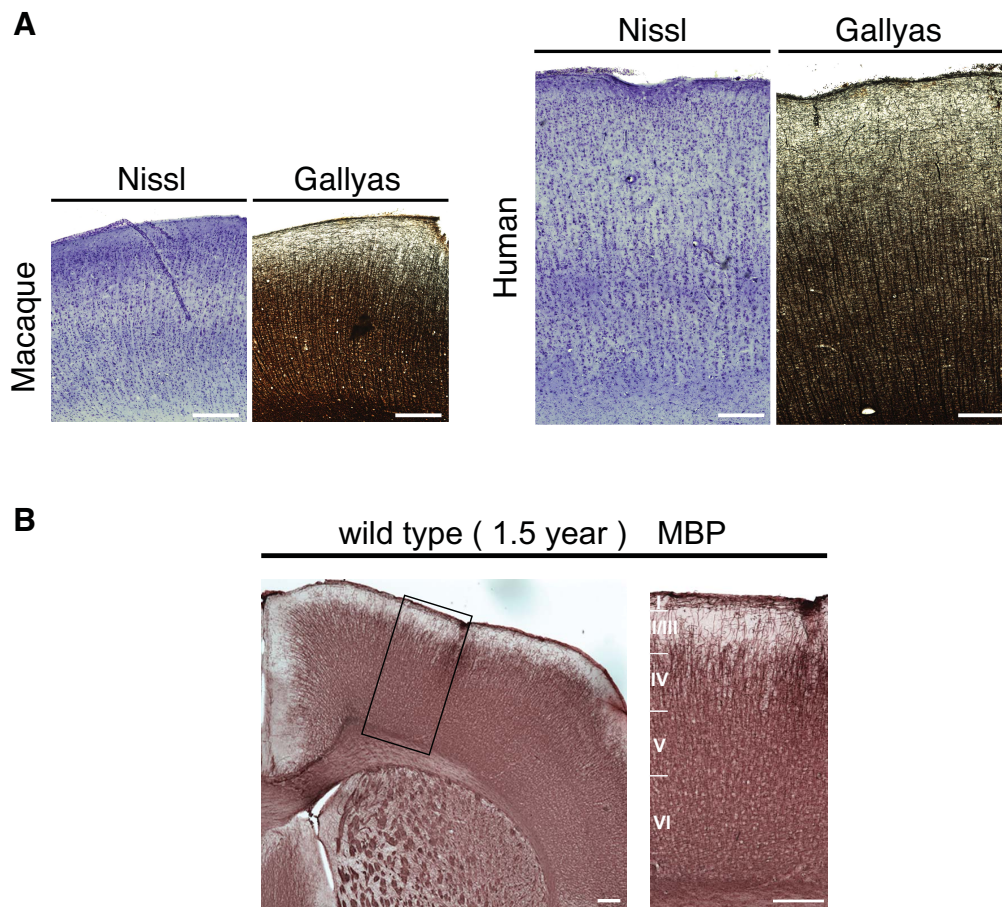


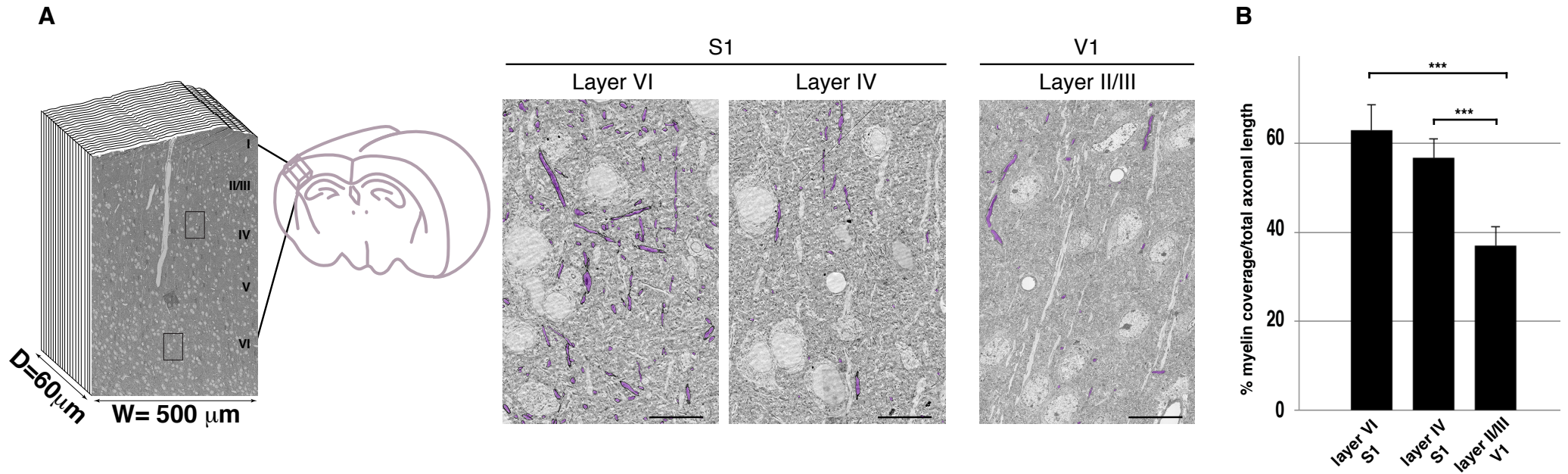
Fig. S1



**Fig. S1. Reduced levels of myelin in the upper layers are conserved in macaque and human neocortex and maintained in aged mice.**

(A) Histological staining of myelin by Gallyas on coronal sections of macaque and human sensory cortices showing graded myelin distribution. (B) Immunohistochemistry for MBP on a coronal section of a 1.5 year old wild type mouse. Scale bars, 400  $\mu\text{m}$  (A), 200  $\mu\text{m}$ , (B).

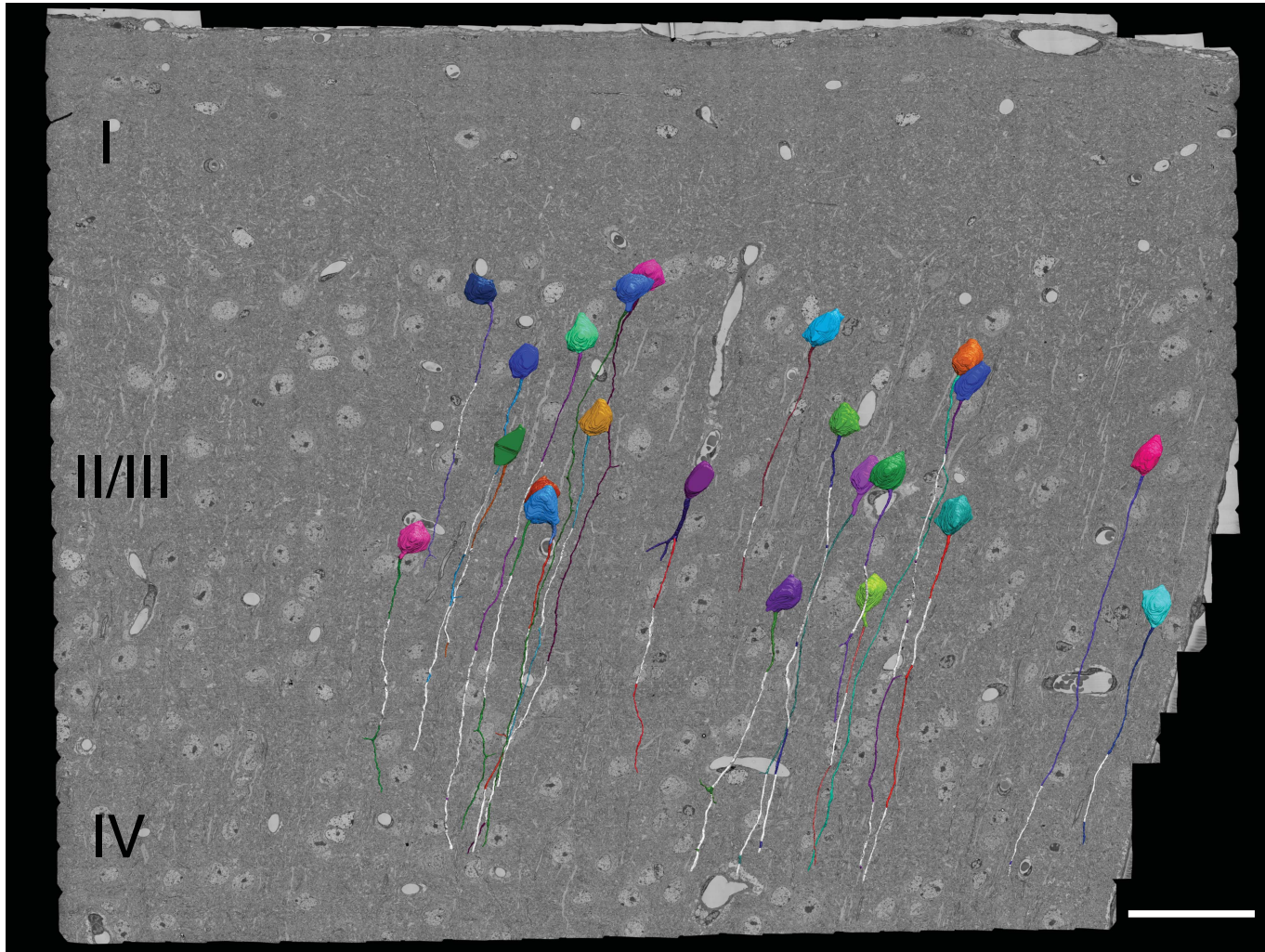
Fig. S2



**Fig. S2. Different longitudinal coverage by myelin along axons of upper and deep layer pyramidal neurons in the adult mouse neocortex.**

(A) Schematic of S1 dataset location in the mouse brain and representative magnifications of layer VI and IV. Also shown is a representative magnification of layer II/III from the V1 dataset. (B) Percentage coverage (mean±s.e.m.) by myelin of axons in layers VI, IV (S1 dataset), and layer II/III (V1 dataset). Scale bars, 20  $\mu$ m.

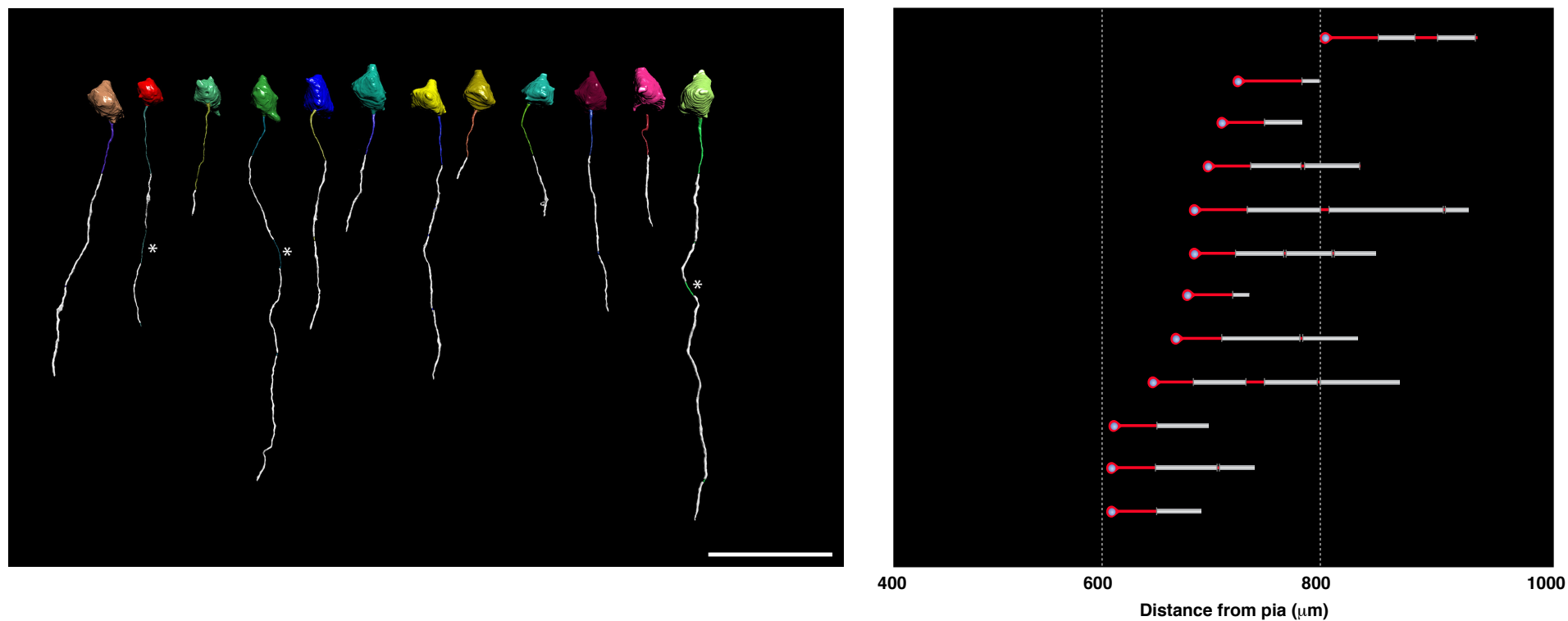
Fig. S3



**Fig. S3. Relative distribution of pyramidal neurons reconstructed in layer II/III of V1 dataset.**

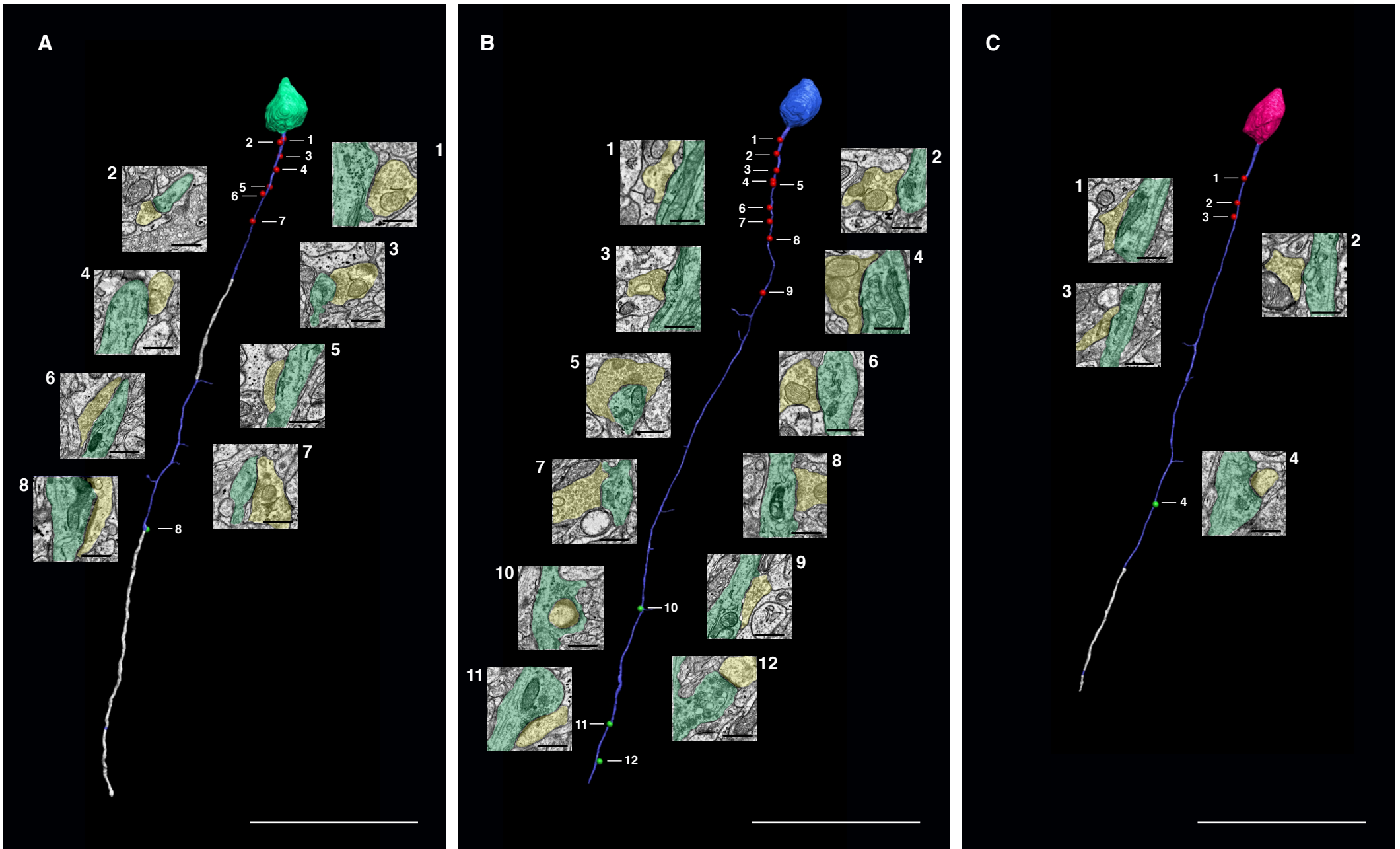
Rendering of reconstructed neurons and relative location on one representative image from the V1 dataset. Scale bar, 50  $\mu\text{m}$ .

Fig. S4



**Fig. S4. Longitudinal profiles of myelination on pyramidal neurons of the deep cortical layers.**

High-resolution renderings of myelin distribution along single axons of 12 layer V-VI pyramidal neurons traced and reconstructed in the S1 dataset. Myelin is rendered in white. Long unmyelinated tracts are indicated by asterisks. Scale bar, 50  $\mu\text{m}$ .



**Fig. S5. Distribution of synapses on representative neurons in layer II/III of the V1 dataset axons.**

High resolution renderings of (A) an intermittent, (B) an unmyelinated and (C) a "long PMAS" neuron of the V1 dataset. Insets show all traced synapses. Red and green dots indicate the native position of each numbered synapse along the axons. Red, afferent synapses, green, efferent synapses. Scale bars, 50  $\mu\text{m}$  (renderings), 0.5  $\mu\text{m}$  (insets).