Supplementary Figure 1. The specificity of the *Xenopus* TrkB antibody was examined by western blot and immunoprecipitation analyses. Western blot analysis with a custom-made *Xenopus* TrkB rabbit polyclonal antibody recognizes two prominent bands migrating at approximately110 and 145 kDa, as estimated from the molecular weight standards (see arrows). Those bands most probably represent differently glycosylated forms of the TrkB protein as shown by (Martin-Zanca et al., 1989) (Martin-Zanca D, Oskam R, Mitra G, Copeland T, Barbacid M. 1989. Molecular and biochemical characterization of the human trk proto-oncogene. Mol Cell Biol 9(1):24-33). A band of approximately 110 kDa molecular weight is recognized by an anti-human phospho-TrkB antibody in these same tissues (pTrkB blot) together with a faint band of 145 kDa. Tissue immunoprecipitation with the *Xenopus* TrkB antibody followed by immunoblot with anti-phospho-TrkB (IP blot) also reveals two bands of similar molecular weight. Bands of intermediate molecular weight are also recognized by the *Xenopus* TrkB antibody in eye and brain.

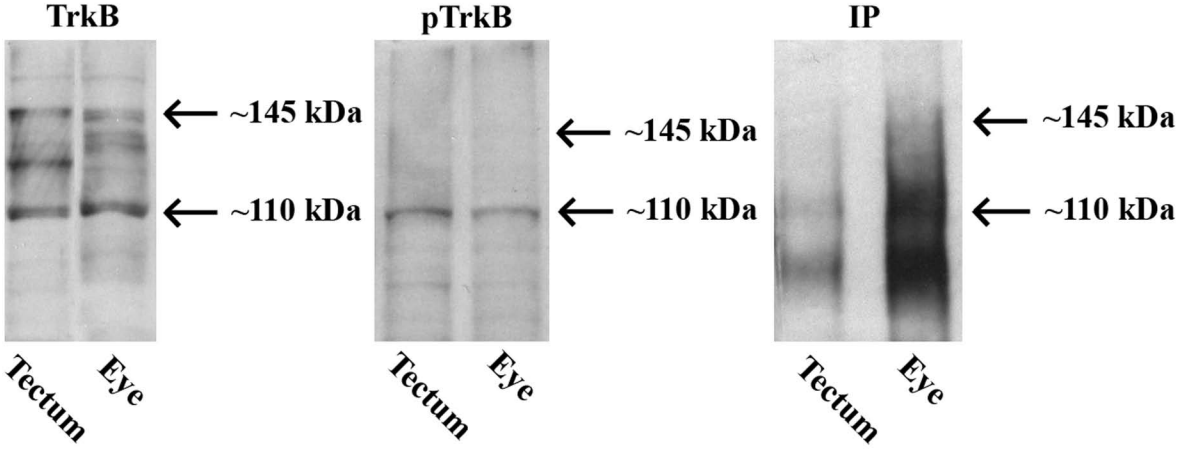
Supplementary Figure 2. Filopodia-like and spine-like protrusions in stage 45 *Xenopus* tectal neurons imaged *in vivo*. A-D) The brain primordium of stage 22 *Xenopus* embryos was lipofected with plasmids coding for GFP-tagged postsynaptic density protein 95 (PSD-95-GFP; *green*) and DsRed2 (*red*) (A, B), or and enhanced GFP plasmid (*green*; C-D). At stage 45, anesthetized tadpoles were screened and imaged by confocal microscopy as described previously (see Sanchez et al., 2006). A) Confocal projection of a sample stage 45 tectal neuron expressing PSD-95-GFP and DsRed2 demonstrates the discrete distribution of the PSD-95-GFP puncta along the dendritic arbor. The dashed boxes demarcate the enlarged areas of the arbor shown in B. Scale = 20 µm. B) To better differentiate specific portions of the dendritic arbor, the confocal stack planes corresponding to each boxed area were projected into one plane. The arrows mark spine-like protrusions observed in primary, secondary and tertiary branches. The long rectangular box shows a portion of the same dendritic arbor imaged within a 2 hour time interval. In some cases, spiny protrusions are more easily discerned by the accumulation of PSD-95-GFP at the tip of the process (yellow and blue arrows) rather than by the DsRed2 fluorescence. C, D) Confocal projection of a tectal neuron expressing GFP. In D, a portion of the dendritic arbor was imaged at five minute intervals with confocal zoom to reveal dynamic changes in fine processes. The pink arrow points

to a dynamic filopodia-like process and the yellow arrow shows the emergence of a small spine-like protrusion. Scale = 5 µm. A magenta-green version of this figure is provided in Supplementary Figure 5.

Supplementary Figure 3. Distribution of full-length TrkB in the stage 45 *Xenopus laevis* visual system. A) Coronal section of a stage 45 *Xenopus* retina shows the distribution of TrkB immunoreactivity (*green fluorescence*) in the inner plexiform layer (IPL) and its co-localization with the neurofilament associated protein (NAA-3A10, *red fluorescence*) in the retinal ganglion cell layer (RGC); this can be clearly seen in the enlarged inset. B) Horizontal section at the level of the optic tectum. Fibers expressing NAA, most of them possible being RGC axons reach the neuropil (n) of the optic tectum, where TrkB is widely expressed. Cell bodies in both panels are labeled with DAPI (*blue fluorescence*), scale bar 10 µm. C, D) These two panels show a magenta-green version of panels A, B respectively but without the DAPI staining.

Supplementary Figure 4. This figure is a magenta-green version of panels A-C of Figure 8. Here, the red immunofluorescence is shown in magenta and the DAPI fluorescence is not shown. Scale bar in *A* = 50 µm; in *C* = 5 µm.

Supplementary Figure 5. This figure is a magenta-green version of Supplementary Figure 2. In panels *A, B* the DsRed2 fluorescence is shown in magenta and PSD-95-GFP in green. In panels *C, D* the GFP fluorescence is shown in white. Scale bar in *A* = 20 µm; in *D* = 5 µm.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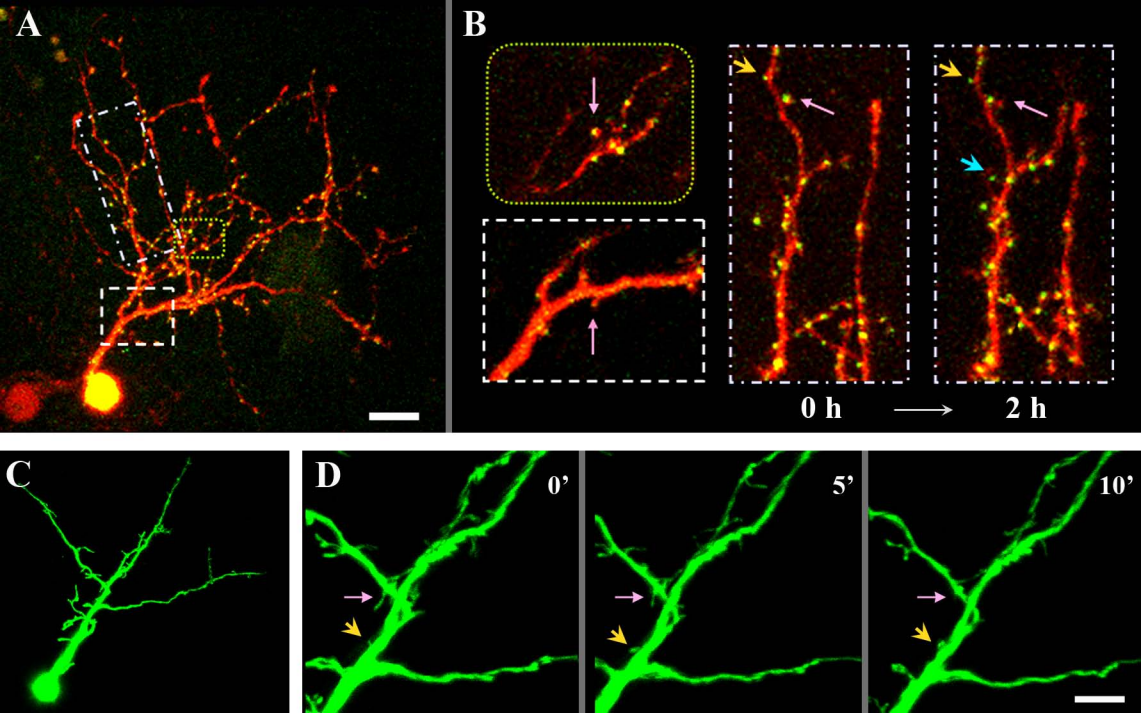
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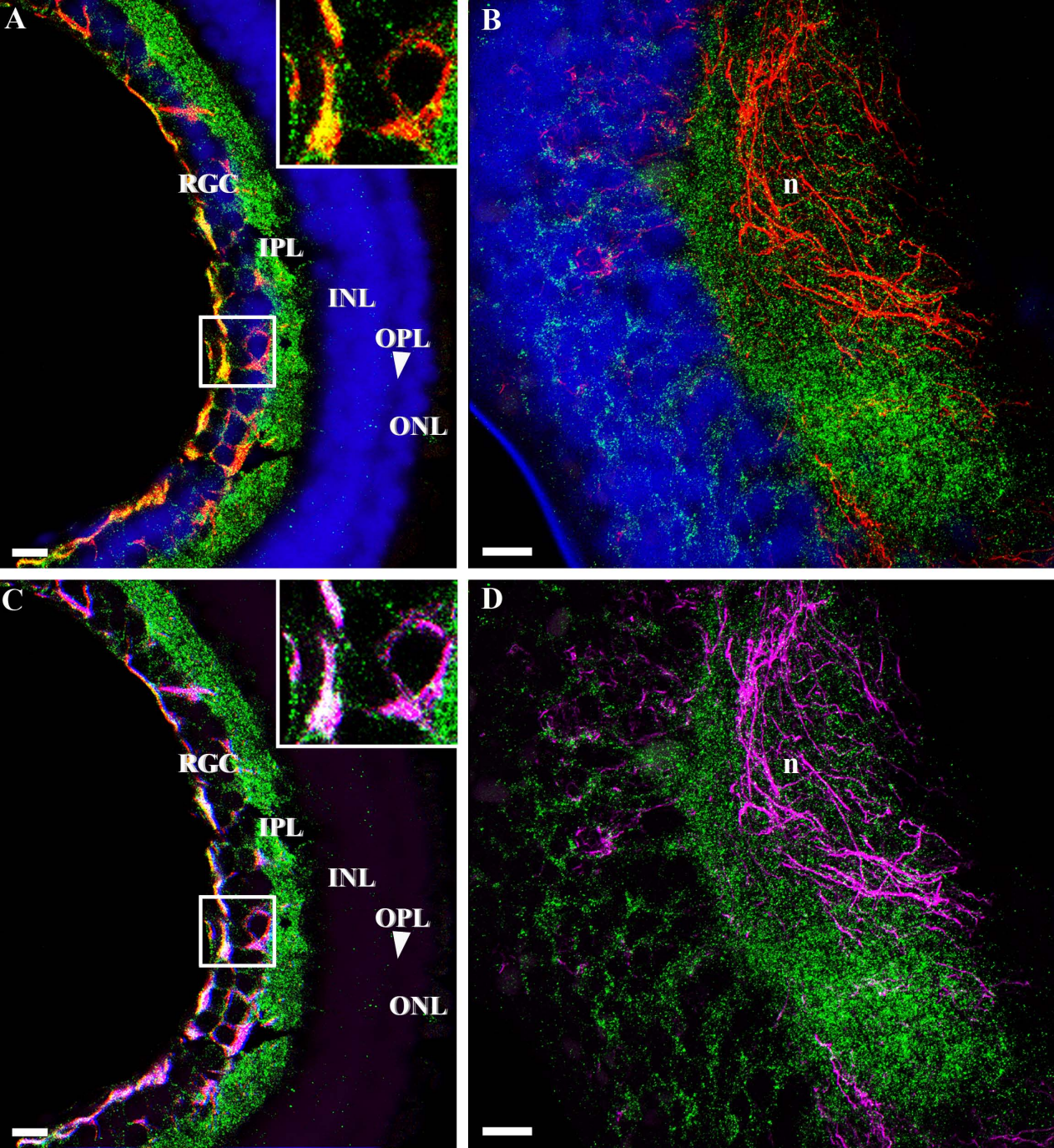
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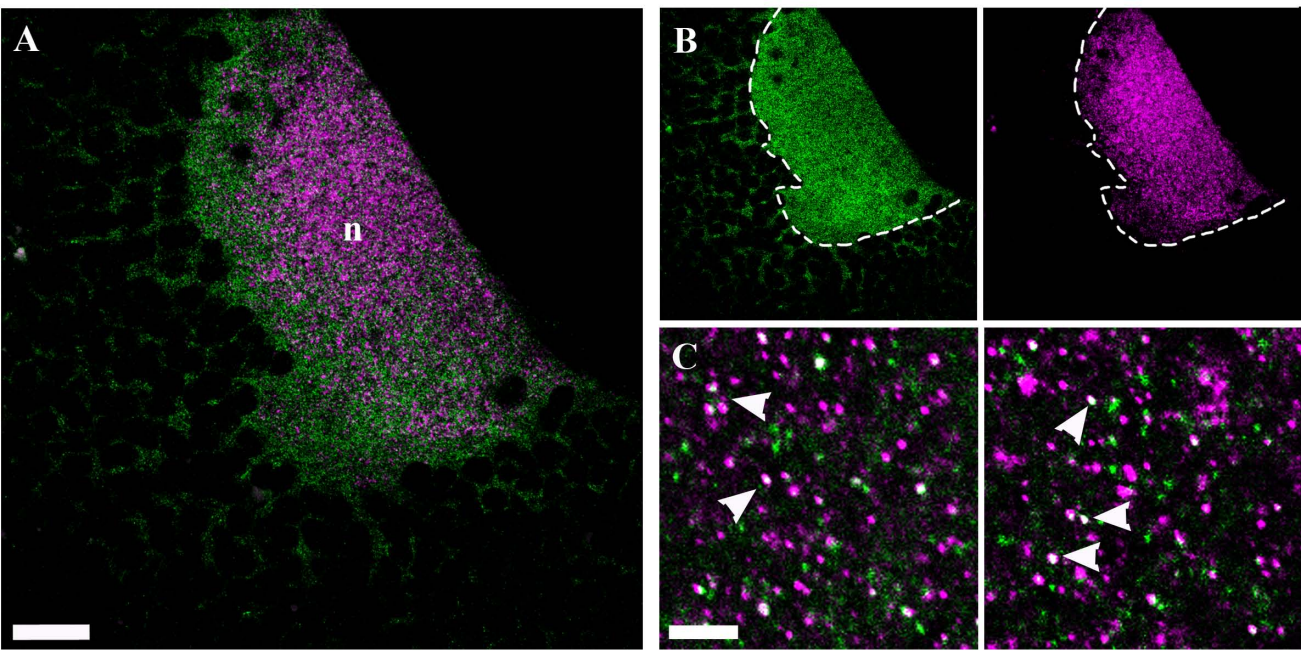
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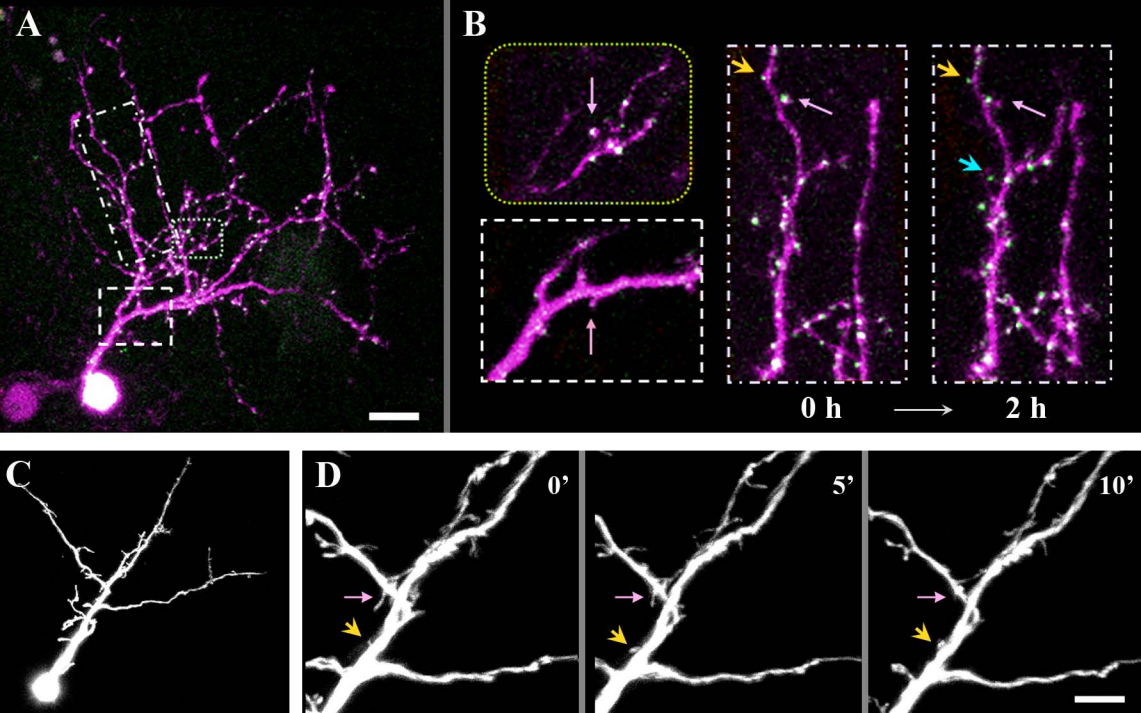
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