

Figure S1. COUP-TFI is expressed in a subpopulation of neuroblasts in the adult mouse SVZ. (A) COUP-TFI/DCX double-immunostained P42 mouse brain section. **(B-F)** Higher-magnification images of the boxed areas in **(A)** showing COUP-TF+/DCX+ cells in the dorsal SVZ **(B, C)**; COUP-TFI+ cells were not in the lateral, ventral or medial SVZ at the rostral part of the lateral ventricle. **(G)** COUP-TFI was expressed in about 12% CR+ cells in the GCL, but not in the periglomerular layer. Scale bars: 200 μ m in A; 100 μ m in G for B-G.

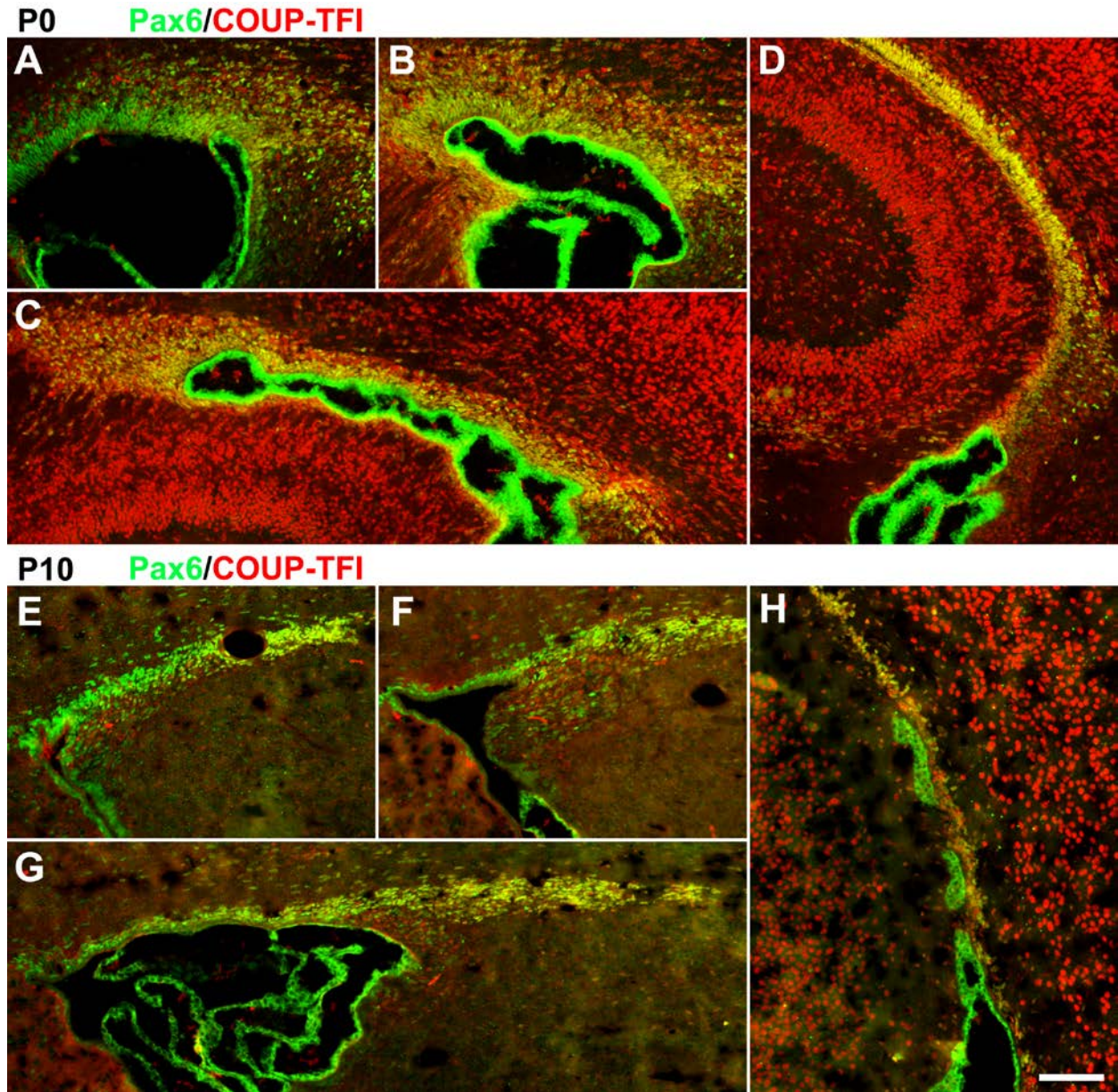


Figure S2. COUP-TFI is expressed in a gradient of low rostral to high caudal within the P0 and P10 SVZ. (A-H) Pax6/COUP-TFI double-immunostained coronal brain sections at different rostrocaudal levels of the SVZ at P0 (**A-D**) and P10 (**E-H**). Scale bar: 100 μ m in H for A-H.

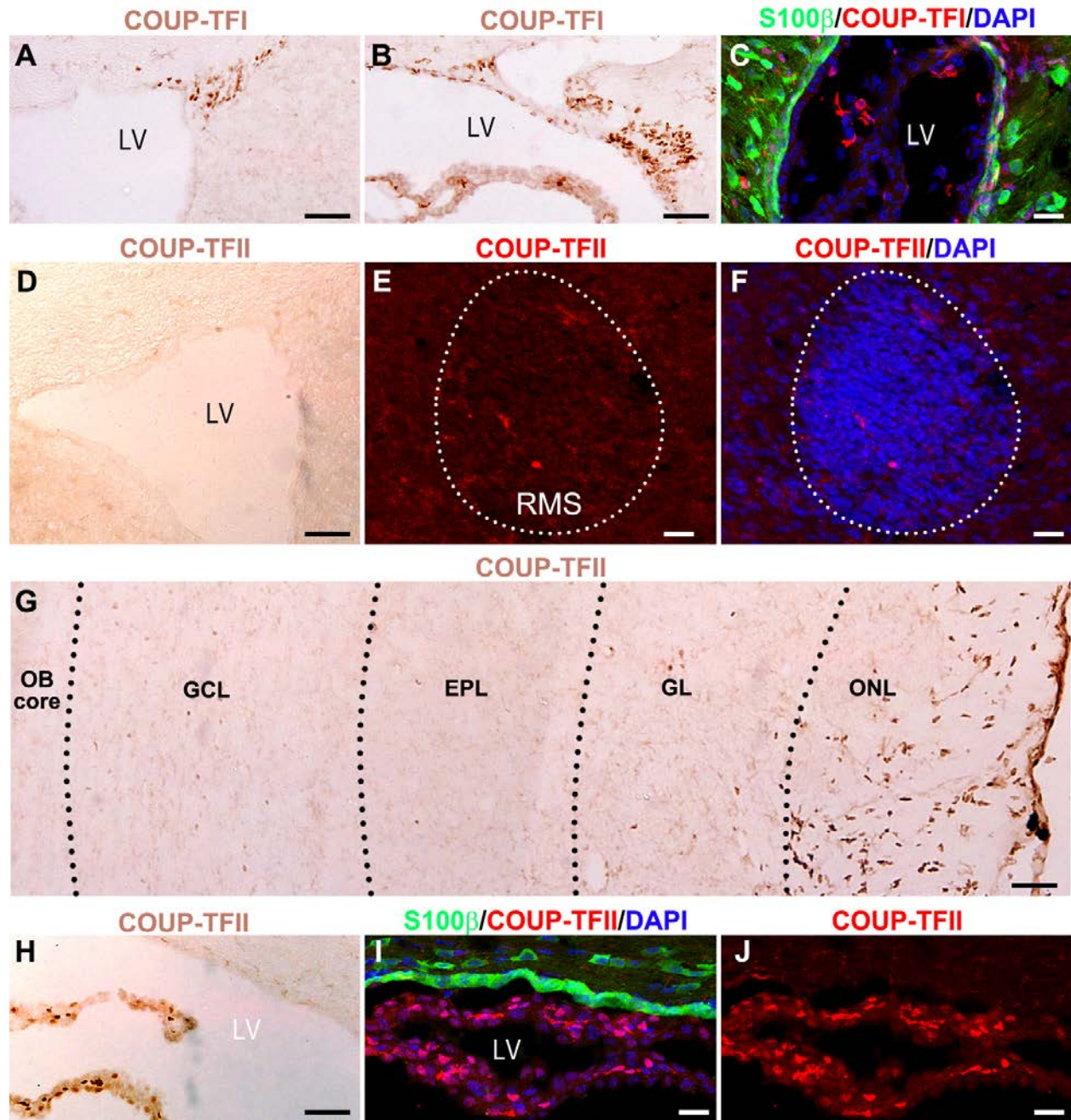


Figure S3. Few COUP-TFII+ cells exist in the adult SVZ-RMS-OB pathway. (A-C) COUP-TFI is expressed in ependymal cells in the caudal lateral wall of the lateral ventricle in adult mice (B, C) but not in ependymal cells at the rostral level (A). (D-G) Very few COUP-TFII+ cells were in the adult SVZ-RMS-OB pathway. Note that COUP-TFII is strongly expressed in the ONL (G). (H-J) COUP-TFII is expressed in the choroid plexus. LV: lateral ventricle; GCL: granule cell layer; EPL: external plexiform layer; GL: periglomerular layer; ONL: olfactory nerve layer. Scale bars: 50 μ m in A, B, D, G, H; 20 μ m in C, E, F, I, J.

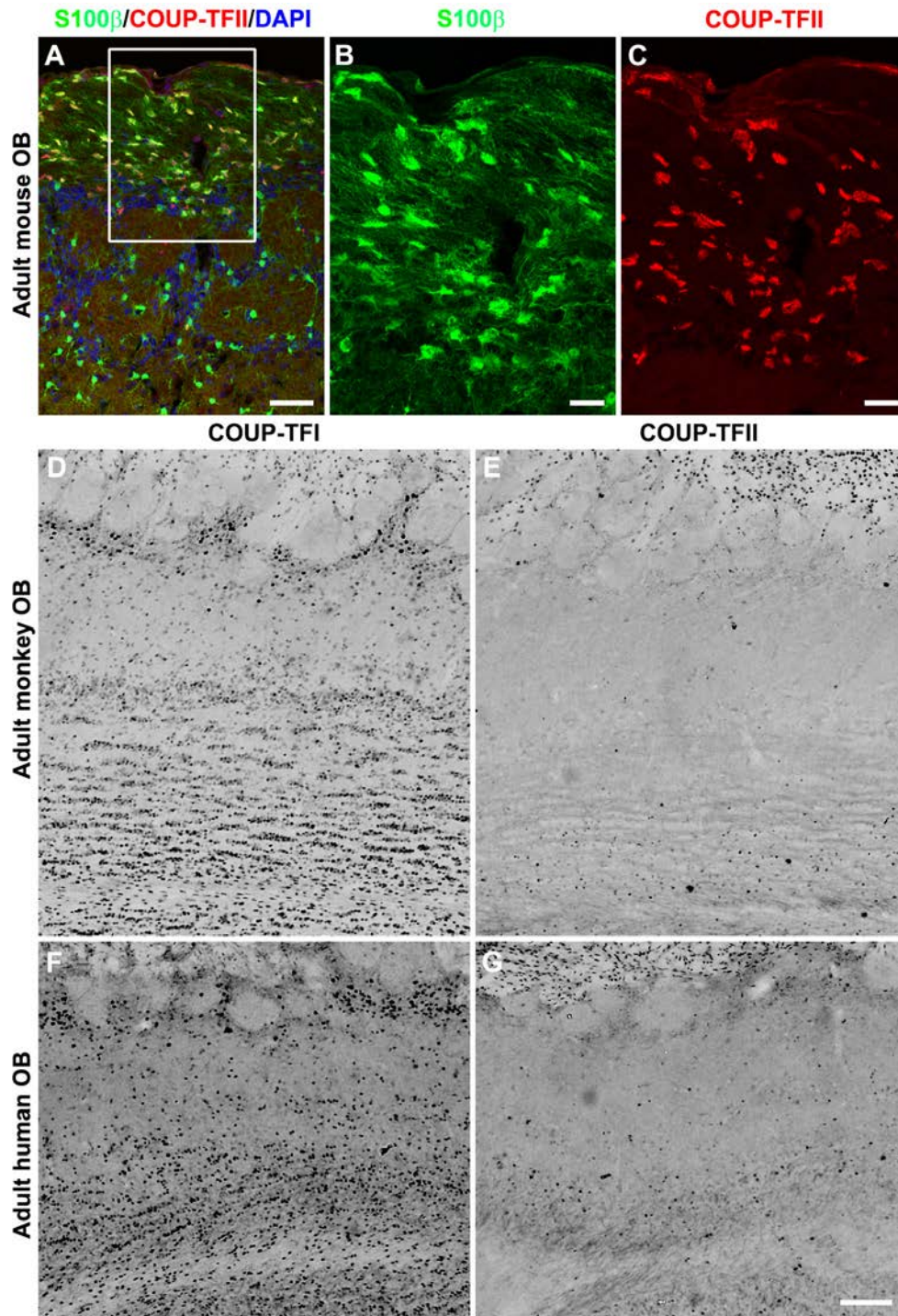


Figure S4. Expression patterns of COUP-TFI and COUP-TFII in the adult human and rhesus monkey OB are similar to those in adult mice. (A-C) COUP-TFII is strongly expressed in olfactory ensheathing cells (S100 β +) in the olfactory nerve layer of the adult mouse OB. **(D-G)** COUP-TFI+ cells were abundant **(D, F)**, whereas only a small number of COUP-TFII+ cells **(E, G)** were in the adult human and monkey OB. Scale bars: 50 μ m in A; 20 μ m in B, C; 100 μ m in G for D-G.

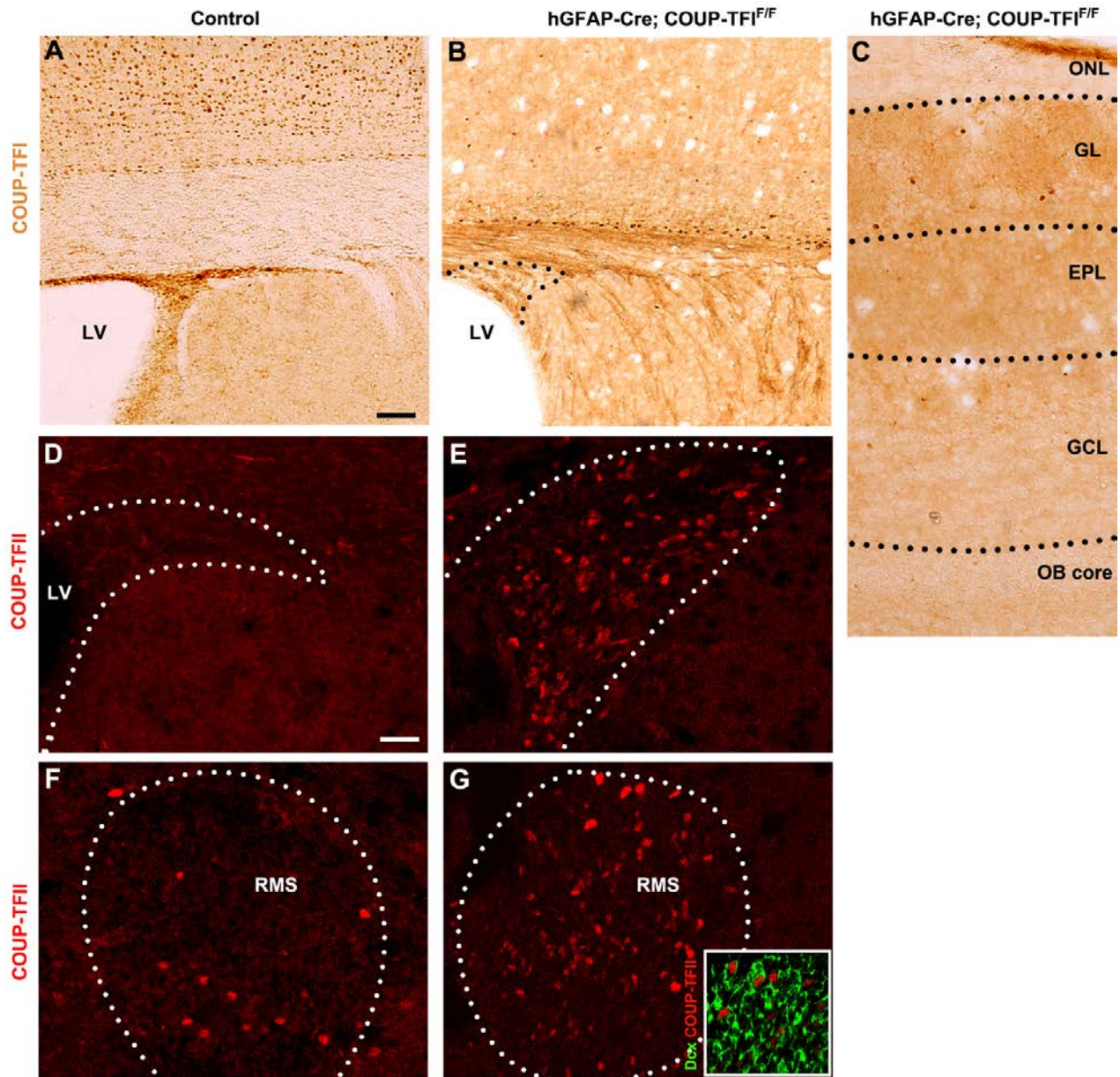


Figure S5. COUP-TFII expression is upregulated in the SVZ and RMS of the COUP-TFI conditional mutant mice. (A-C) COUP-TFI expression was eliminated in the SVZ and OB of adult hGFAP-Cre; COUP-TFI^{flox/flox} mice. Note that many projection neurons in neocortical layer VI still expressed COUP-TFI in hGFAP-Cre; COUP-TFI^{flox/flox} mice, as the hGFAP-Cre exhibits excision of floxed alleles in mouse cortical radial glia around E13.5. (D-G) In control mice, very few COUP-TFII+ cells were identified in the SVZ and RMS (D, F), but COUP-TFII expression in the SVZ and RMS was significantly upregulated in hGFAP-Cre; COUP-TFI^{flox/flox} mice (E, G). Insert in (G) showed that a subpopulation of DCX+ neuroblasts in the RMS expressed COUP-TFII. All brain sections were from P21 mice. Scale bars: 50 μ m in A for A-C; 100 μ m in D for D-G.

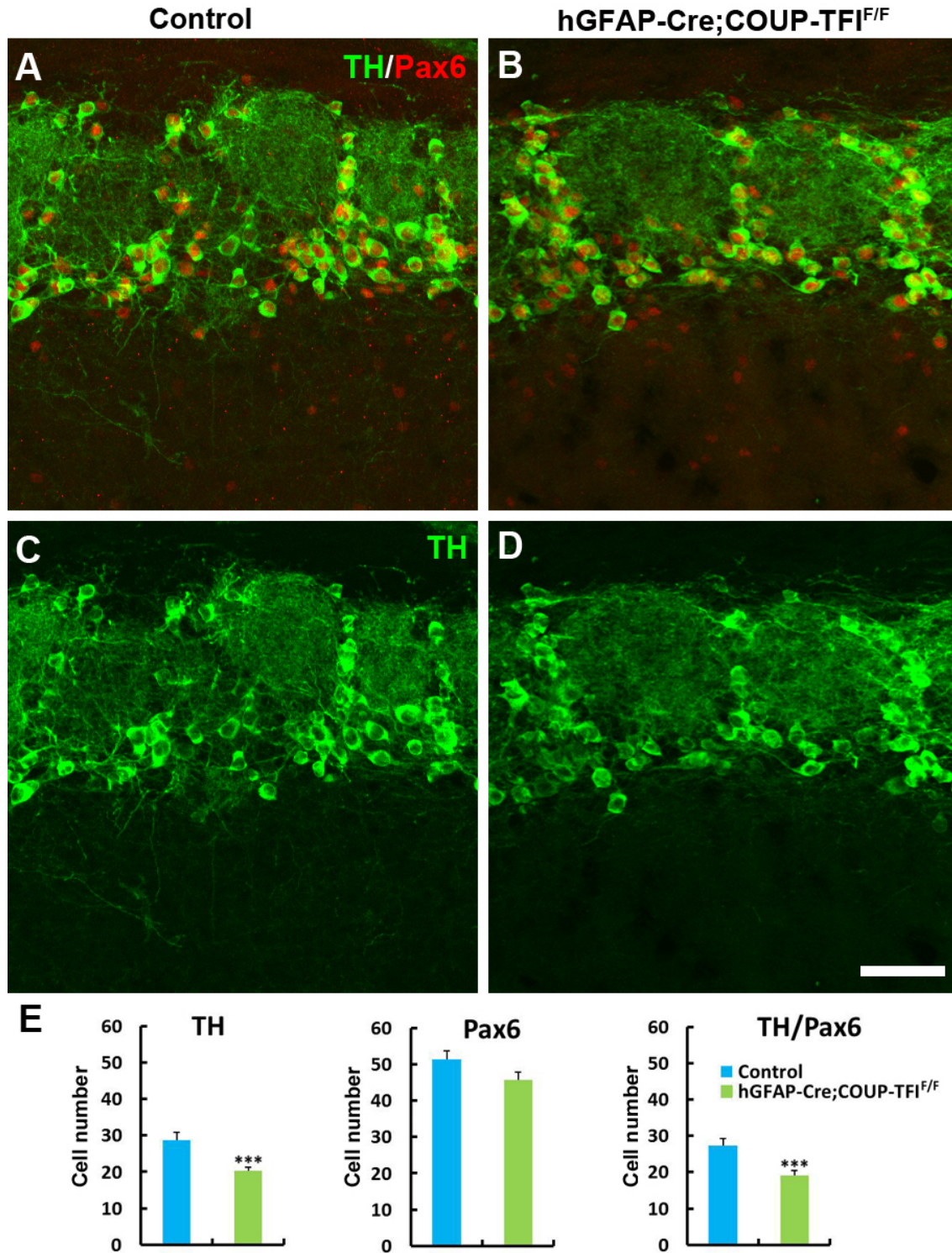
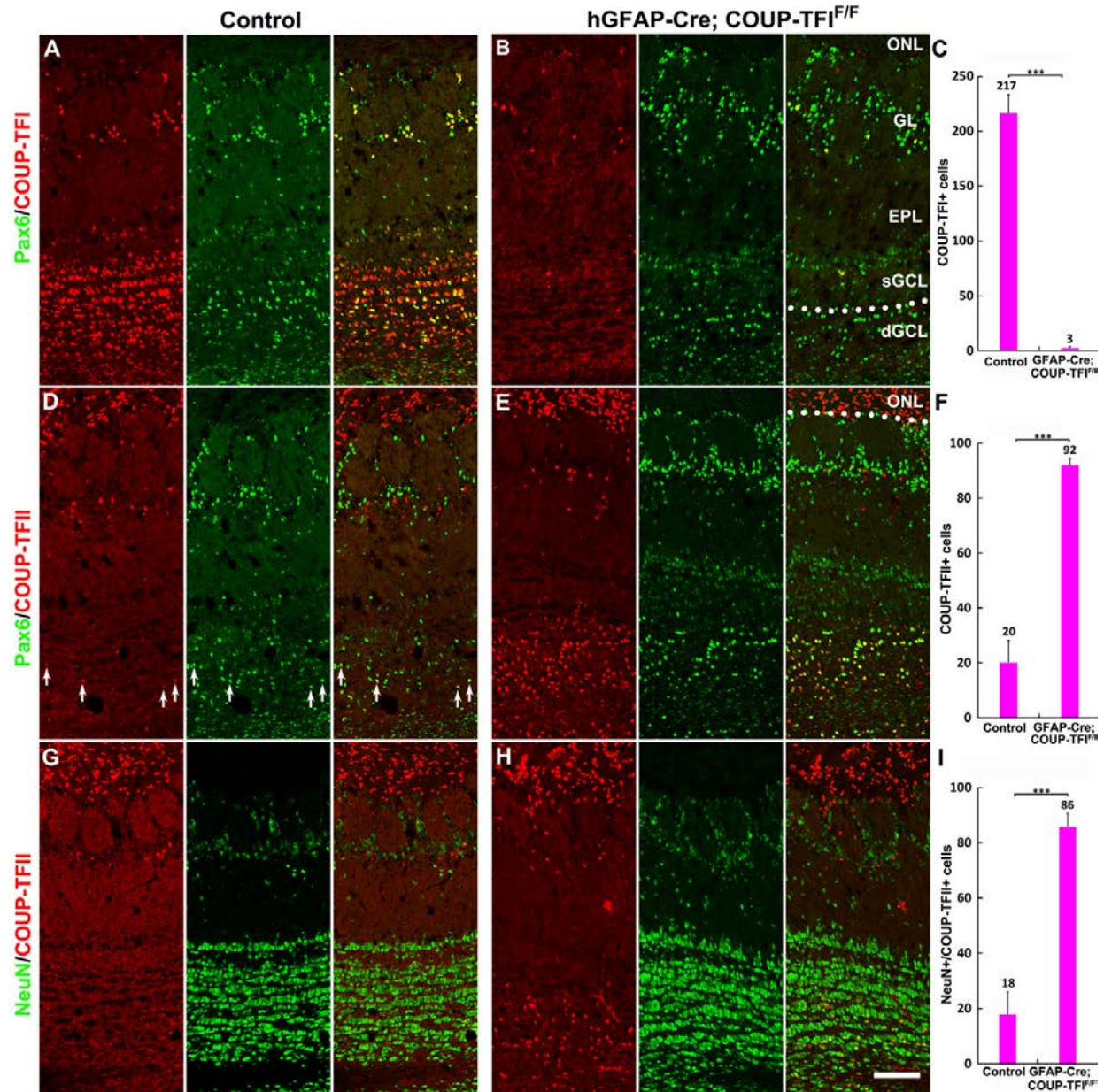


Figure S6. TH expression is reduced in the glomerular layer of the COUP-TFI conditional mutant OB. (A-D) OB sections double immunostained for TH and Pax6. (E) The number of TH+ and TH+/Pax6+, but not Pax6+ periglomerular cells was significantly reduced in the hGFAP-Cre; COUP-TFI^{flox/flox} mouse OB compared to controls at P21. *** p<0.001. Scale bar: 50 μ m in D for A-D.



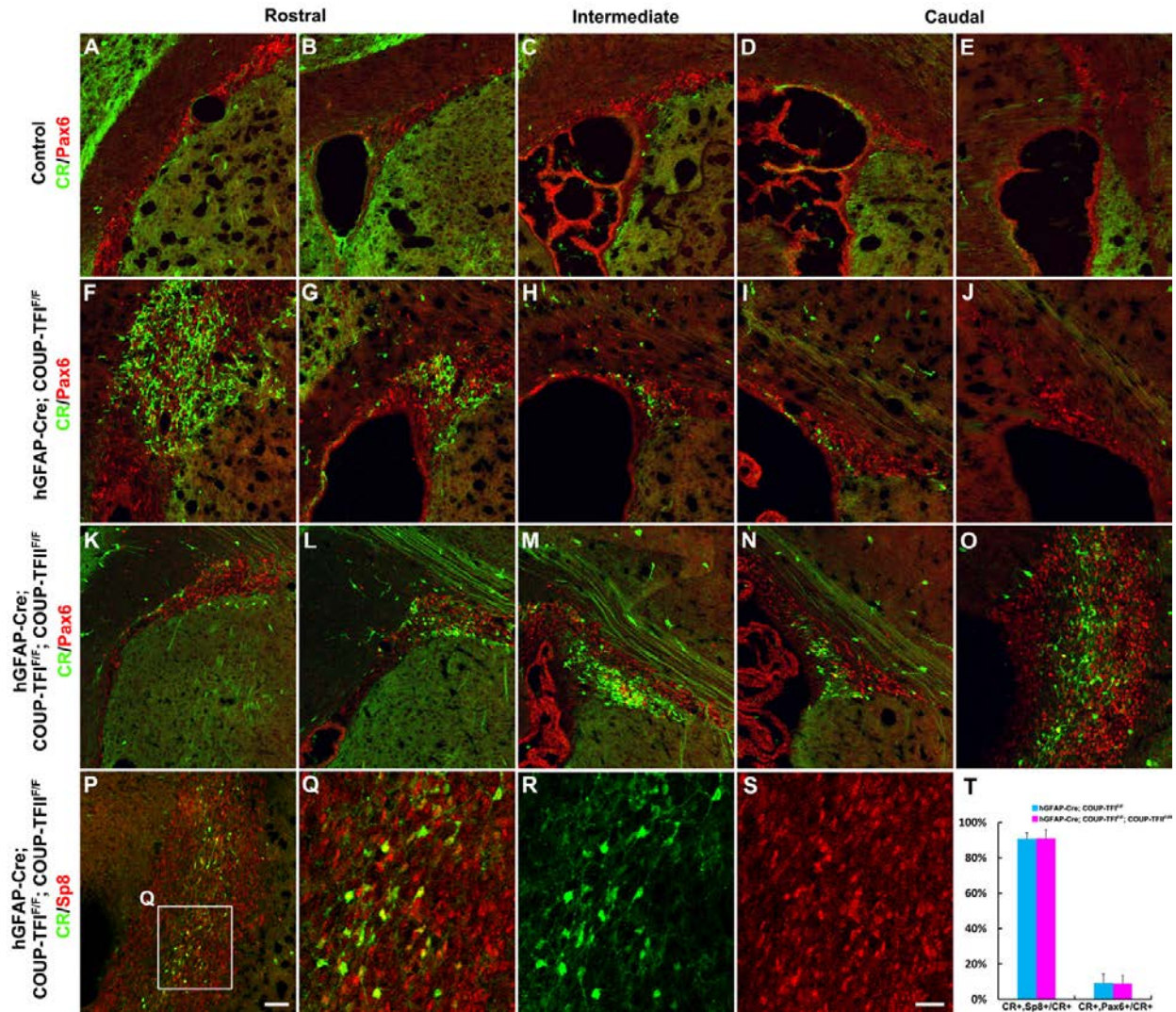


Figure S8. CR⁺ cells accumulate in the SVZ of COUP-TFs conditional mutant mice. (A-O) CR/Pax6 double-immunostaining showed that very few CR⁺ cells were in the control SVZ (A-E), whereas a subset of CR⁺ cells accumulate in the SVZ of hGFAP-Cre; COUP-TF1^{flox/flox} mice (F-J) and hGFAP-Cre; COUP-TF1^{flox/flox}; COUP-TFII^{flox/flox} mice (K-O). (P-S) CR/Sp8 double immunostained sections of COUP-TFs double conditional mutant SVZ. (T) Quantification data showed that about 91% of CR⁺ cells expressed Sp8 and about 9% of CR⁺ cells expressed Pax6. All brain sections were from P21 mice. Scale bars: 50 μ m in P for A-P; 20 μ m in S for Q-S.

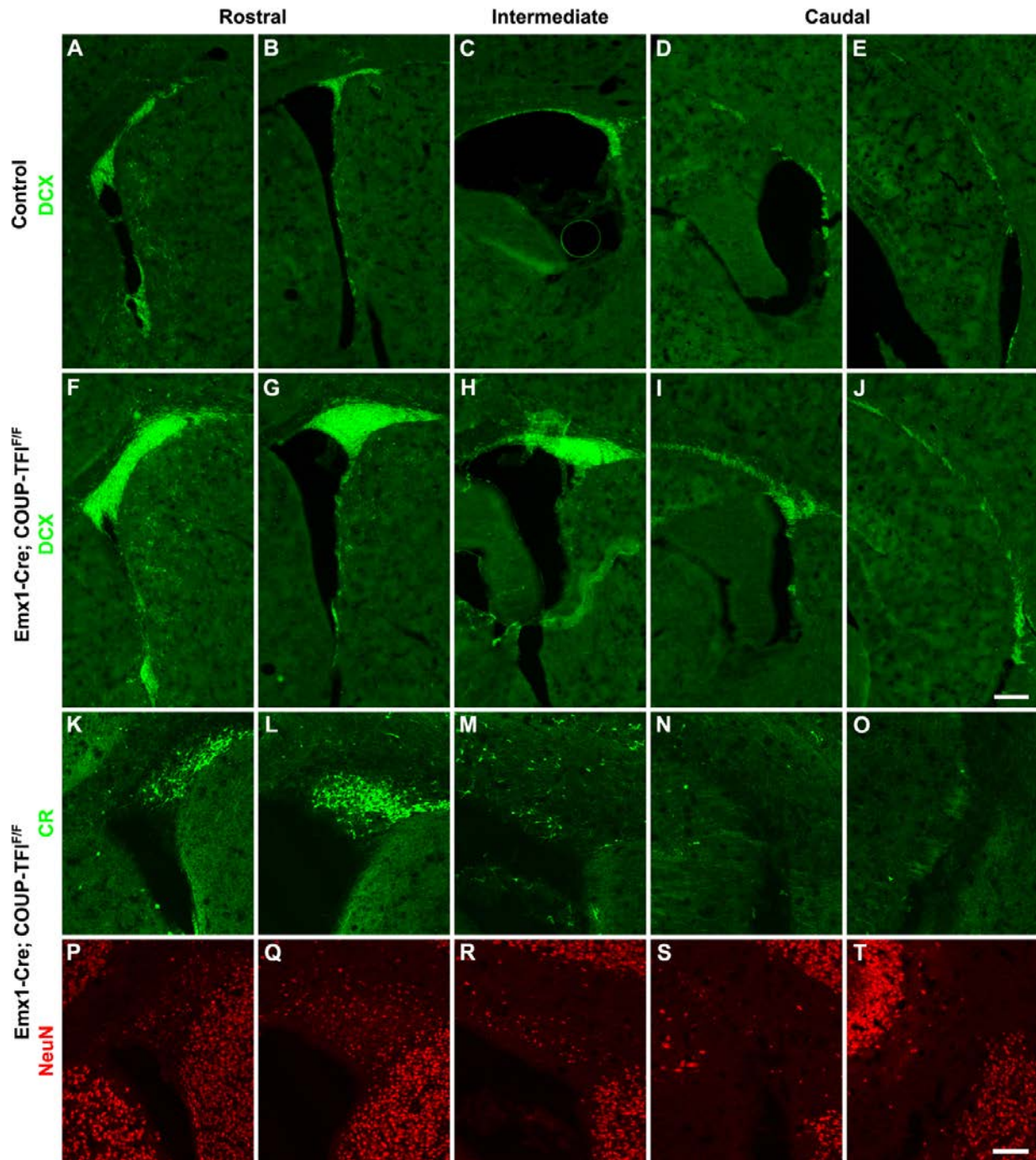


Figure S9. DCX+, CR+ and NeuN+ cells accumulate in the SVZ of Emx1-Cre; COUP-TFI^{flox/flox} conditional mutants. (A-E) DCX+ cells in the P21 control mouse SVZ. (F-J) More DCX+ cells were in the SVZ of P21 Emx1-Cre; COUP-TFI^{flox/flox} conditional mutant mice compared to controls. (K-T) A subset of CR+ (K-O) and NeuN+ (P-T) cells accumulate in the SVZ of Emx1-Cre; COUP-TFI^{flox/flox} conditional mutant mice at P21. Scale bars: 200 μ m in J for A-J; 100 μ m in T for K-T.

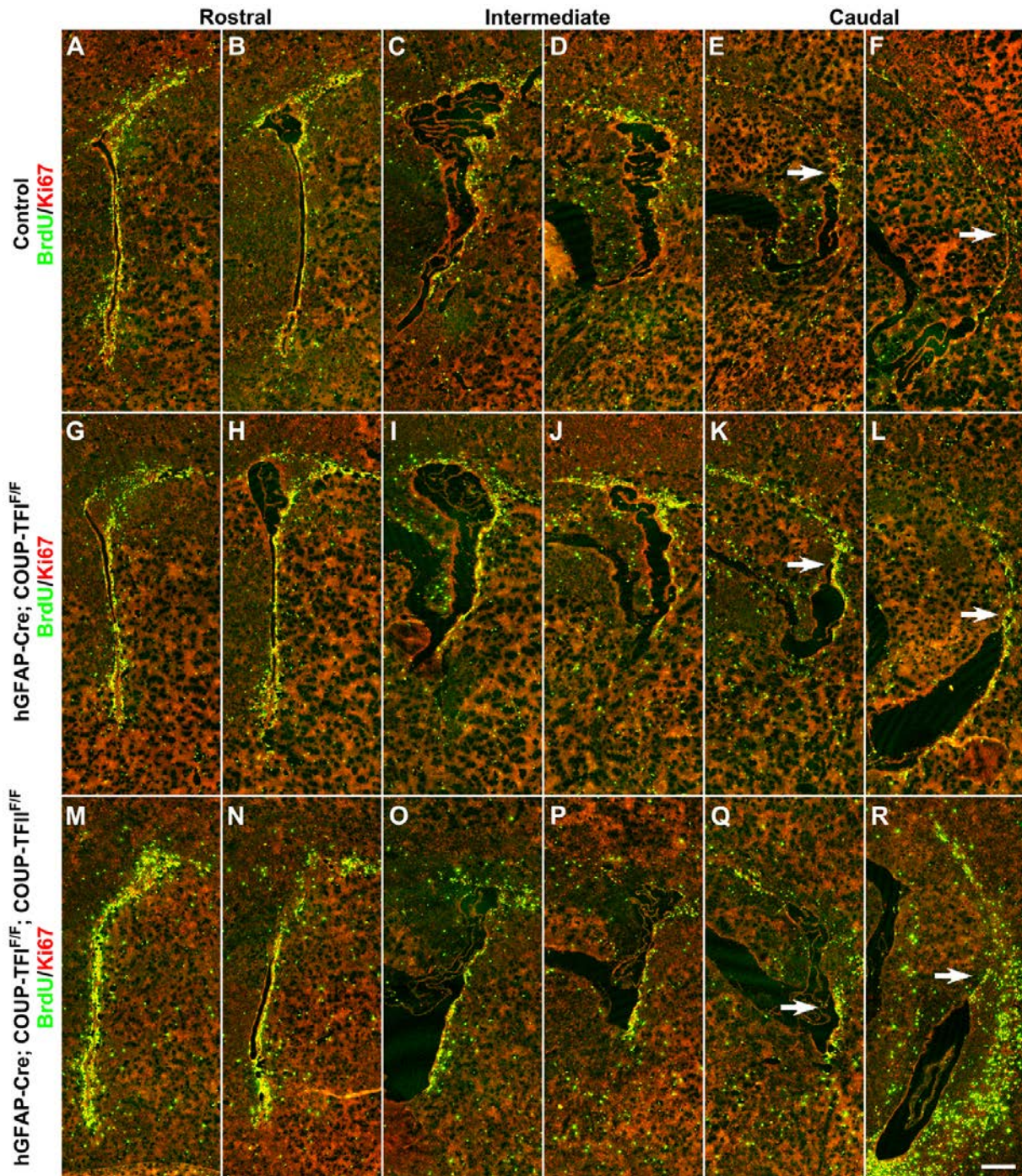
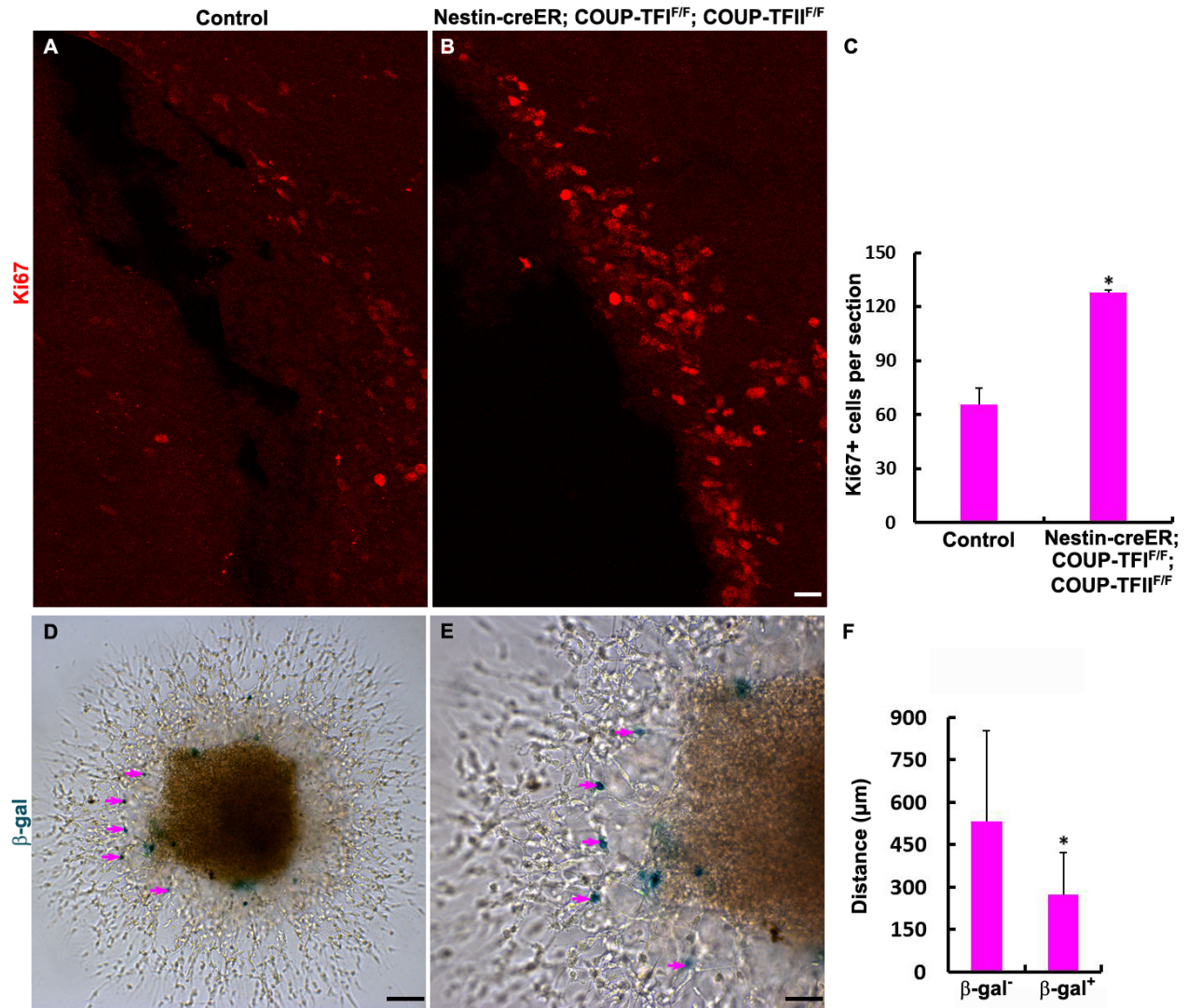


Figure S10. Cell proliferation in the SVZ of COUP-TFs conditional mutant mice. (A-R) BrdU was injected into control and COUP-TFs conditional mutant mice at P10 and mice were sacrificed 2 hours after BrdU injection. Compared to the caudal SVZ of control mice (**E, F**, arrows), more BrdU+/Ki67+ cells were observed in the caudal SVZ of hGFAP-Cre; COUP-TFI^{flox/flox} mice (**K, L**, arrows) and hGFAP-Cre; COUP-TFI^{flox/flox}, COUP-TFII^{flox/flox} mice (**Q, R**, arrows). Scale bar: 200 μ m in R for A-R.



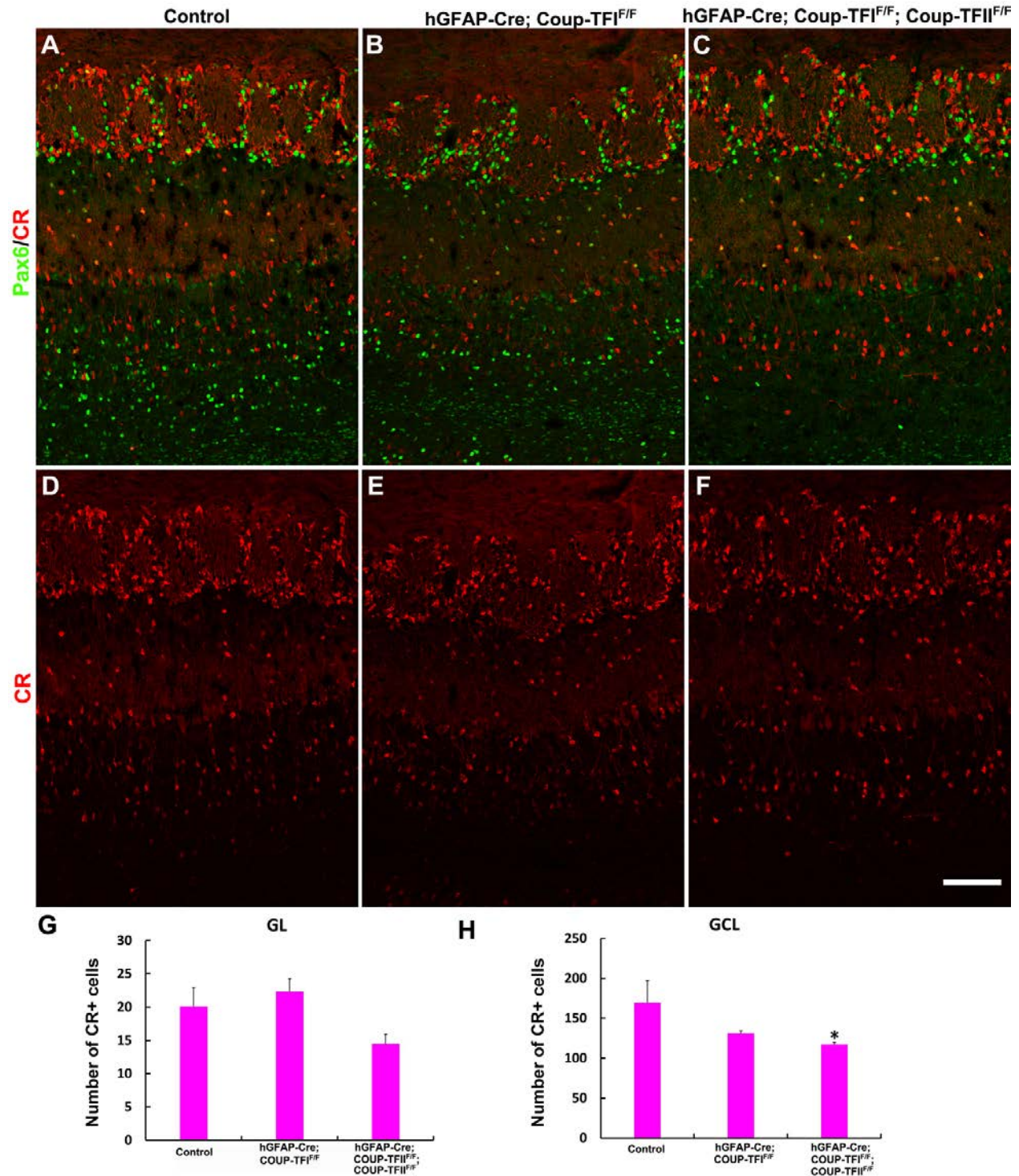


Figure S12. CR+ GCs are reduced in the hGFAP-Cre; COUP-TFI^{flox/flox}, COUP-TFII^{flox/flox} mouse OB. (A-F) Most CR+ cells in the OB GCL did not express Pax6. (G, H). The number of CR+ GCs in the hGFAP-Cre; COUP-TFI^{flox/flox}, COUP-TFII^{flox/flox} mouse OB were significantly reduced compared to controls at P21. * $p < 0.05$. Scale bar: 100 μ m in F for A-F.