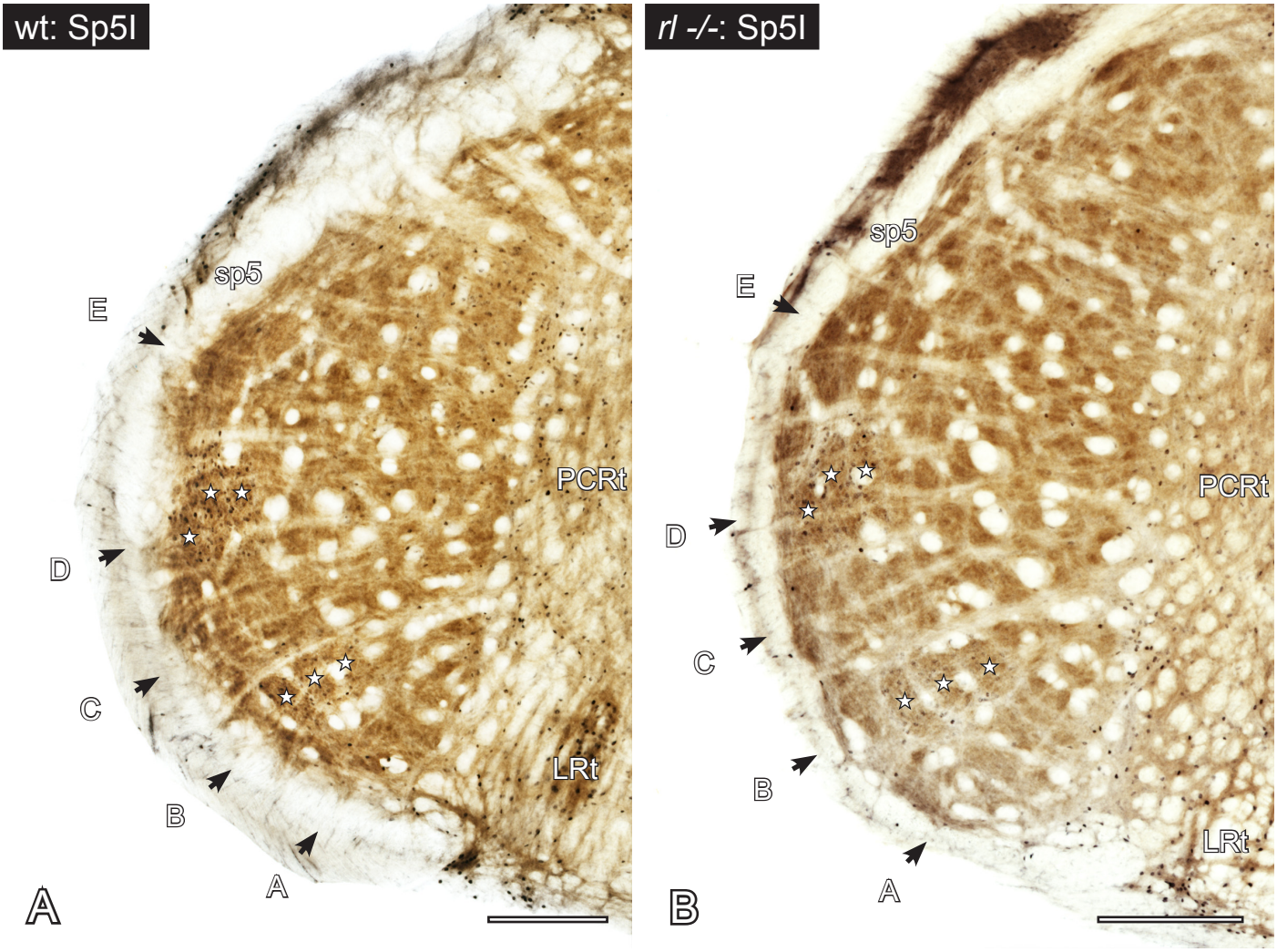
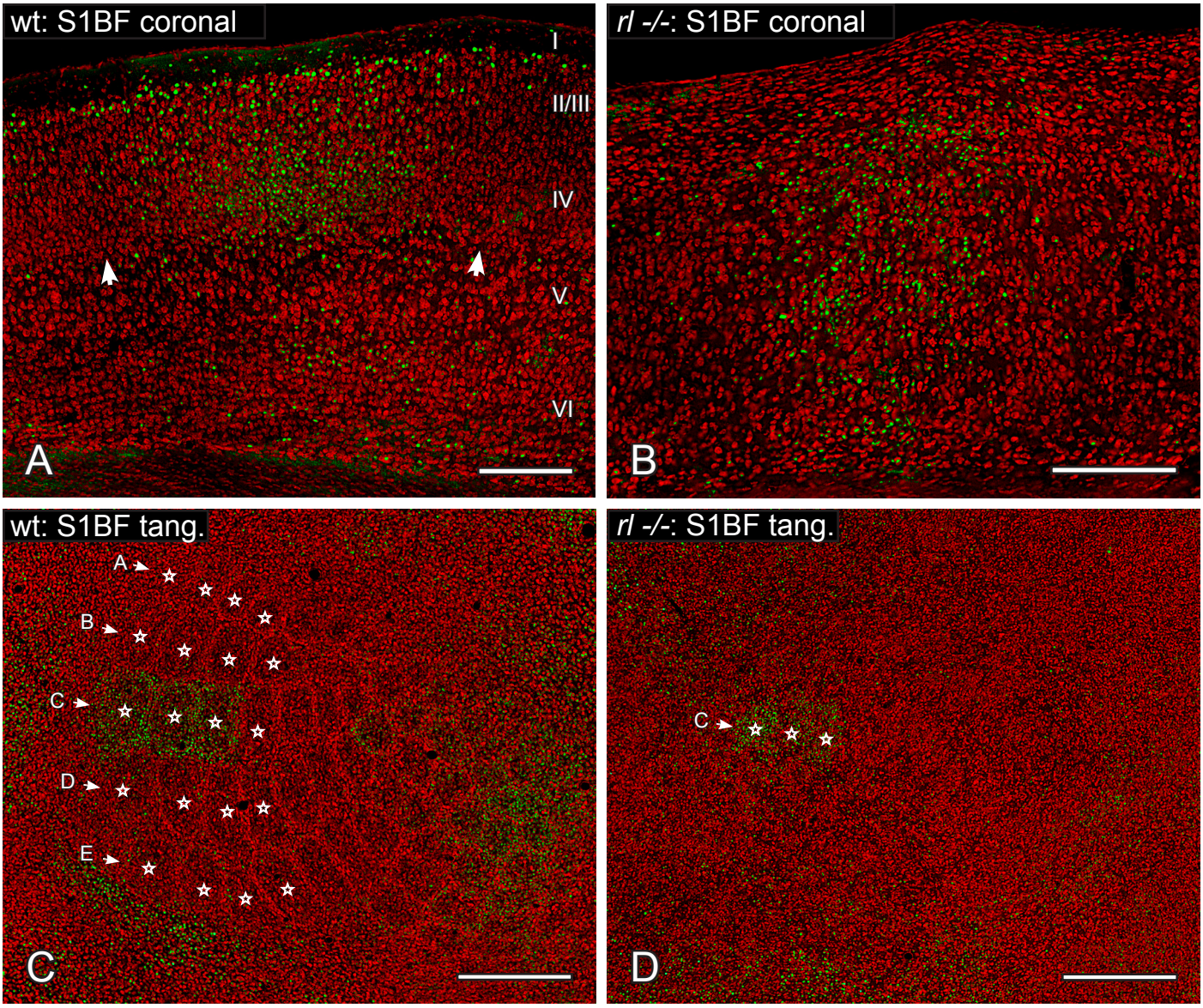
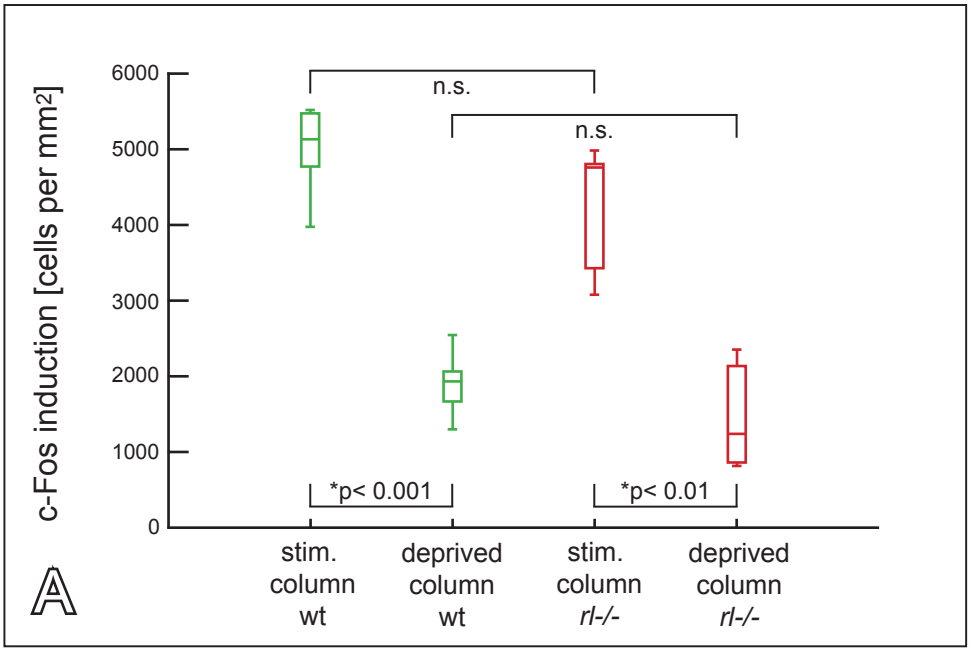
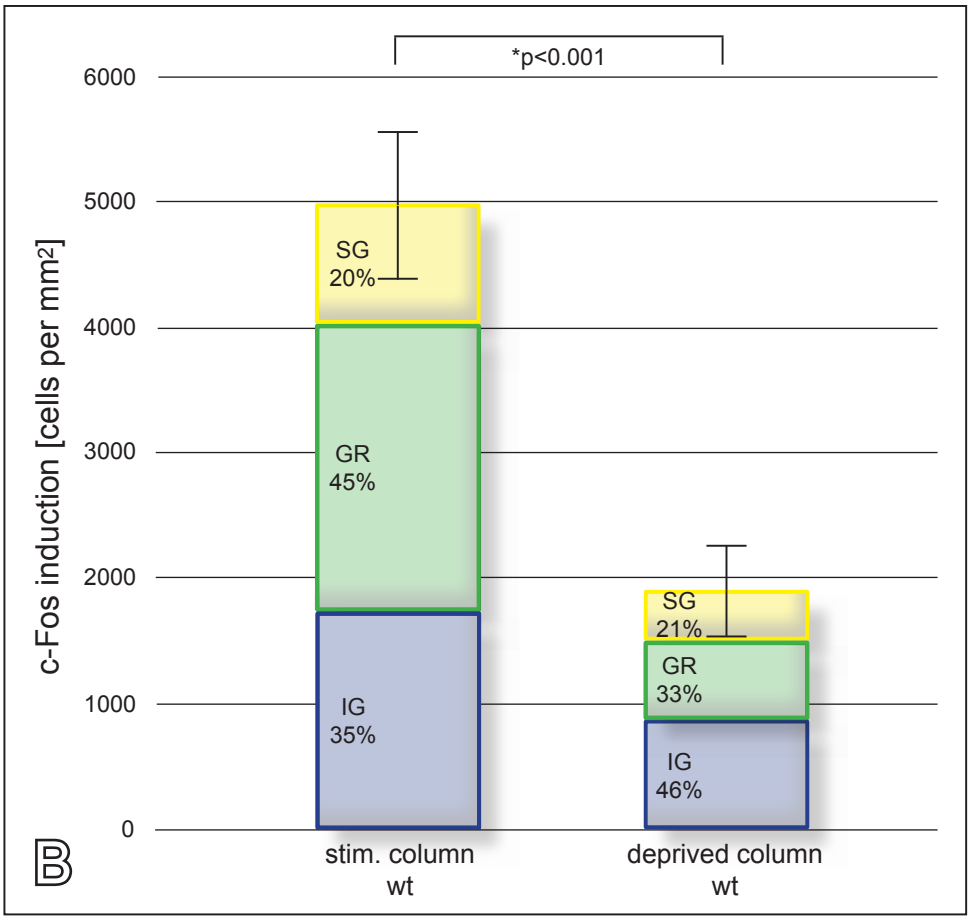


Supplemental Figure 1 Spinal trigeminal nucleus, interpolar part (SP5I). Anatomy and induction of c-Fos after exploration of an enriched environment (spared whiskers: B 1-3 & D 1-3).
(A) wild type (B) *reeler*. Coronal section through the left brainstem (Bregma -7,20 mm). The topography of the barrelettes is revealed by CO (brown); rows lettered according to standard nomenclature. Stimulated barrelettes are visualized by c-Fos staining (black) and are marked by stars. Other structures identified for orientation: sp5: spinal trigeminal tract, LRt: lateral reticular nucleus PCRt: parvicellular reticular nucleus. Scale bar: 250 µm

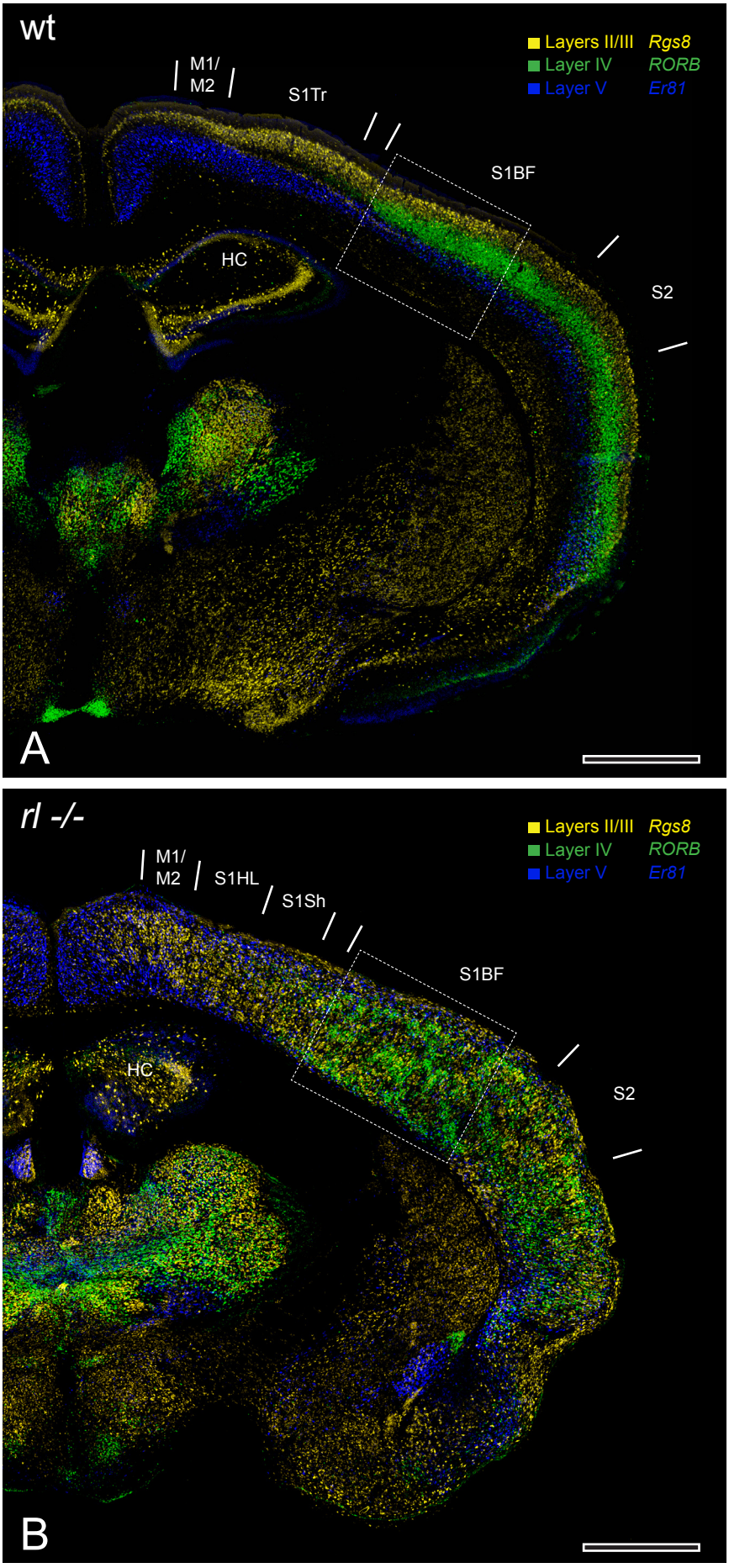


Supplemental Figure 2 Whisker representation in the primary somatosensory "barrel" cortex (S1BF). Anatomy and induction of c-Fos after exploration of an enriched environment (spared whiskers: C 1-3). Fluorescent Nissl (NeuroTrace; red) and c-Fos (green) staining
(A) Micrograph showing 3 barrel-related columns in the coronally sectioned wild type brain. Barrels are revealed by a higher packing density of cells in lamina IV (unstimulated barrels are marked by arrows at the layer IV/Va border), one of the stimulated C-row columns is revealed by c-Fos. (B) shows the corresponding area in *reeler*. NeuroTrace staining does not reveal barrels or any other modular pattern in unstimulated columns. The stimulated module (stained by c-Fos) visualizes a barrel-equivalent containing column corresponding to a B row whisker. (C) Tangential section through layer IV in the wild type barrel cortex. Different packing density of cells visualizes the denser barrel sides and the less dense barrel hollows (single barrels marked by stars in their center). C-Fos staining shows the activation pattern of the barrels corresponding to the spared and stimulated contralateral vibrissae (C 1-3). (D) Tangential section through the *reeler* barrel cortex. The section has the same distance to the pia as the wild type section. The NeuroTrace staining does not reveal any reliable pattern, whereas c-Fos visualizes barrel-equivalents (marked by stars in their center). Roman numerals indicate cortical layers. Scale bars: A and B 250 µm, C and D 500 µm

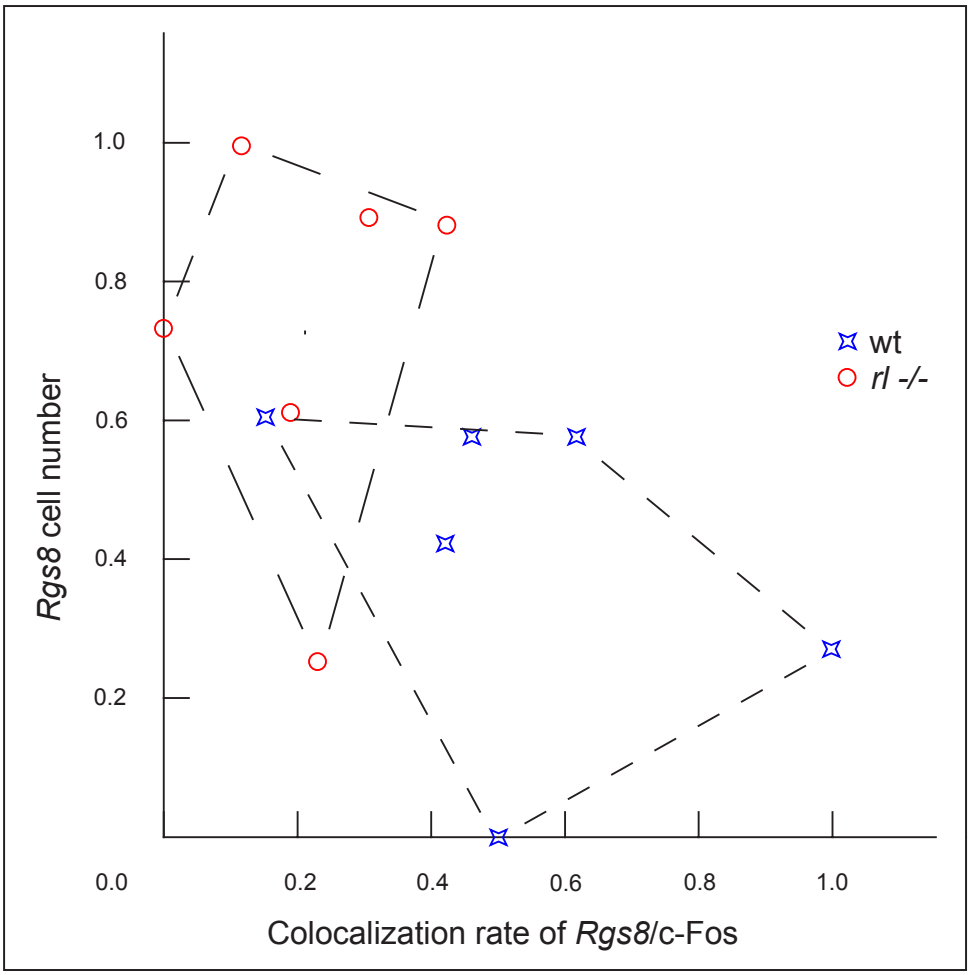




Supplemental Figure S3 Quantification of c-Fos induction
(A) Density of c-Fos cells shown as boxplots. The highly significant difference ($p<0.01$) between the stimulated versus deprived (corresponding whiskers clipped) columns became obvious. Neither the stimulated nor the deprived columns showed statistical differences in a wild type versus *reeler* comparison. (B) C-Fos induction in stimulated and deprived wild type columns subdivided for the main compartments (SG: supragranular, GR: granular, IG: infragranular). The upper and lower whisker represents +/- 1 SD related to the whole column.



Supplemental Figure 4 Laminar markers in the adult cortex.
In situ hybridizations for laminar markers in the wild type (A) and *reeler* (B) brain, sectioned in the standard coronal plane. Three consecutive sections are shown as mergers of pseudocolored micrographs. The frame in the S1BF indicates the area that is shown at higher magnification in Figure 3. Other structures: M1/M2: primary/secondary motor cortex, S1Tr/HL/Sh: primary somatosensory cortex, trunk region, hindlimb region, shoulder region, S2: secondary somatosensory cortex, HC: hippocampus. Scale bars: 1000 µm



Supplemental Figure 5 *Rgs8* population size and c-Fos colocalization.
Inverse correlation of *Rgs8* cell numbers and its colocalization rate with c-Fos labeled cells (data are normalized; 0= lowest value, 1= highest value). *Reeler Rgs8* cells showed reduced activation as a consequence of behavioral stimulation. The inversed correlation indicates that the colocalization rate decreased to the same extend as additional Rgs8 cells appeared. Thus, the additional layer II/III-fated *reeler* cells are not recruited proportionately. reeler: red, wild type: blue