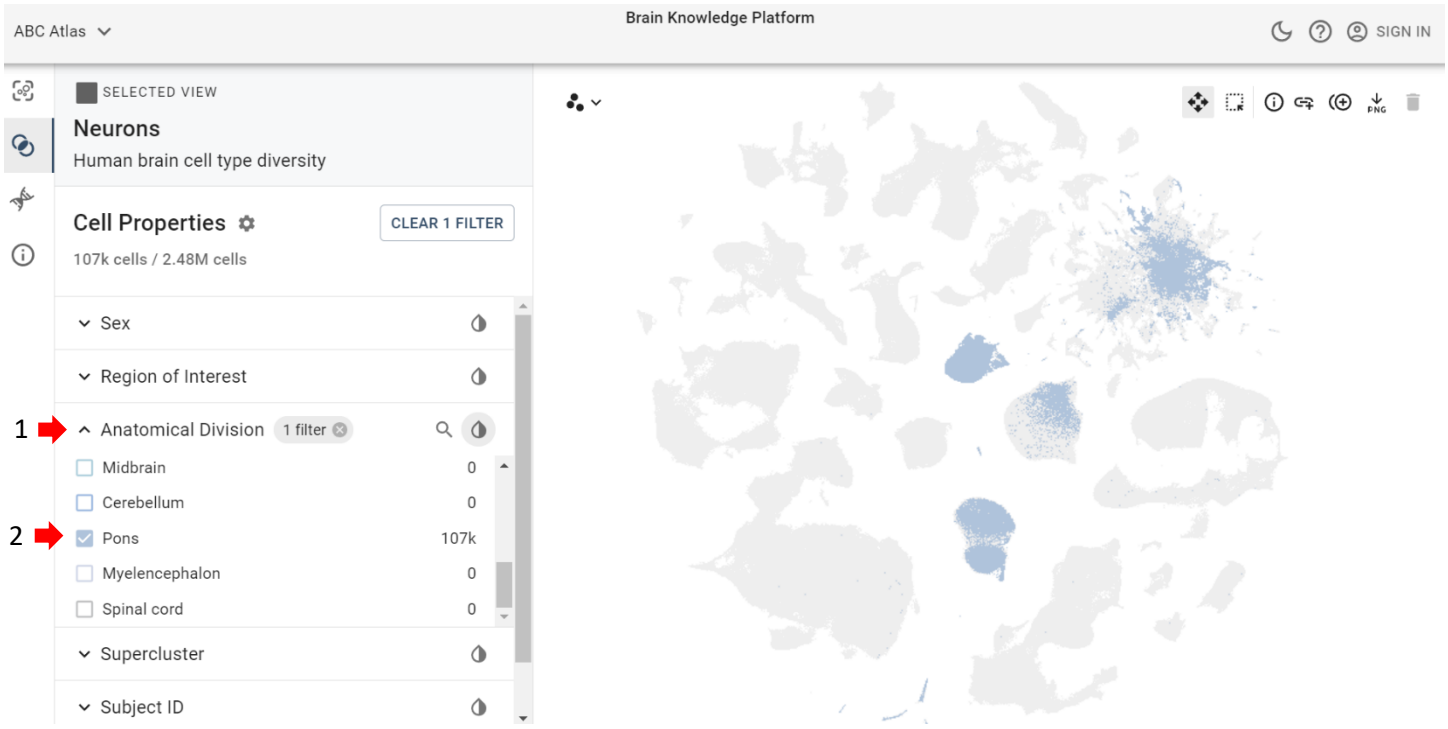
Experimental Model: Mouse | Rat | Non-Human Primate | **Human** | Invertebrate | Non-Traditional Vertebrate

During journal club, a student was introduced to Siletti et al., 2023, which contains single nucleus RNA seq data from the entire human brain. Prior to journal club, the student had mainly read about cells in the neocortex; the student is now interested in learning more about data from other brain regions.

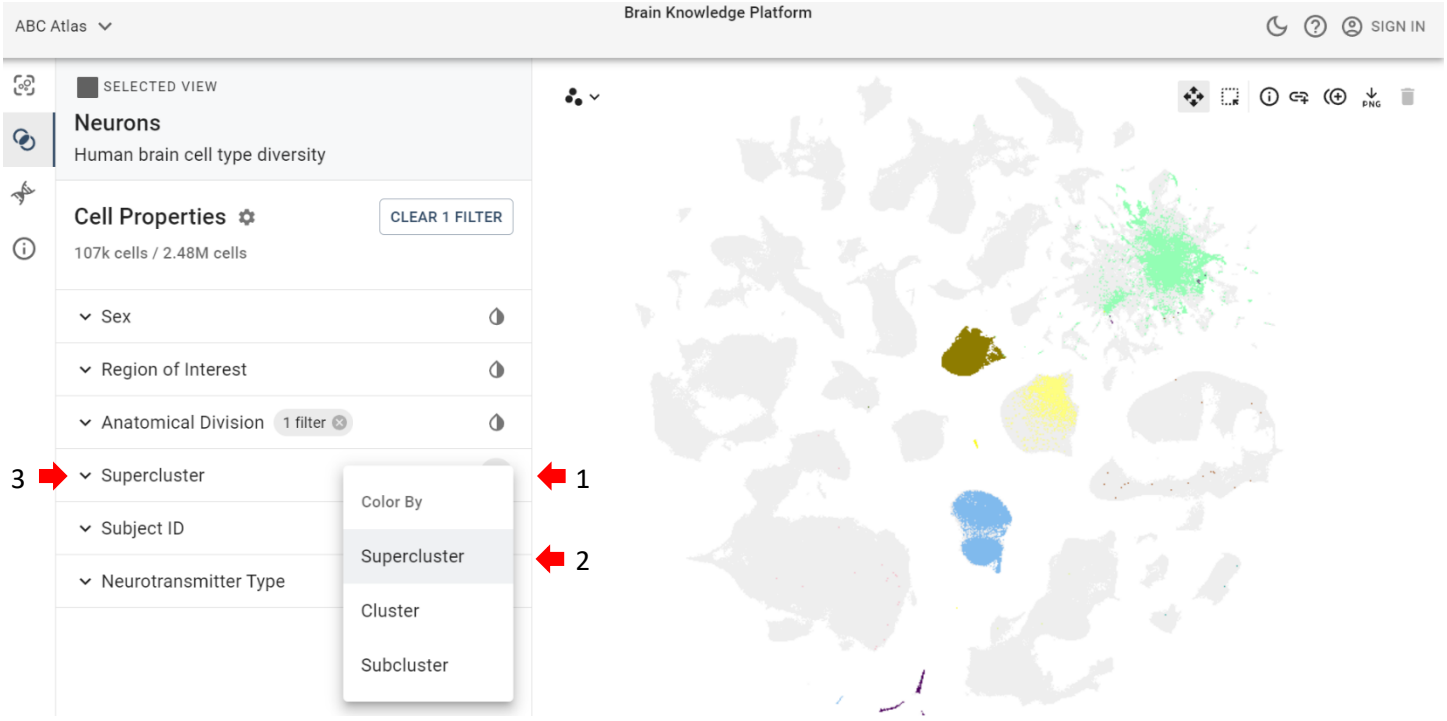
1. The student read in Siletti et al., 2023 that one of the more diverse areas was the brainstem. To isolate just nuclei from the brainstem, the student first clicks on the "Cell Properties" tab (step 1) and colors by "Anatomical Division" by clicking on the ink drop symbol (step 2). Link to view in ABC Atlas

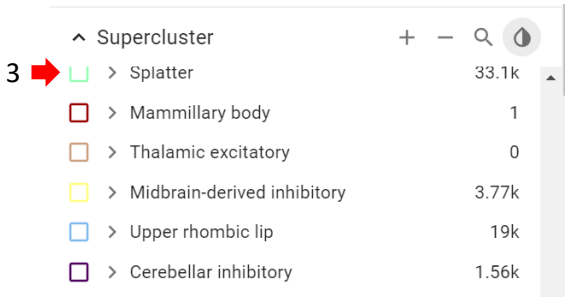


2. To isolate nuclei from specific parts of the brainstem, the student clicks on the arrow (step 1) to display all anatomical divisions and checks the “Pons” box (step 2). [Link to view in ABC Atlas]

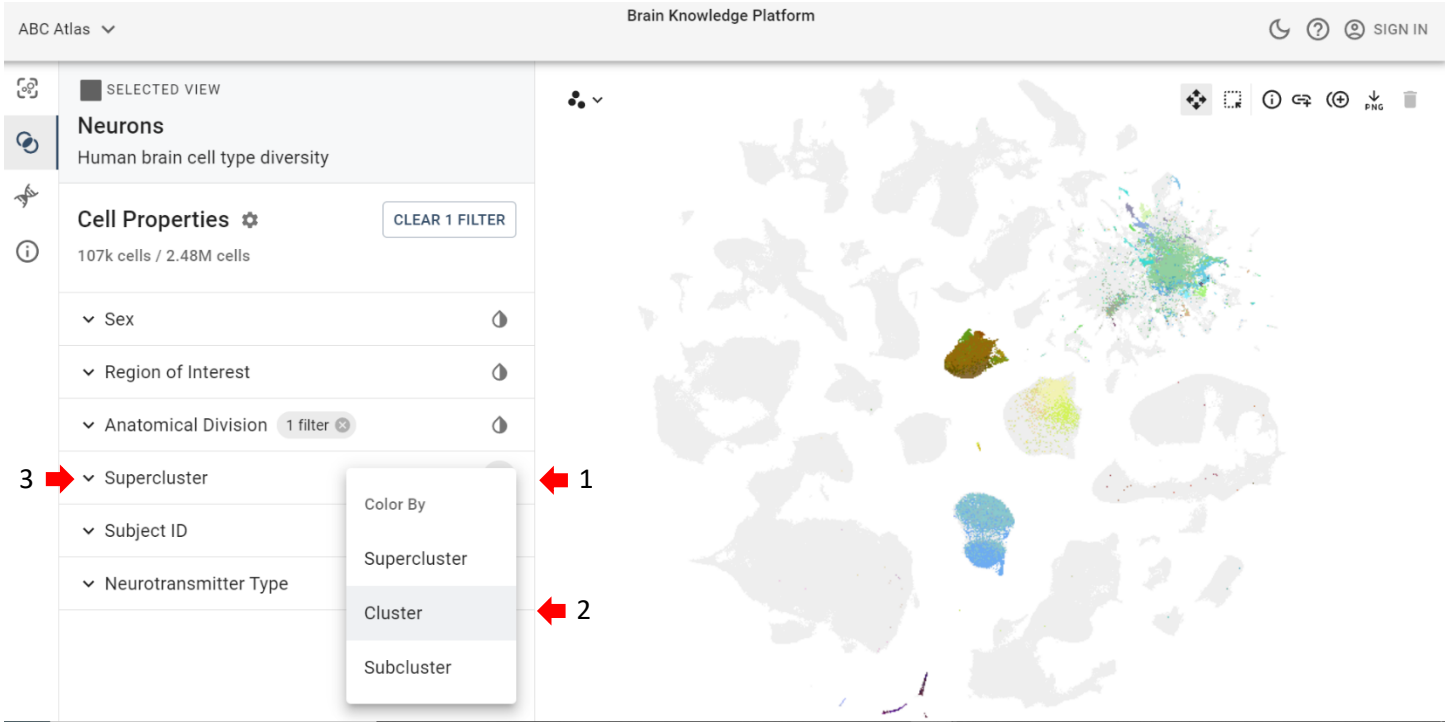


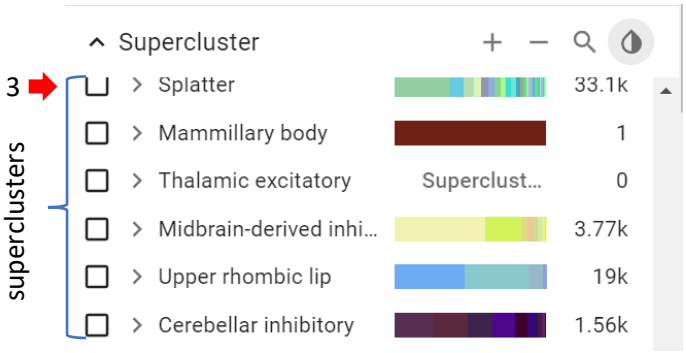
3. To look at the diversity within the pons, the student decides to look at the different clustered taxonomy levels (supercluster, cluster, and subcluster). The student filters by supercluster (the broadest level), by clicking the ink drop next to “Supercluster” (step 1) and selecting “Supercluster” in the pop-up menu (step 2). By clicking on the arrow next to “Supercluster” (step 3), the student can see the color-coded names of the superclusters present and the number of nuclei per cluster. [Link to view in ABC Atlas]

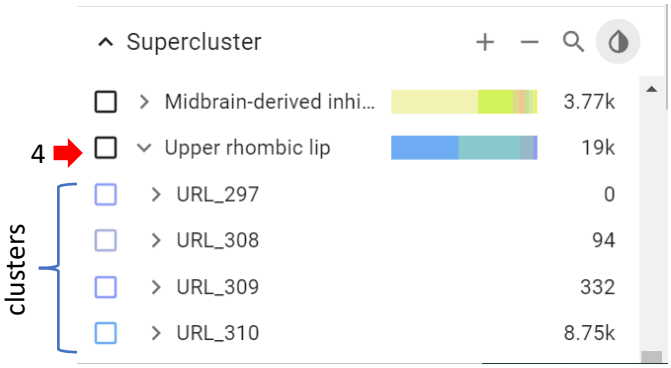




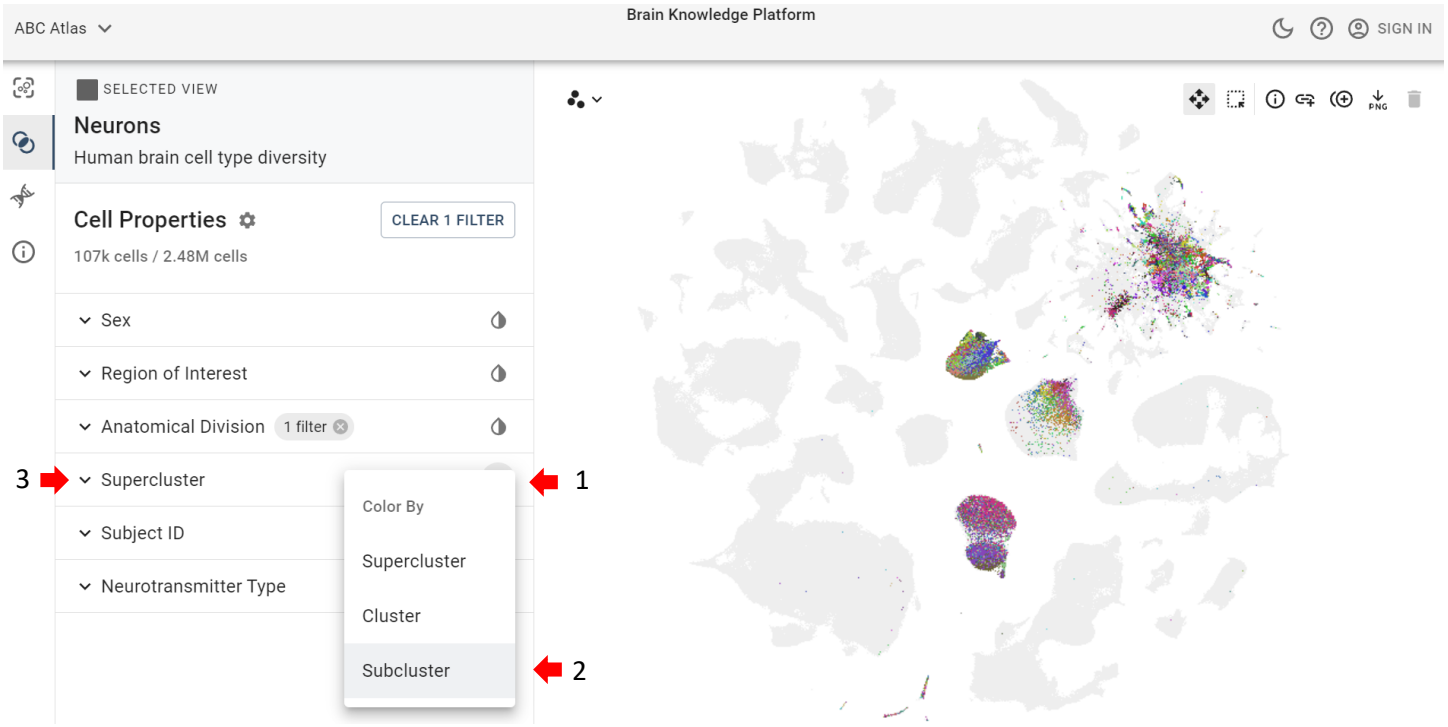
4. To look at the next level, the student clicks the ink drop next to “Supercluster” (step 1) and selects “Cluster” in the pop-up menu (step 2). To view the clusters present within the superclusters, the student can see the color-coded names of the clusters by clicking on the arrow next to “Supercluster” (step 3) and then clicking the arrows next to the individual superclusters (step 4), to see the color-coded clusters within each supercluster. [Link to view in ABC Atlas]

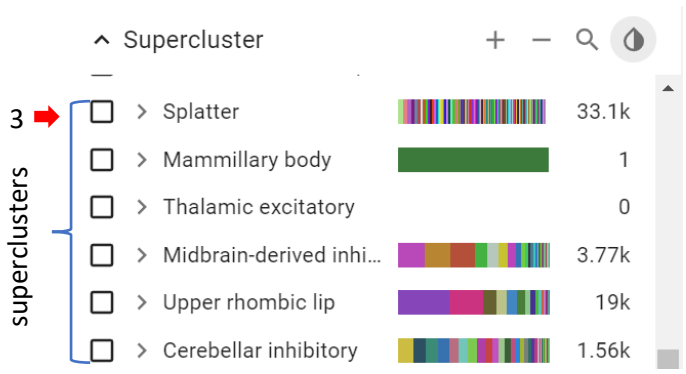


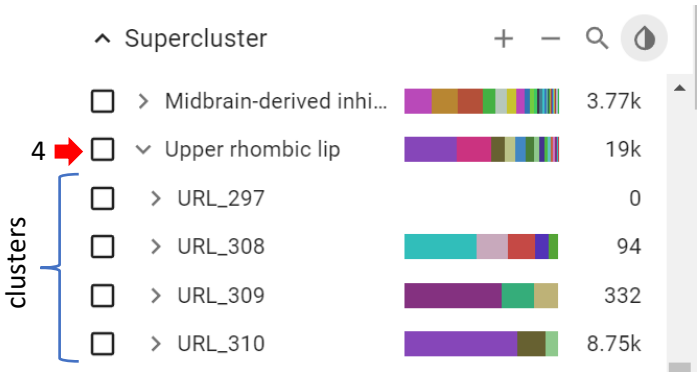


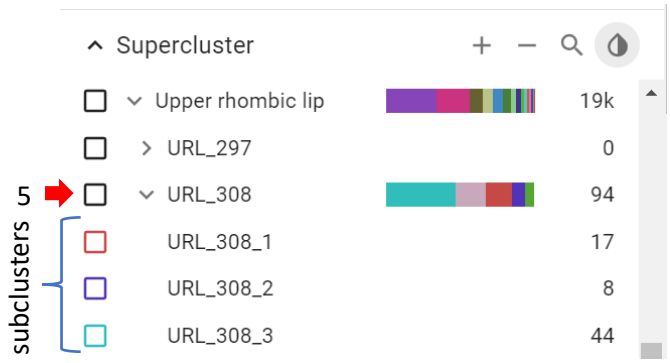


5. To look at the most detailed level of the taxonomy (subcluster), the student clicks the ink drop next to “Supercluster” (step 1) and selects “Subcluster” in the pop-up menu (step 2). To view the subclusters present within the clusters and superclusters, the student clicks on the arrow next to “Supercluster” (step 3), then clicks the on arrows next to the individual superclusters (step 4) to see the clusters within, and then clicks the on arrows next to the clusters to see the color-coded subclusters within each cluster (step 5). [Link to view in ABC Atlas]

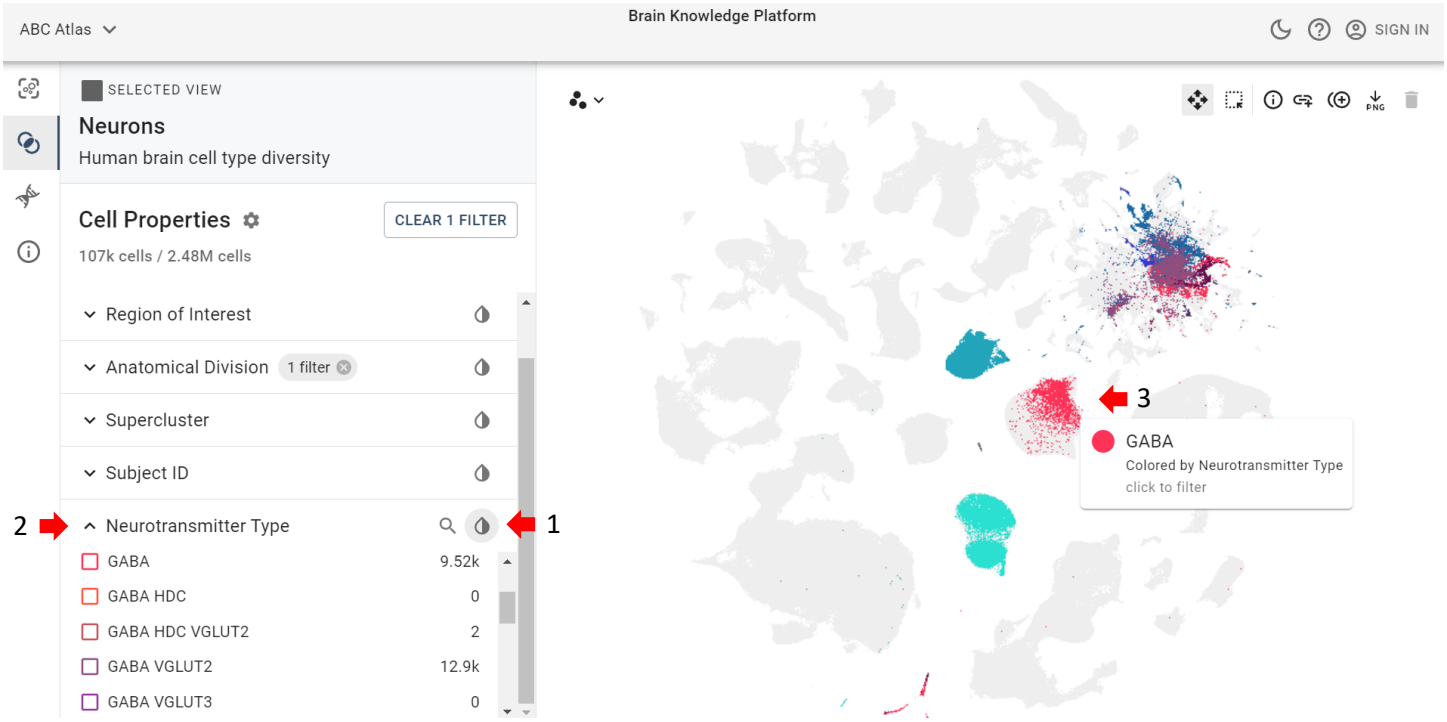




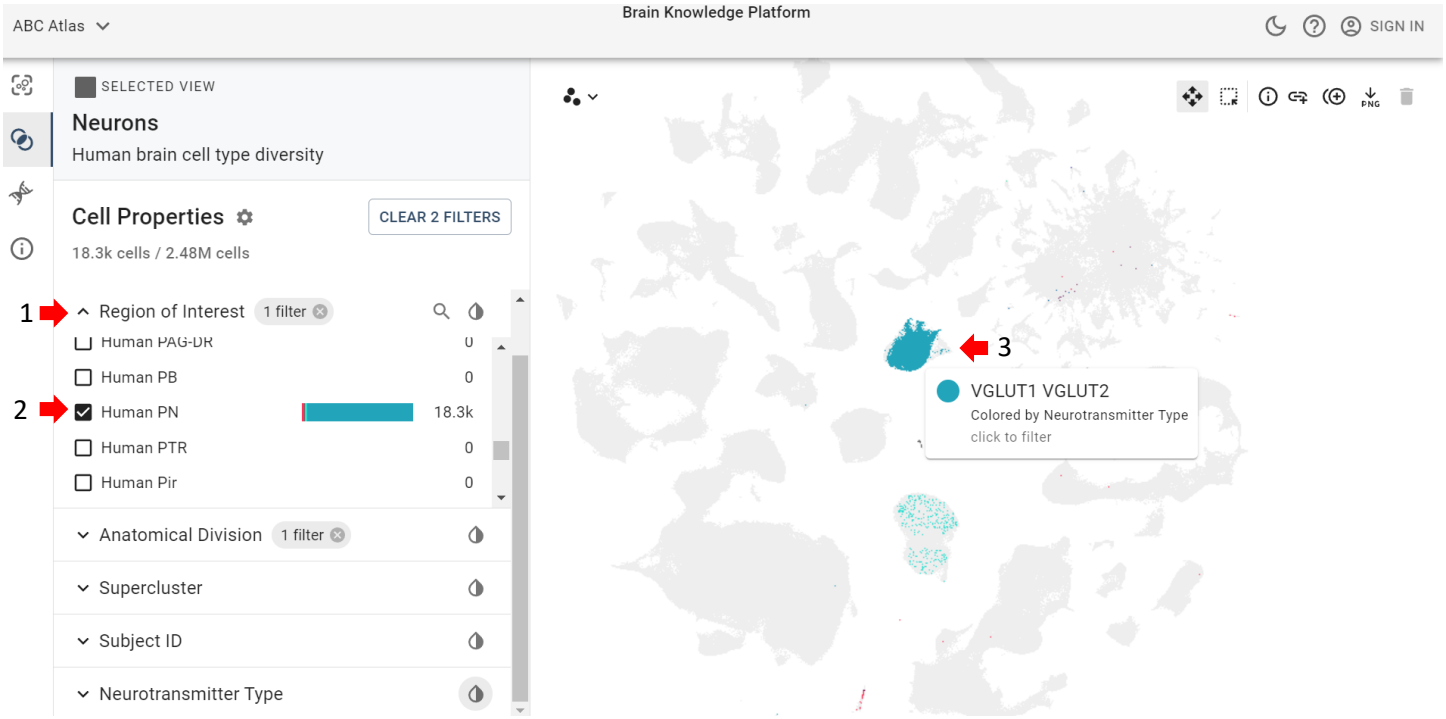




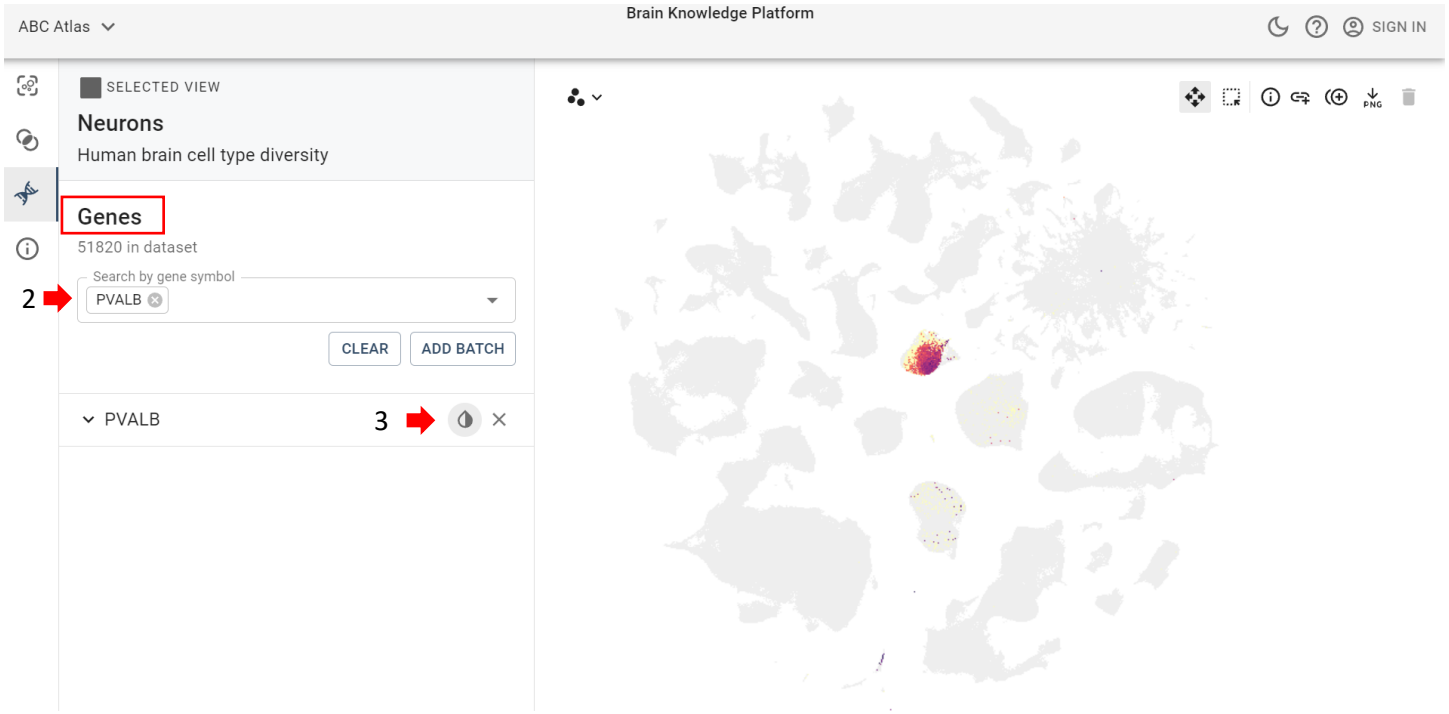
6. To see which neurotransmitters are present in the pons, the student clicks on the ink drop symbol next to “Neurotransmitter Type” (step 1). Clicking the drop arrow next to “Neurotransmitter Type” shows all the color-coded neurotransmitter categories (step 2) and hovering a mouse over the colored t-SNE plot reveals the corresponding neurotransmitter group (step 3). [Link to view in ABC Atlas]



7. In Figure 1 of Siletti et al., 2023, the student read that the pons contained six regions of interest: DTg, PB, PN, PnAN, PnEN, and PnR. To see if neurotransmitters are region specific, the student clicks on the “Region of Interest” arrow (step 1), and filters for “Human PN” (step 2). By hovering the mouse over the colored part of the t-SNE (step 3), the student learns that the teal VGLUT1 VGLUT2 group is primarily in the PN region of the pons. [Link to view in ABC Atlas]



8. While reading Siletti et al., 2023, the student noticed that the genes for some calcium-binding proteins were expressed in the pons. To see if they were expressed in the “PN” region, the student clicks on the gene tab (step 1), and types in a gene from the paper, “PVALB” (step 2). The student then colors the plot for *PVALB* gene expression by clicking on the ink drop symbol (step 3) and sees that *PVALB* is highly expressed. [Link to view in ABC Atlas]



9. Now that the student has learned a bit more about the pons, they are interested in looking at other brain regions as well; they then use the ABC Atlas to answer more questions.