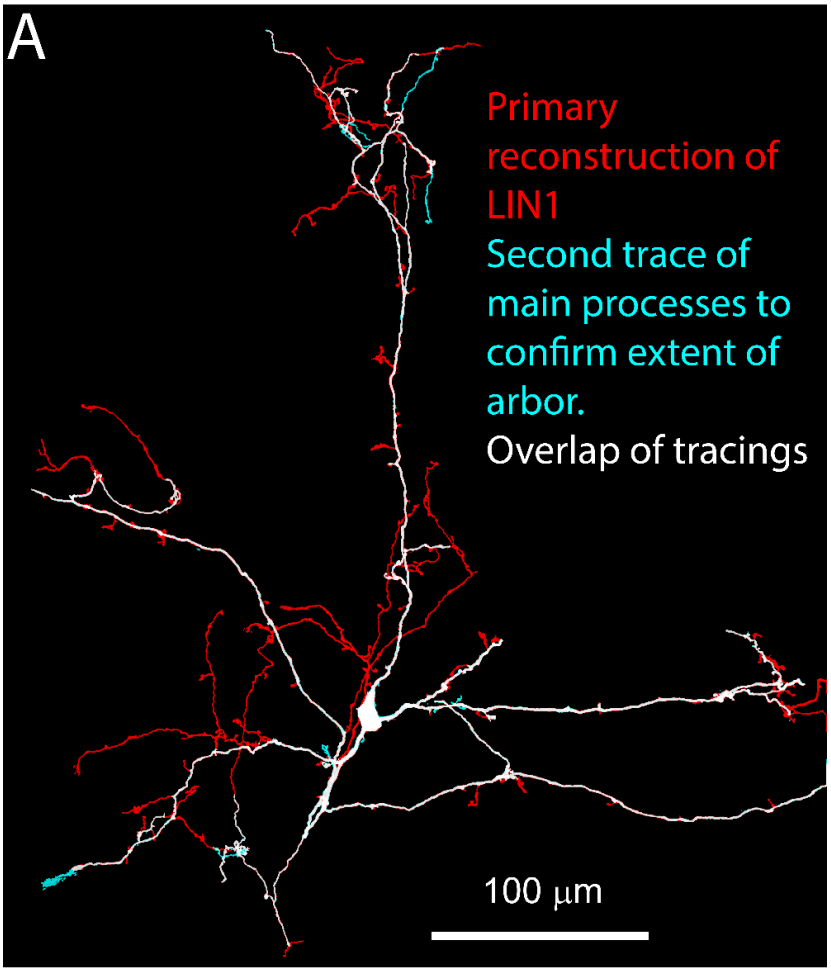
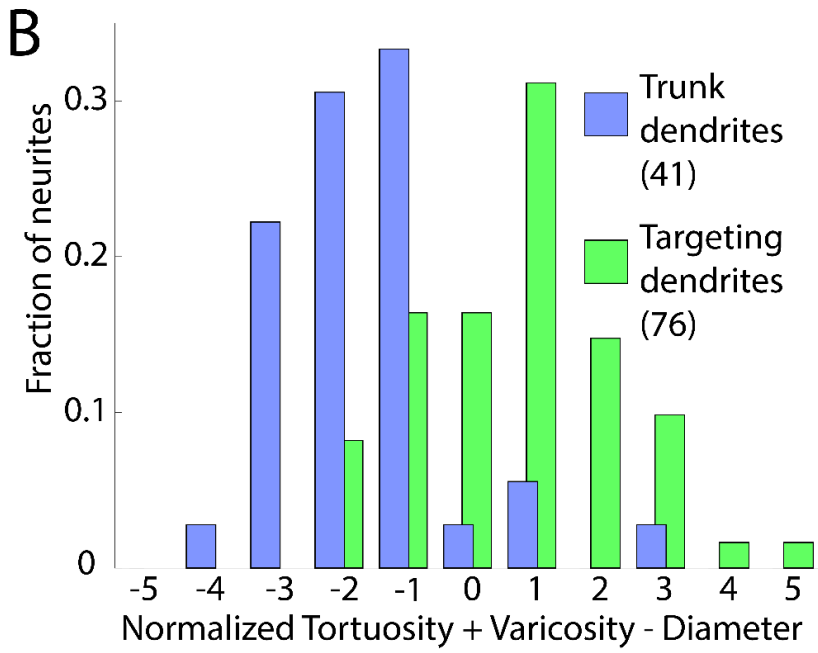
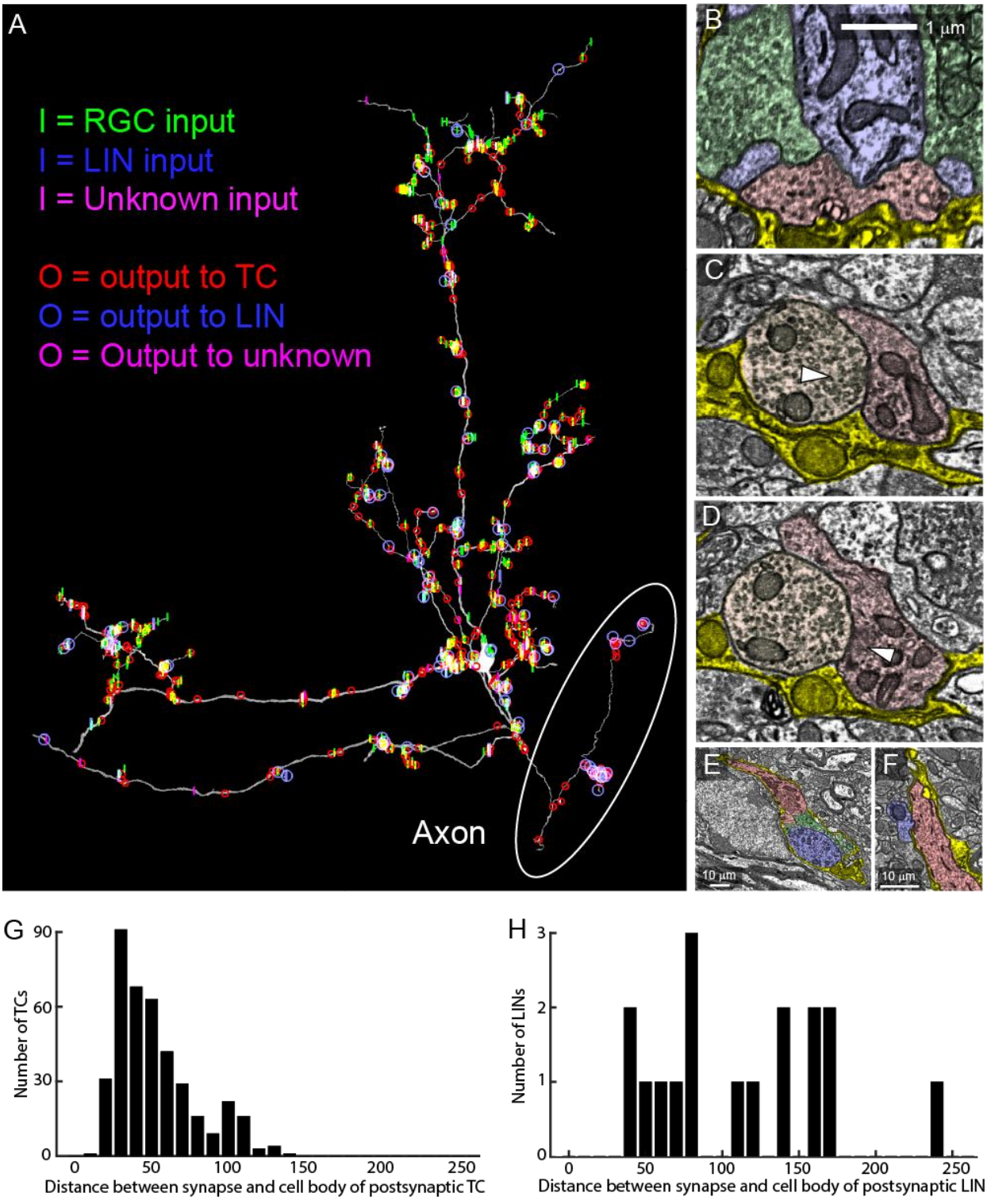
SUPPLEMENTAL INFORMATION





Supplementary Figure 1. Morphology of LIN1, Related to Figure 1 A) An independent tracing (cyan) of the main processes of LIN1 was used to confirm the wide arborization observed in the original tracing (red). B) Morphology of neurites identified as trunk or targeting dendrites shown as combined measure of normalized ([x-mean]/standard deviation) tortuosity + varicosity – diameter.



Supplementary Figure 2. Synaptic connections of LIN1, Related to Figure 2. A) Distribution of different synapse types across LIN1. LIN1 is rotated to a sagittal view so that the axon is clearly distinguishable. Axon-like neurite is circled. B) Electron micrograph of a synapse formed by the axon of LIN1 (red) onto a TC dendrite (blue). RGCs that innervate spines of the TC are shown in green. Glial sheath is shown in yellow. (C-D) Reciprocal motif composed of a synapse from the axon of LIN1 onto another LIN (orange, C) and a synapse from another LIN onto LIN1 (D). E) Electron micrograph showing glial sheath of LIN1 is continuous with the glial sheath of a synaptic glomerulus innervated by LIN1. LIN1 (red), a second LIN (orange), RGCs (green), TC dendrite (blue) and glial ensheathment (yellow) are highlighted. F) Synaptic connection formed between trunk dendrite of LIN1 (red) and dendrite of TC (blue). The synapse is formed at a small gap in the glial ensheathment (yellow). G) Histogram of the distances between synapses between LIN1 and TCs and the cell body of the postsynaptic TC. Most synapses onto TCs were formed within 50 μm of the TC cell body. H) Histogram of distances between LIN1->LIN synapses and the cell bodies of LINs that could be traced to those synapses. Most LIN1->LIN synapses led to neurites that exit the EM volume.

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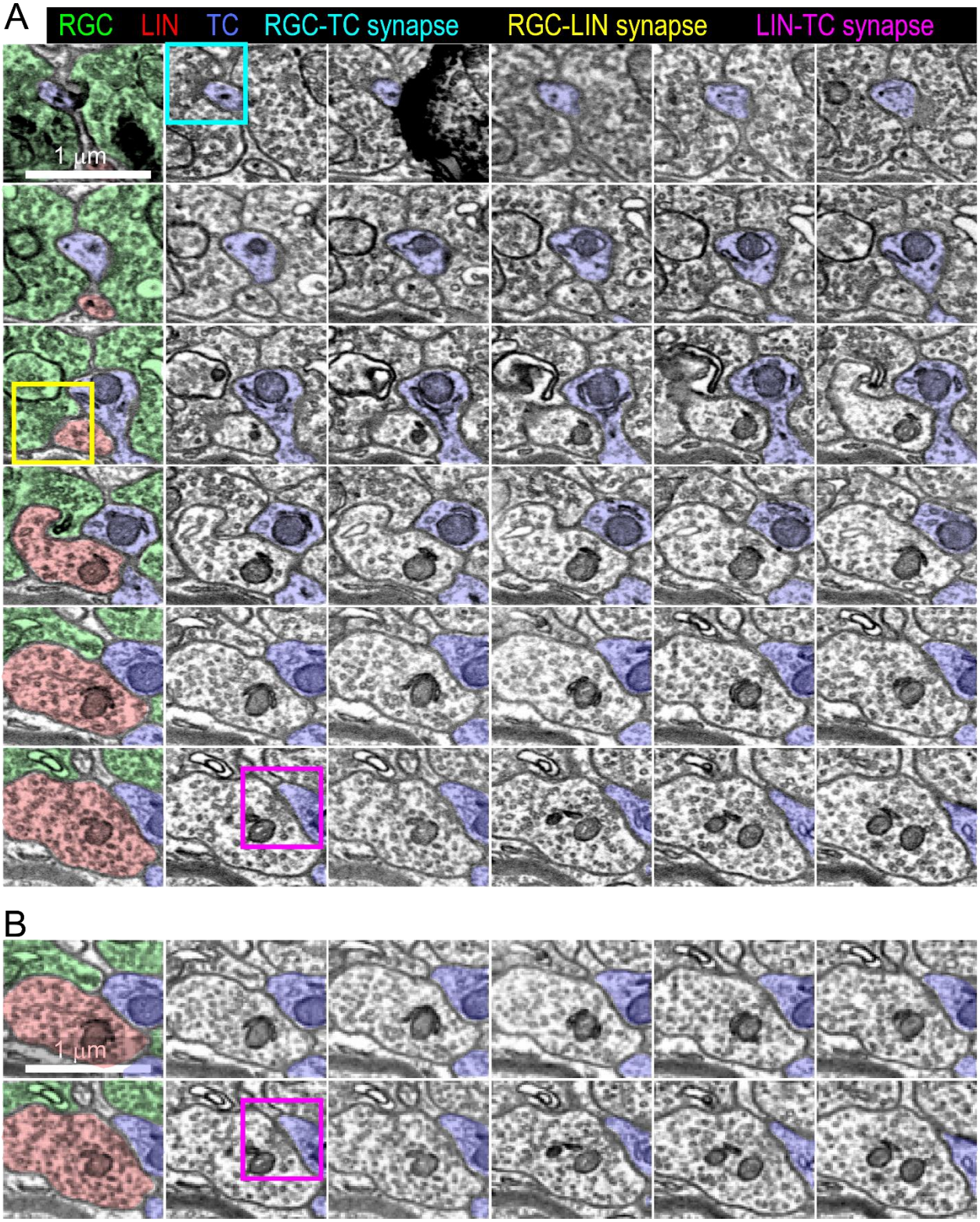

Supplemental Figure 3. EM of a triad synapse, Related to Figure 3. Example of a synaptic triad and comparison between high resolution and downsampled images series through a synapse. A) EM series (full 4 nm x 4nm x 30 nm resolution) through an RGC->LIN->TC triadic synaptic arrangement. The

postsynaptic TC is shown in blue. Cyan box = RGC->TC synapse. Yellow box = RGC->LIN synapse. Magenta box = LIN->TC synapse. B) Downsampled (16 nm x 16 nm x 30 nm) version of LIN1->TC synapse shown in A.

Supplementary Movie 1. LIN arbors, Related to Figure 1. Rotation of partial reconstructions of five LINs showing range of wide arbor orientations. Four of these LINs are shown in Figure 1B.

Supplementary Movie 2. LIN1, synapses, Related to Figure 2. Rotation of initially showing neurite types for LIN1, then input types, then output synapse types.

Supplementary Movie 3. 3D structure of LIN1 glomerulus. Related to Figure 4L. LIN1 is red. Within the glomerulus, TCs are blue, RGCs are green and other LINs are orange. Outside of the glomerulus, some tracings continue in grey. Scale bar is 10 μm.

Supplementary Movie 4. LIN1 trunk dendrite and synaptic partners, Related to Figure 6A. Rotation of trunk dendrite of LIN1 (red) and all its synaptic partners (RGC = green, TC = blue/purple, other LIN = orange) as also shown in Figure 6A. Cones point to position of synapses (RGC->LIN = yellow, LIN->TC = magenta, RGC->TC = cyan, LIN->LIN = red). Scale bar = 10 μm.

Supplementary Movie 5. LIN1 targeting dendrite and synaptic partners, Related to Figure 6C. Rotation of targeting presynaptic dendrite of LIN1 (red) and all of its synaptic partners (RGCs = green, TC = blue, other LIN = orange) as also shown in Figure 6B. Cones point to position of synapses (RGC->LIN = yellow, LIN->TC = magenta, RGC->TC = cyan, LIN->LIN = red). Scale bar = 10 μm.