Reciprocal Pairs

Pairs of neurons (or partial neurons) that synapse onto one another in the Layer 2/3 volume

Top reciprocal pairs in volume

In [11]:
```
# cell id 648518346349528994 is an inhibitory basket neuron that has many pre-synaptic sites in the volume

basket1 = pairs_novascdf["pre_root_id"] == 648518346349528994
basket1_partners = pairs_novascdf.loc[basket1, ["pre_root_id", "post_root_id"]]
basket1_partners
```

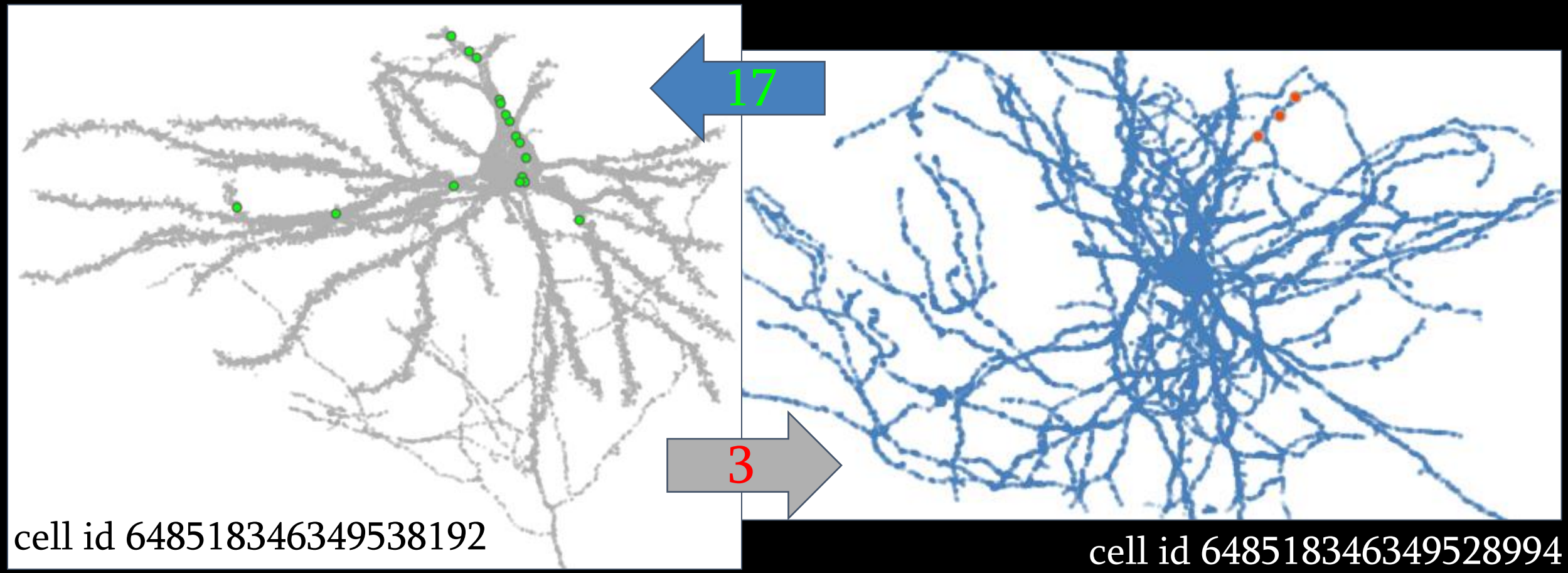
Out[11]:

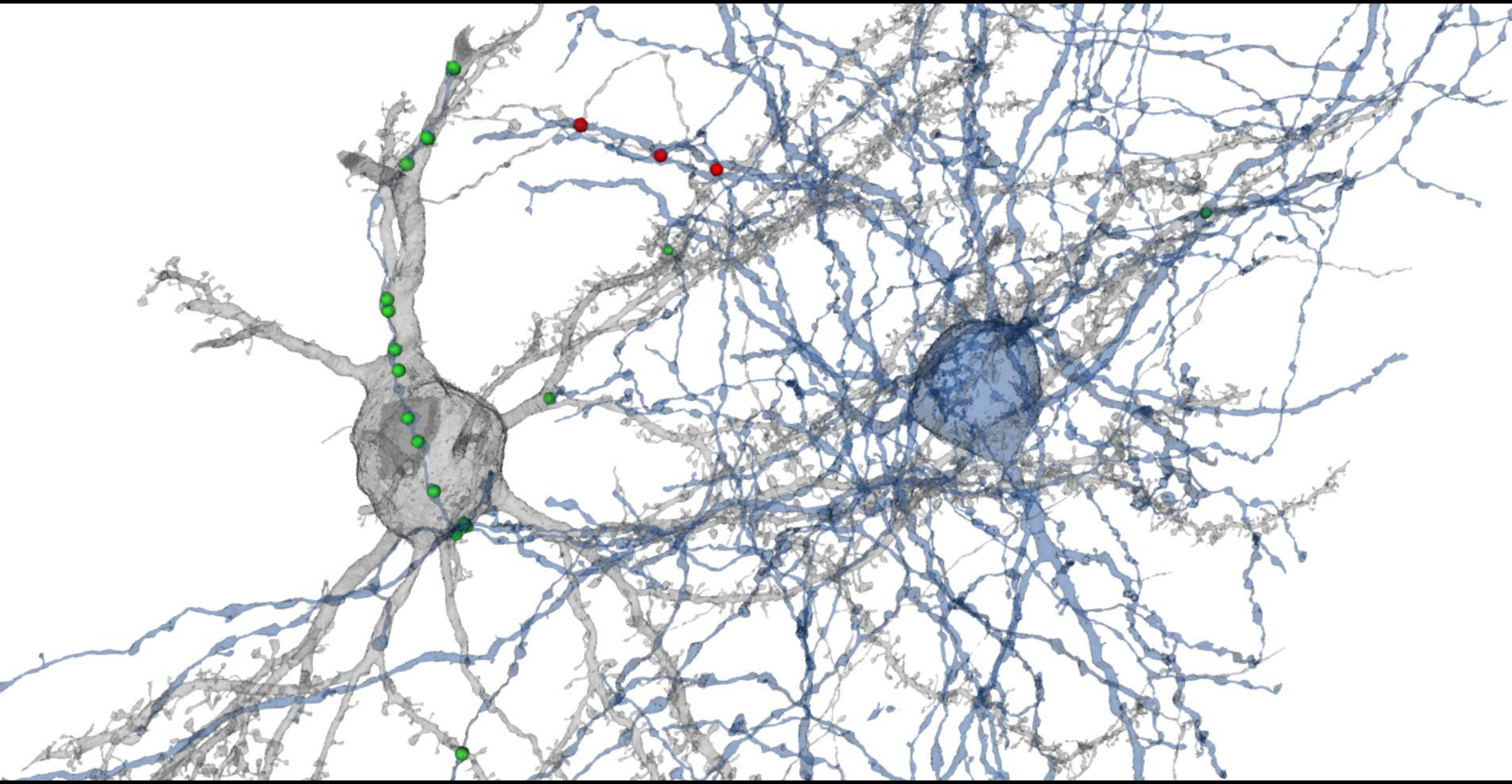
	pre_root_id	post_root_id
93	648518346349528994	648518346349539333
186	648518346349528994	648518346349539886
213	648518346349528994	648518346349537536
235	648518346349528994	648518346349538056
237	648518346349528994	648518346349538056
...	...	...
6140	648518346349528994	648518346349536680
6158	648518346349528994	648518346349534289
6172	648518346349528994	648518346349535192
6246	648518346349528994	648518346349537160
6248	648518346349528994	648518346349537160

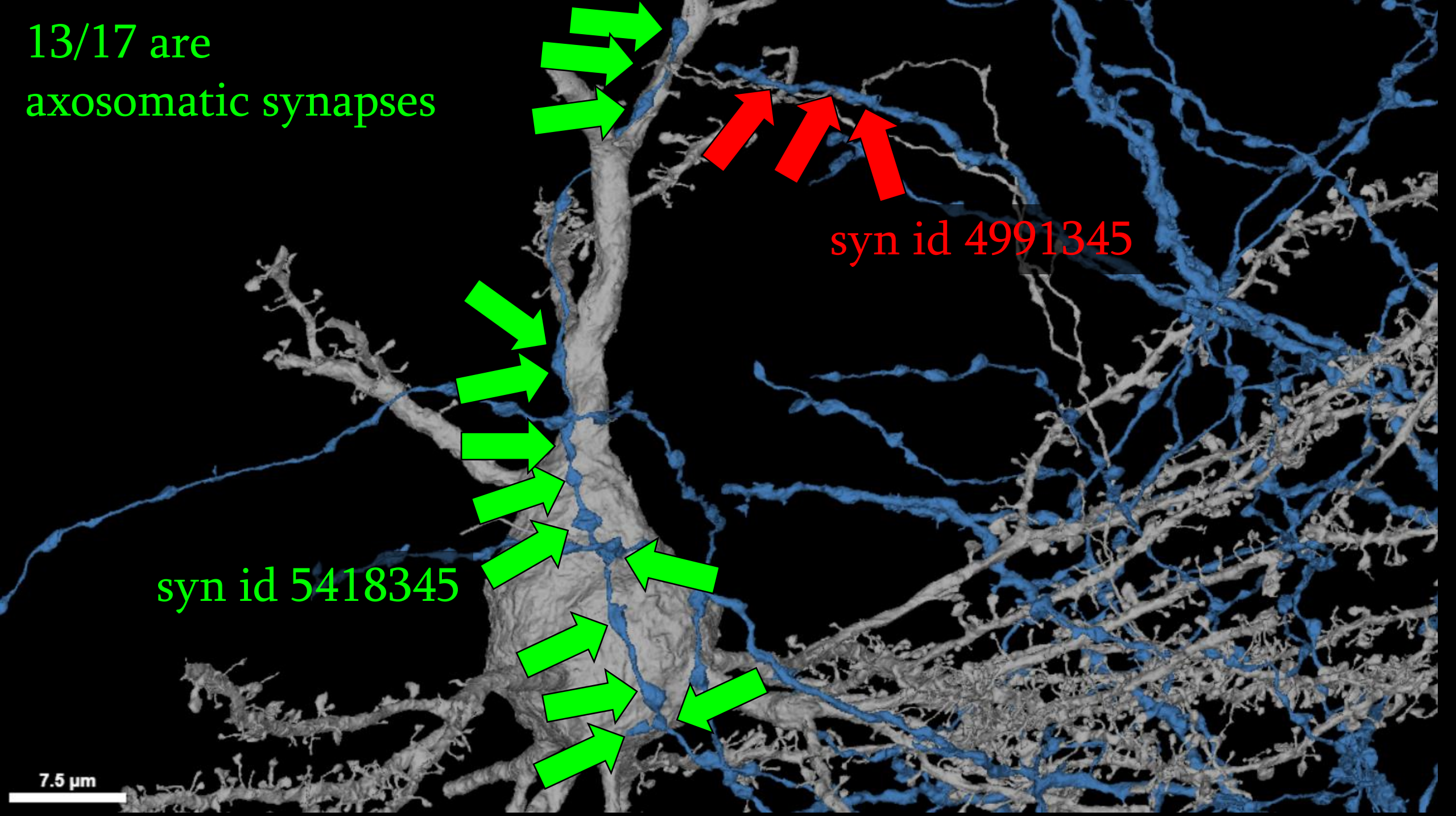
321 rows × 2 columns

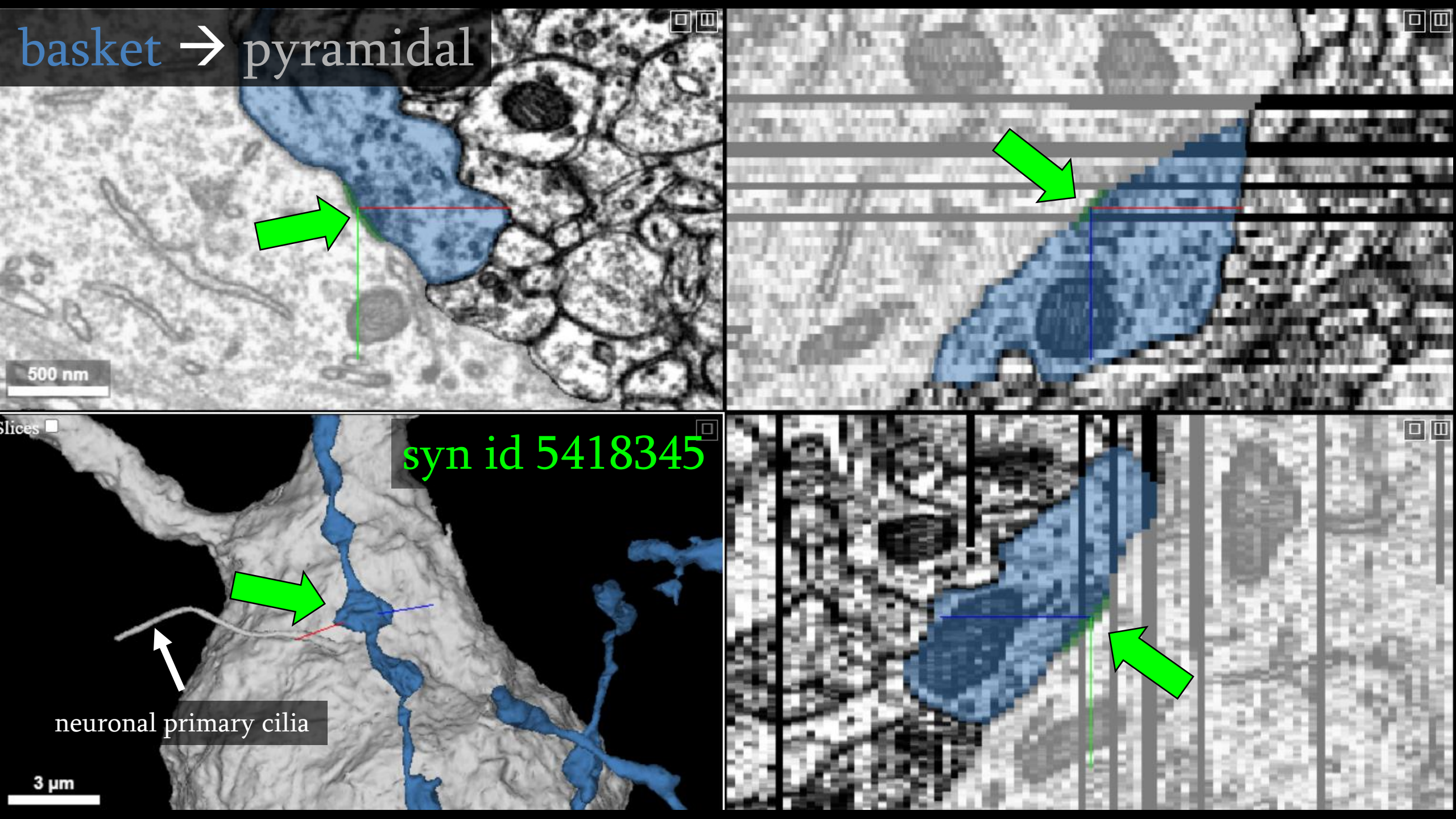
Find this Jupyter notebook on my GitHub repository

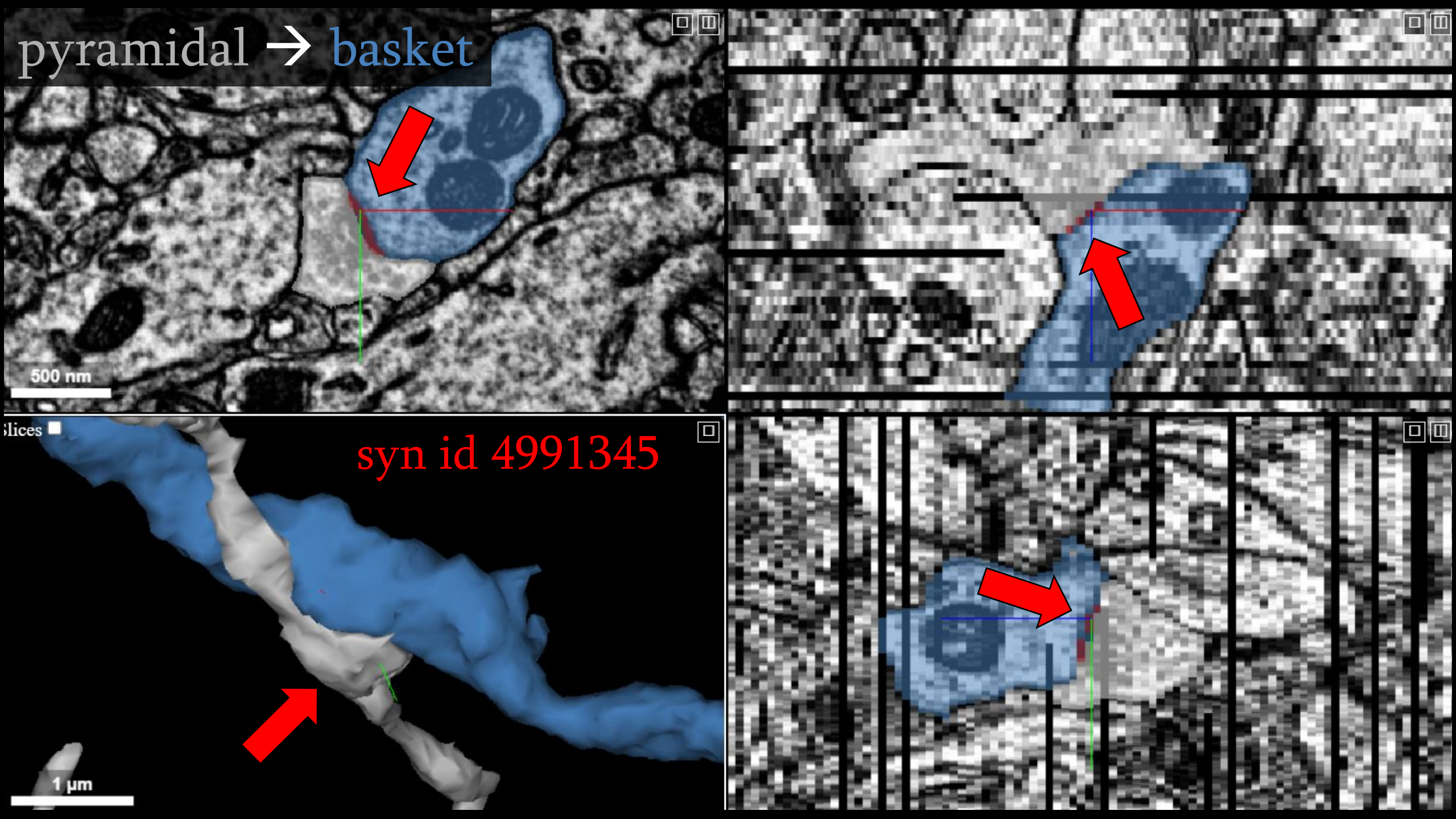
excitatory pyramidal neuron
inhibitory basket neuron






13/17 are
axosomatic synapses
syn id 4991345
syn id 5418345
7.5 µm


basket → pyramidal
500 nm
Slices
syn id 5418345
neuronal primary cilia
3 µm


pyramidal → basket
500 nm
syn id 4991345
1 µm

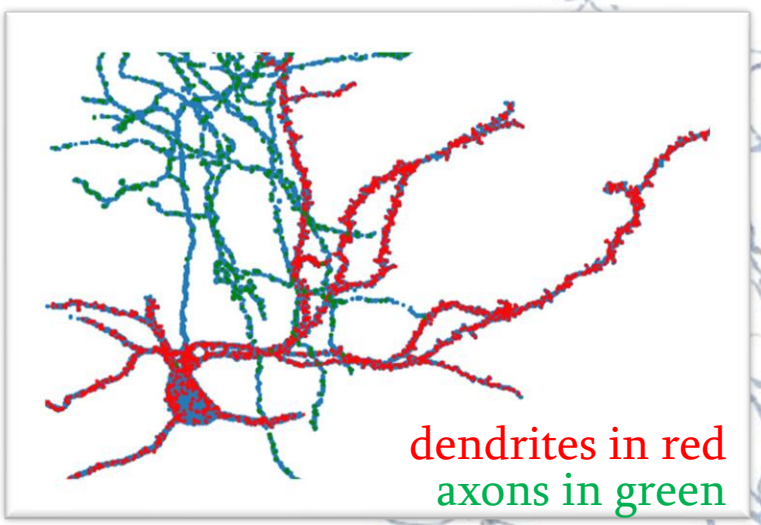
Additional Examples

Inhibitory Martinotti neuron and Inhibitory bipolar neuron

Martinotti-bipolar pair

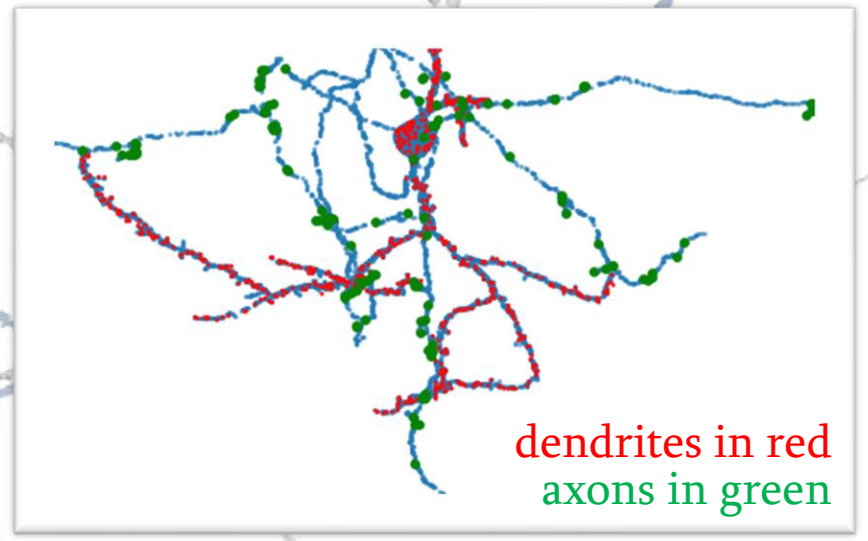
```
In [27]: # This cell id is an inhibitory martinotti neuron

         npairs_pre_4thmost["pre_cell_subtype"].iloc[0]

Out[27]: 'martinotti'

In [28]: # This martinotti neuron makes 117 reciprocal synapses
         len(npairs_pre_4thmost)

Out[28]: 117

In [29]: npairs_pre_4thmost["post_root_id"].value_counts()

Out[29]: 648518346349515986    10
         648518346349537385     9
         648518346349536679     8
         648518346349537860     7
         648518346349539575     7
         648518346349539846     6
         648518346349538787     6
         648518346349539462     5
         648518346349538157     5
         648518346349537081     4
         648518346349538015     4
         648518346349537716     4
         648518346349537400     4
         648518346349537426     3
```

Find this Jupyter notebook on my GitHub repository



8

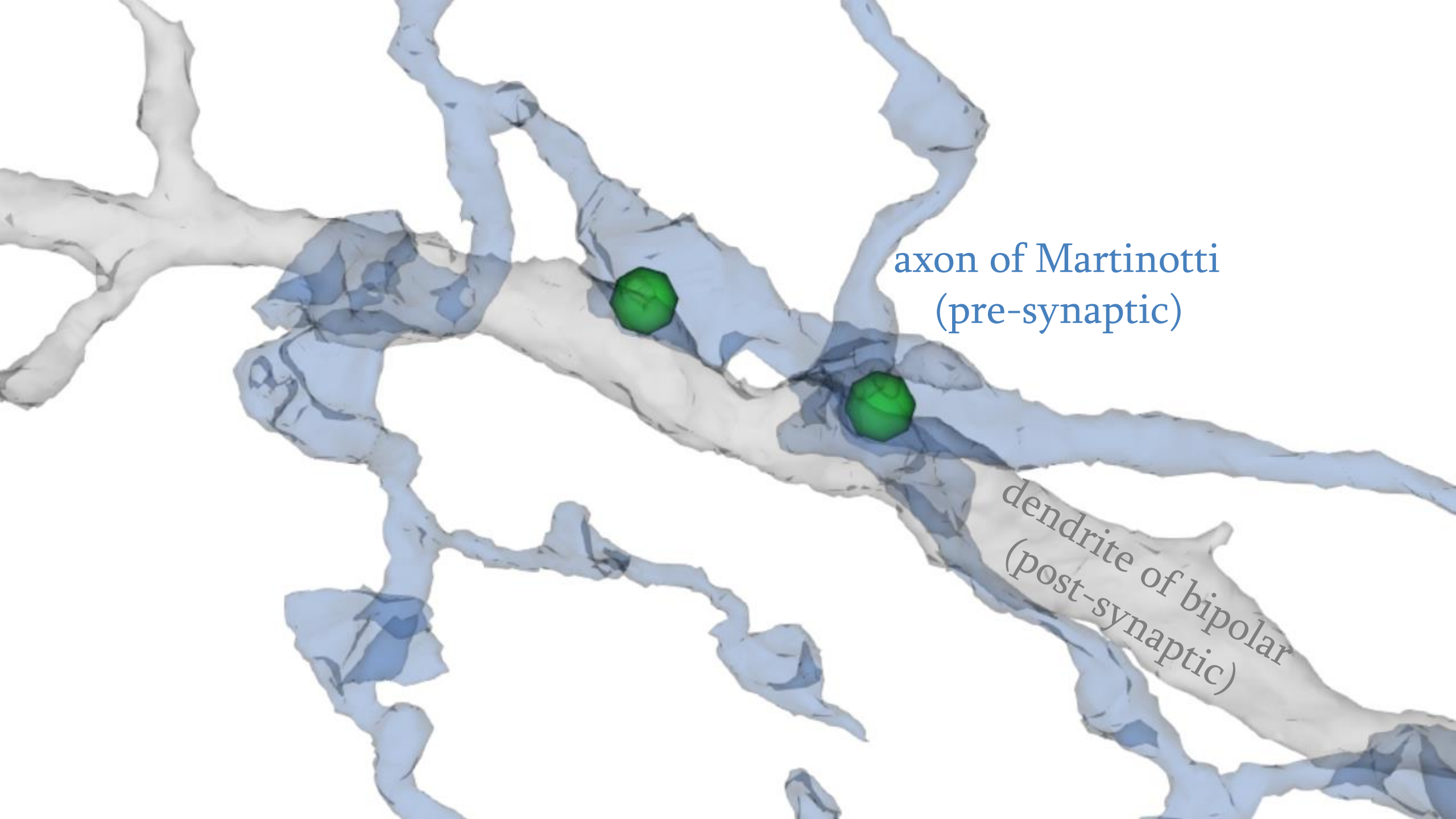
2

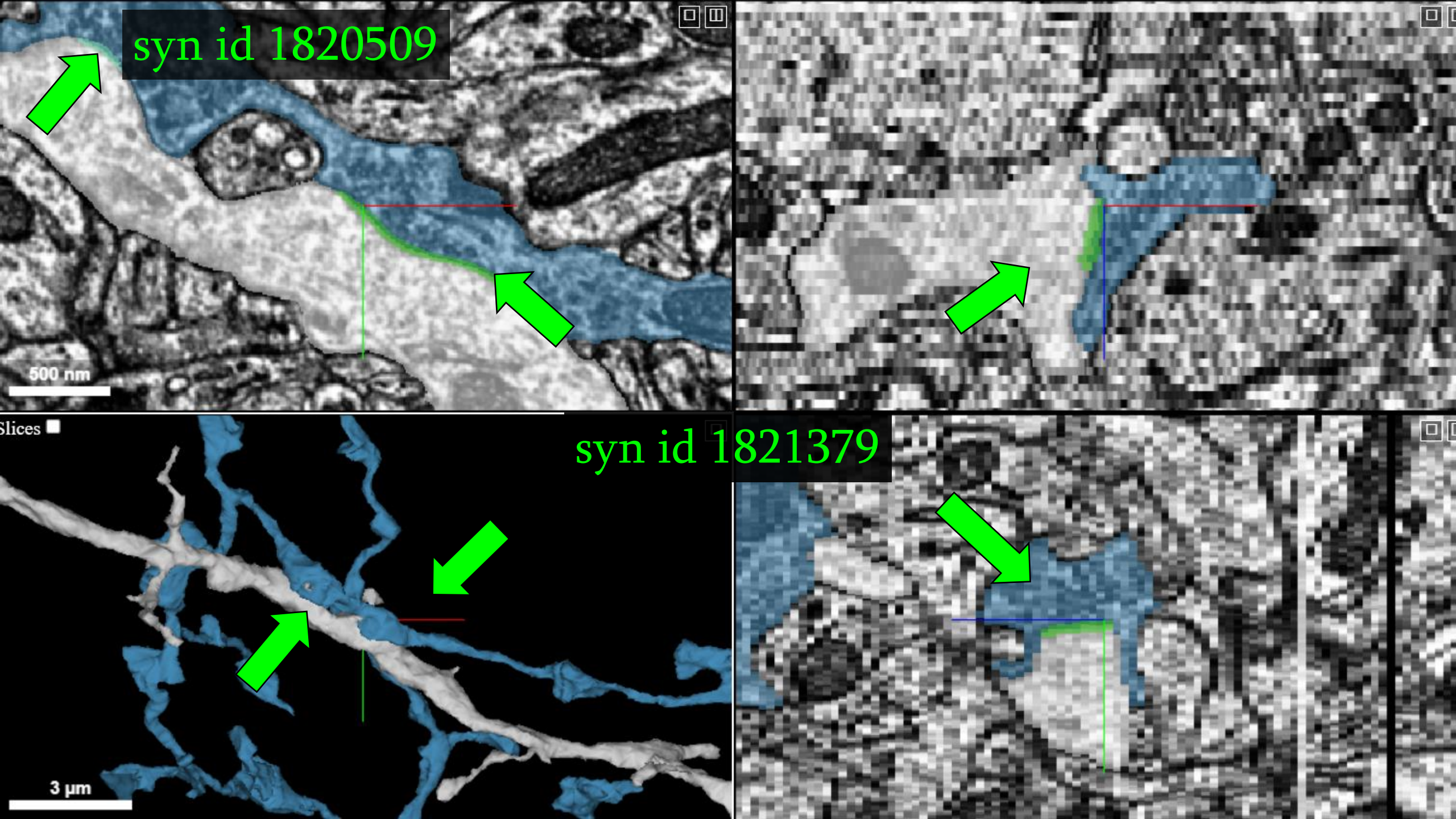


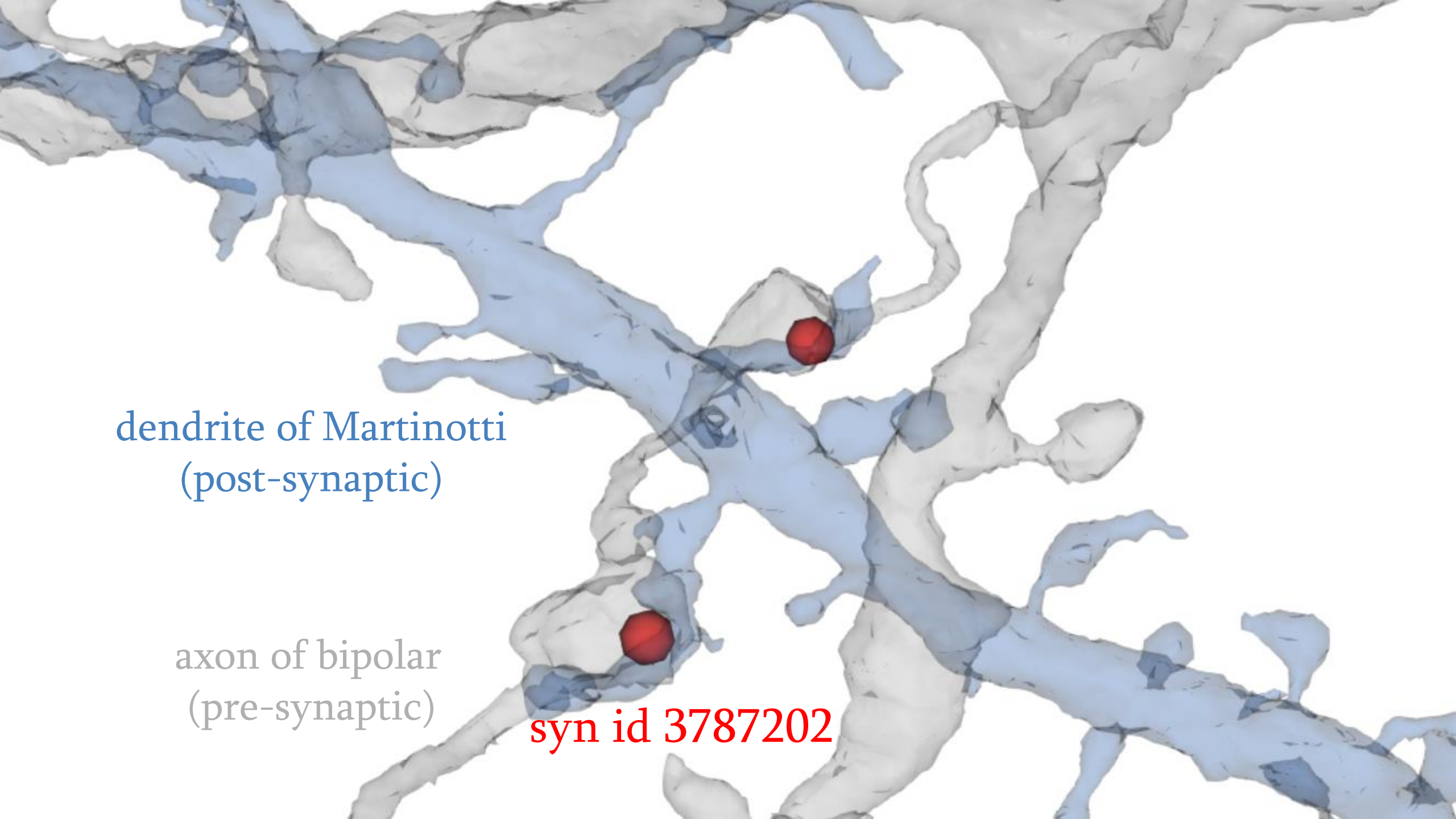
Use the synapse visualizer Jupyter notebook on my GitHub repository

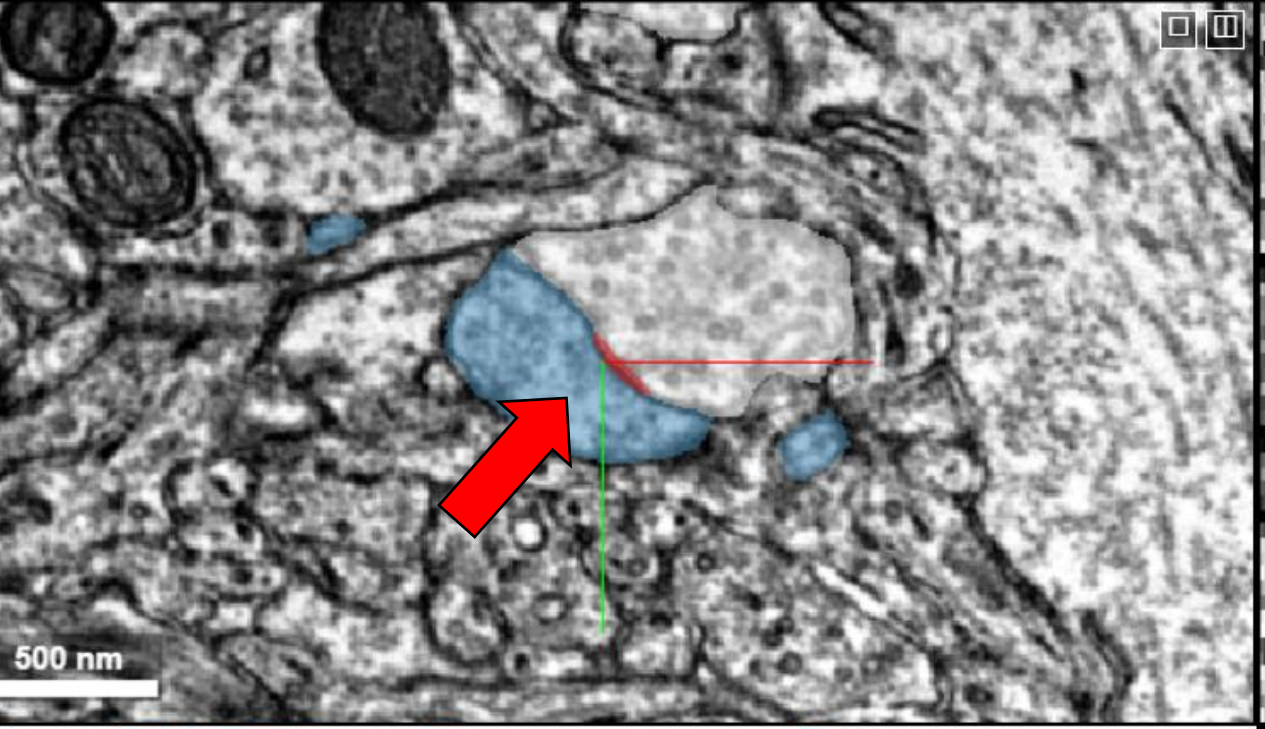
cell id 64851834634953817 9 (Martinotti)

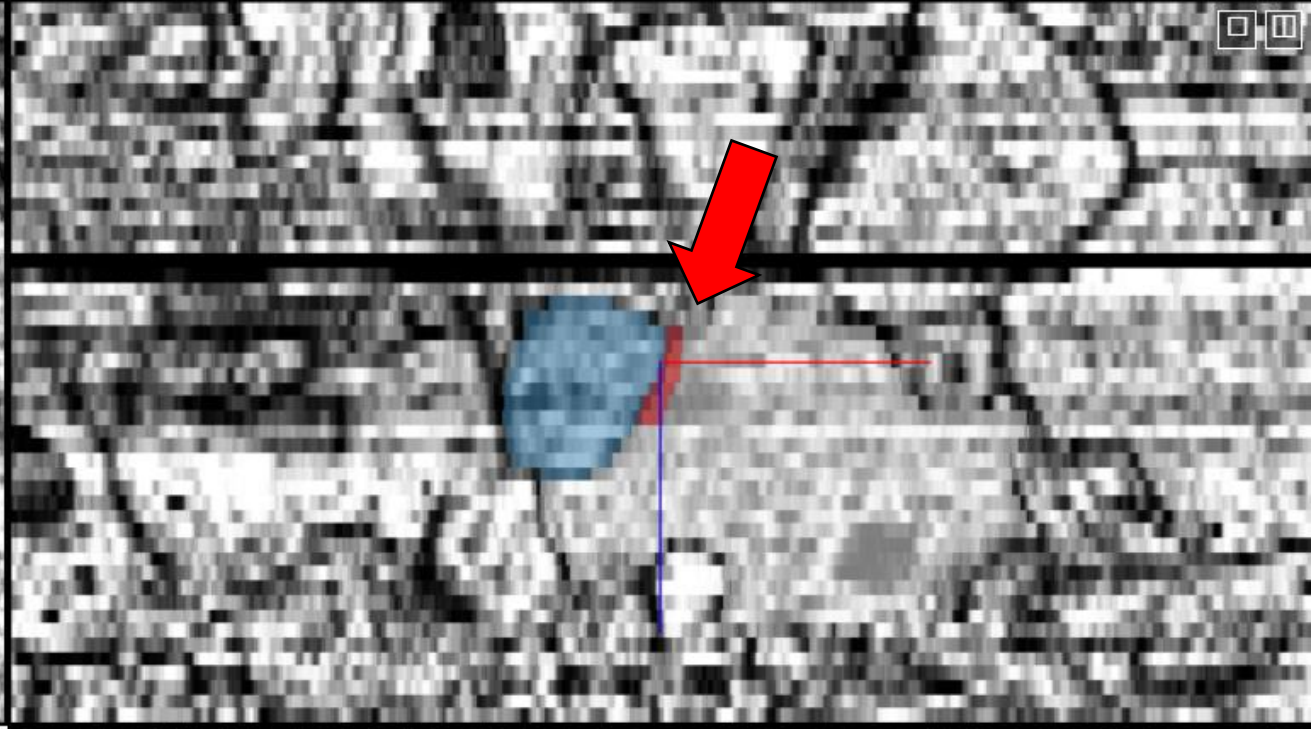
cell id 6485183463495159 86 (bipolar)

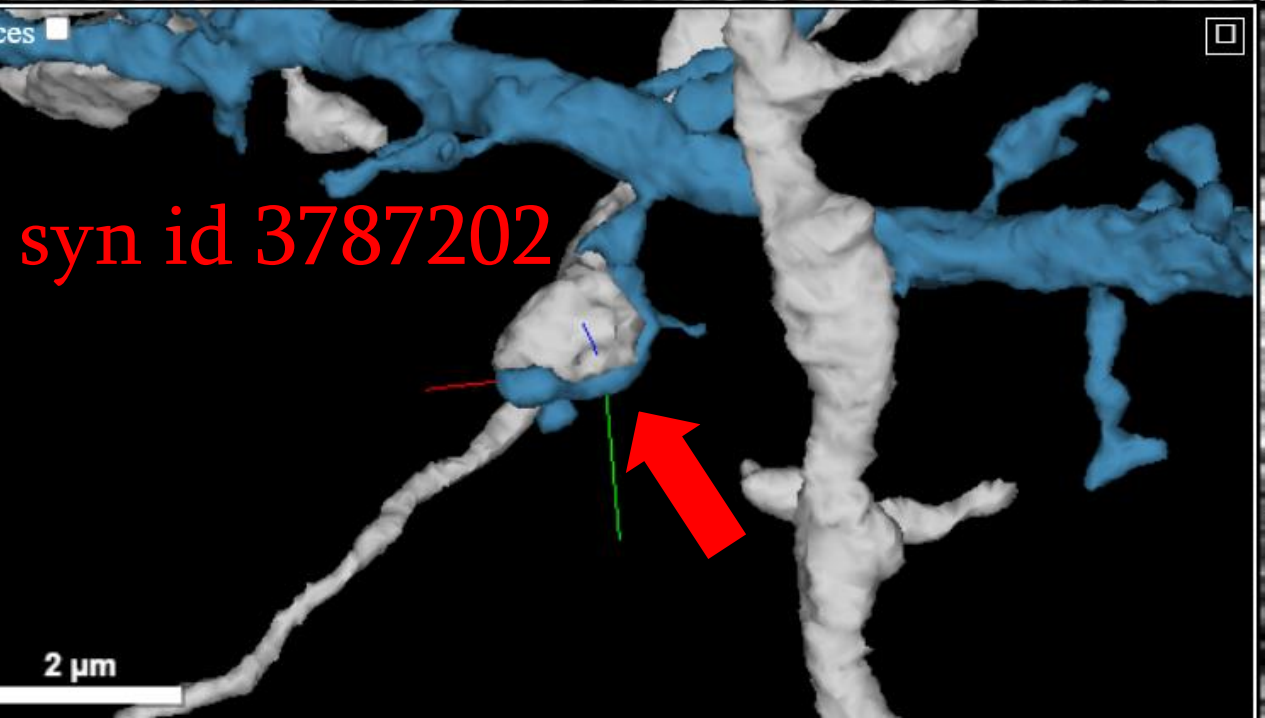

axon of Martinotti
(pre-synaptic)
dendrite of bipolar
(post-synaptic)

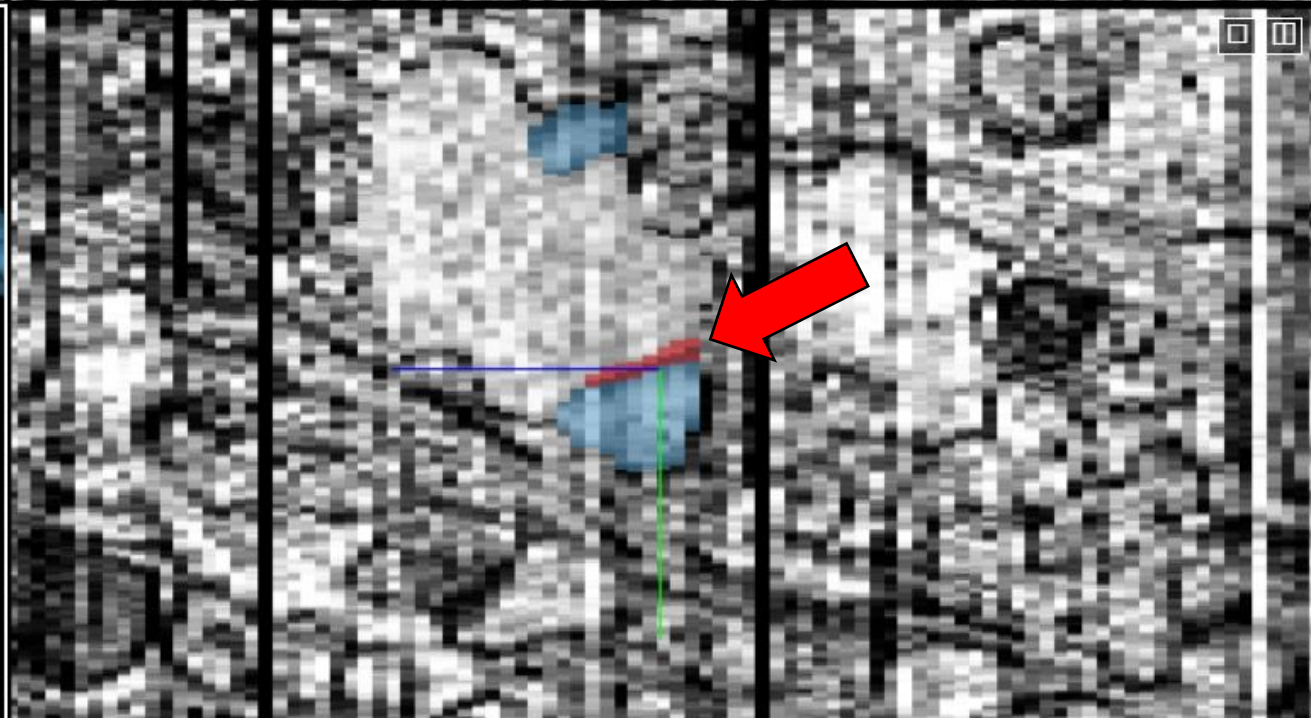

syn id 1820509
500 nm
Slices
syn id 1821379
3 µm


dendrite of Martinotti
(post-synaptic)
axon of bipolar
(pre-synaptic)
syn id 3787202

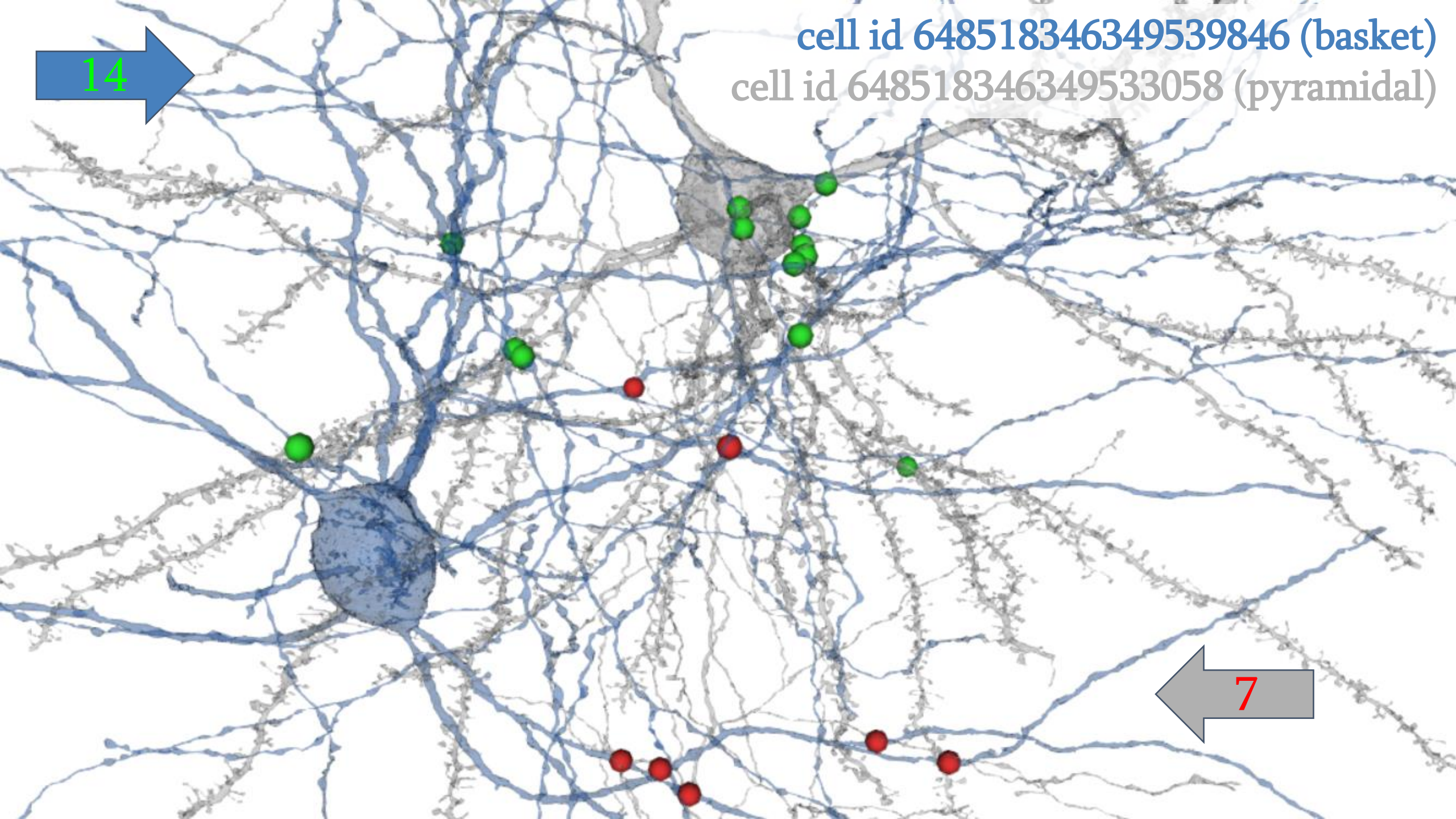

500 nm



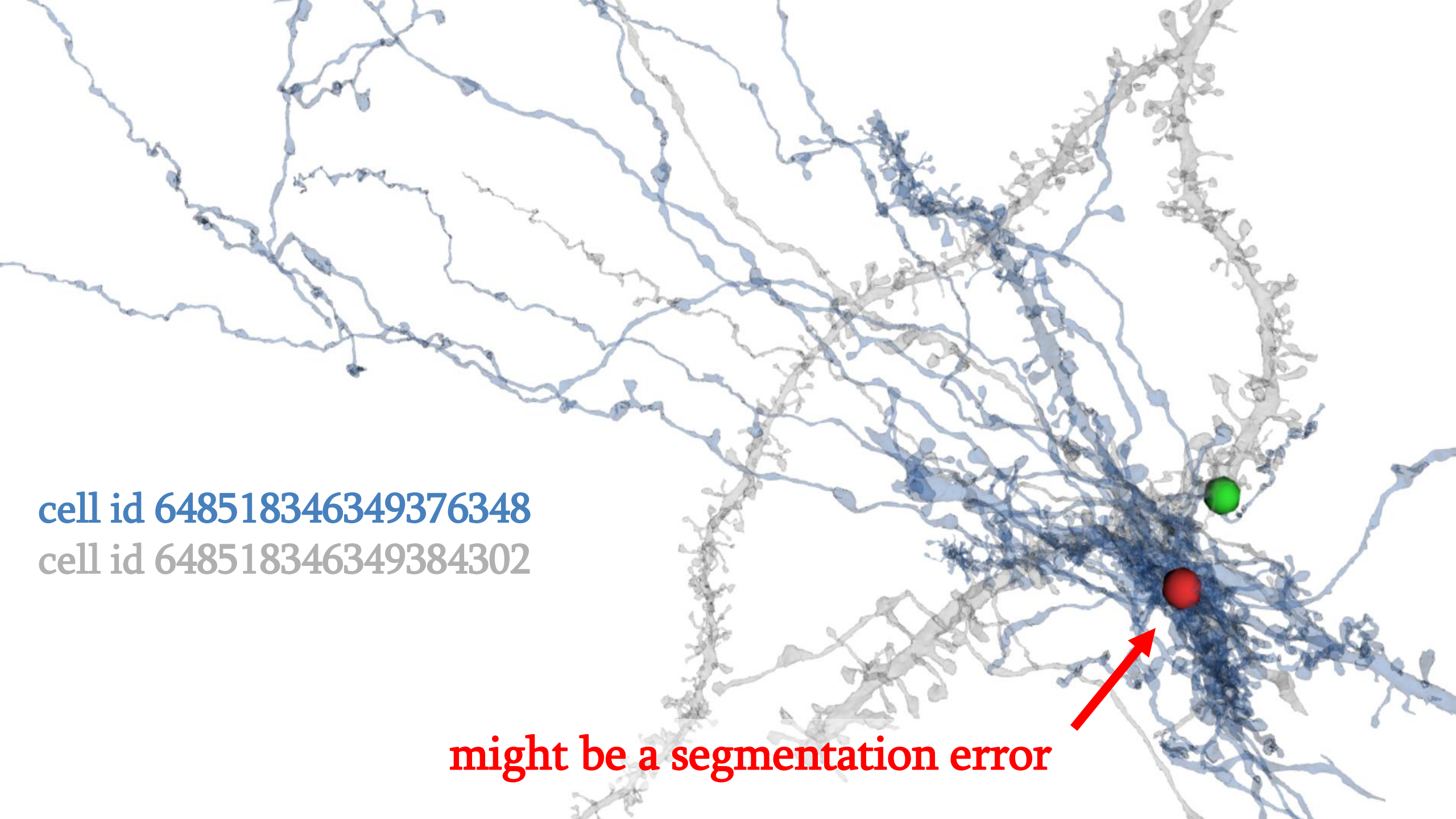

syn id 3787202
2 µm

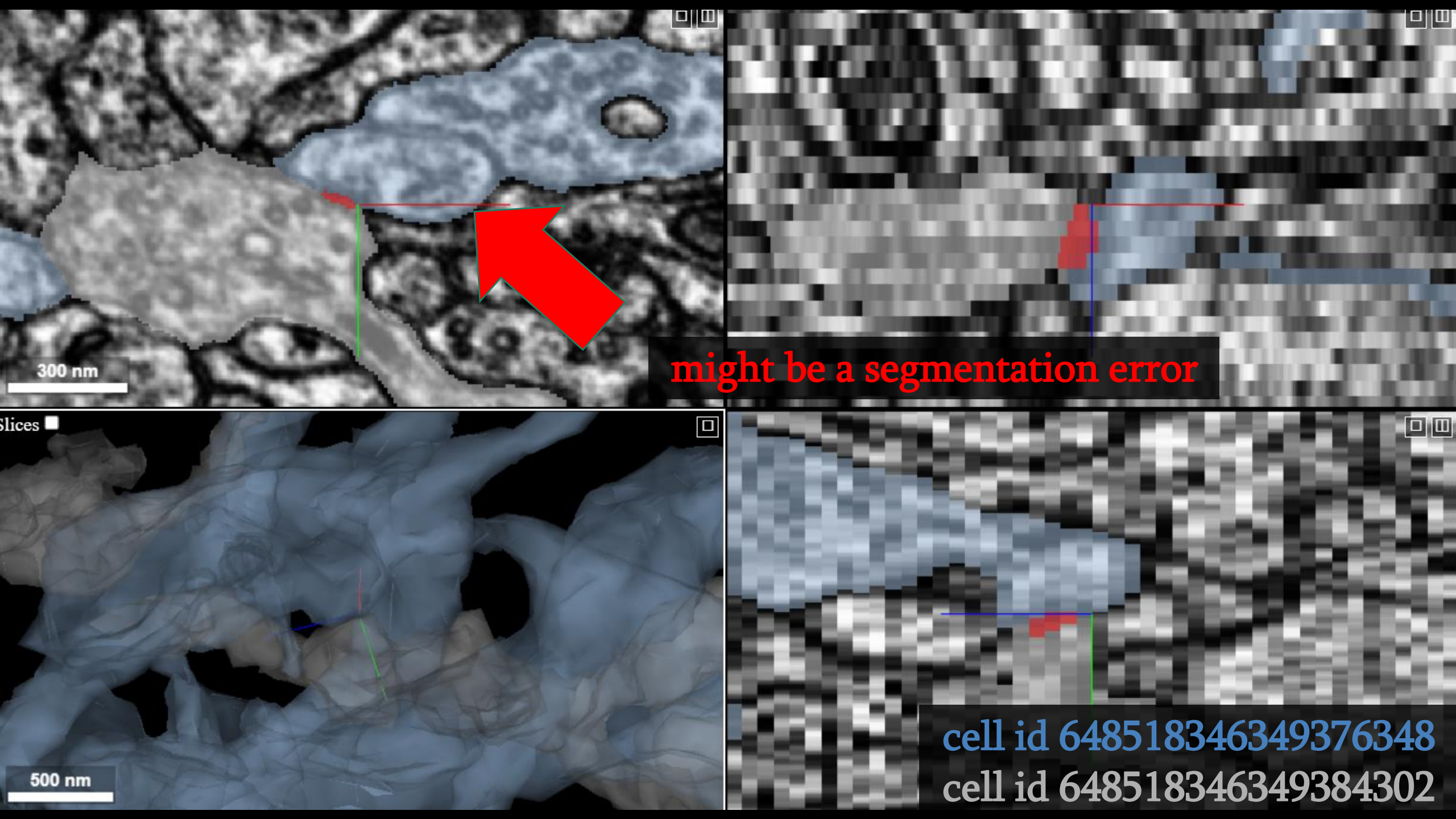


Inhibitory basket neuron and Excitatory pyramidal neuron


14
cell id 648518346349539846 (basket)
cell id 648518346349533058 (pyramidal)
7

Partial processes (both appear to be spiny pyramidal neurons)


cell id 64851834634937634 8
cell id 64851834634938430 2
might be a segmentation error


300 nm
might be a segmentation error
Slices
500 nm
cell id 64851834634937634 8
cell id 64851834634938430 2

Acknowledgements

- Read the original research papers on the Citation page at Allen Institute
- Read the Terms and Conditions page

Code Availability

- Visit my GitHub repository to view how the images and data in this presentation were generated