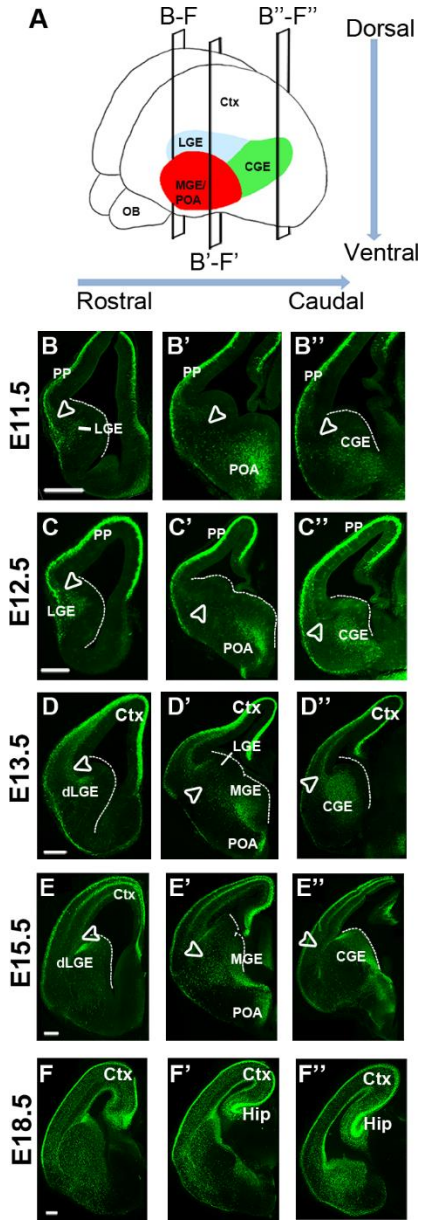

Fig. S1. Anterior to posterior views of the different 5HT3aR-GFP+ migratory streams in the developing mouse. (**A**) Schematic of a mouse brain indicating the position of coronal sections illustrated in B to F''. (**B-F''**) Rostral to caudal sequential coronal sections of *5HT3aR-GFP* embryos immunostained with GFP at the stages indicated on the left. *Empty arrowheads* point to dorsally-migrating GFP+ cells. *Abbreviations: LGE, lateral ganglionic eminence; dLGE, dorsal lateral ganglionic eminence; MGE, medial ganglionic eminence; CGE, caudal ganglionic eminence; POA, preoptic area; PP, preplate; Ctx, cortex; Hip, hippocampus. Scale bars: 300µm.*

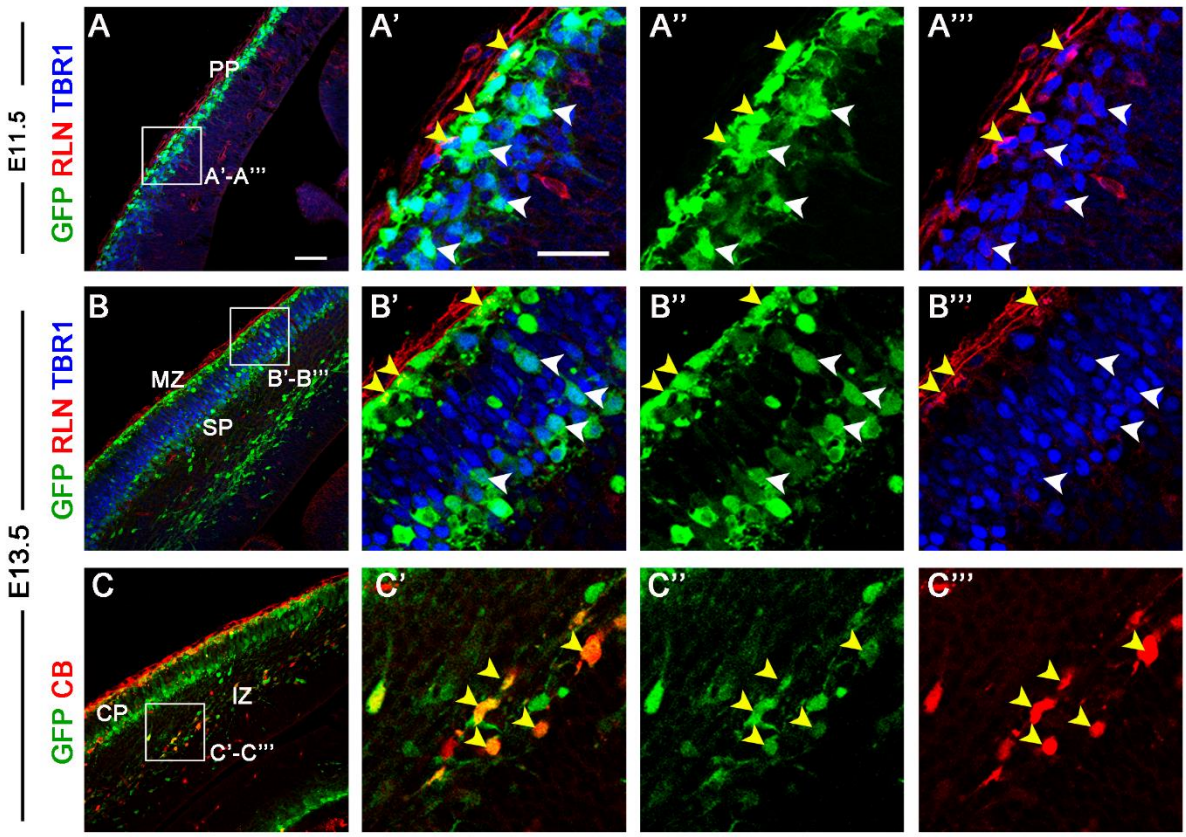

Fig. S2. Expression of 5HT3aR-GFP in preplate cells at early stages of development. (A, B) Coronal sections of E11.5 and E13.5 *5HT3aR-GFP* embryos immunostained with GFP, RLN and TBR1. At E11.5, GFP is expressed in Cajal-Retzius cells in the upper preplate (PP) (yellow arrowheads in **A'-A'''**) and in early pioneer cortical neurons in the PP (white arrowheads in **A'-A'''**). At E13.5, Cajal-Retzius cells remain in the marginal zone (MZ) (yellow arrowheads in **B'-B'''**), whereas the TBR1/GFP + cells are localized in the subplate (SP) (white arrowheads in **B'-B'''**). **(C-C''')** Coronal section of E13.5 *5HT3aR-GFP* embryos immunostained with GFP and Calbindin (CB). CB/GFP + cells are found in the MZ and intermediate zone (IZ) of the cortex corresponding to migratory interneurons (yellow arrowheads). *Abbreviations; PP, preplate; MZ, marginal zone; SP, subplate; CP, cortical plate; IZ, intermediate zone. Scale bars: (A) 50 µm, (A') 25 µm.*

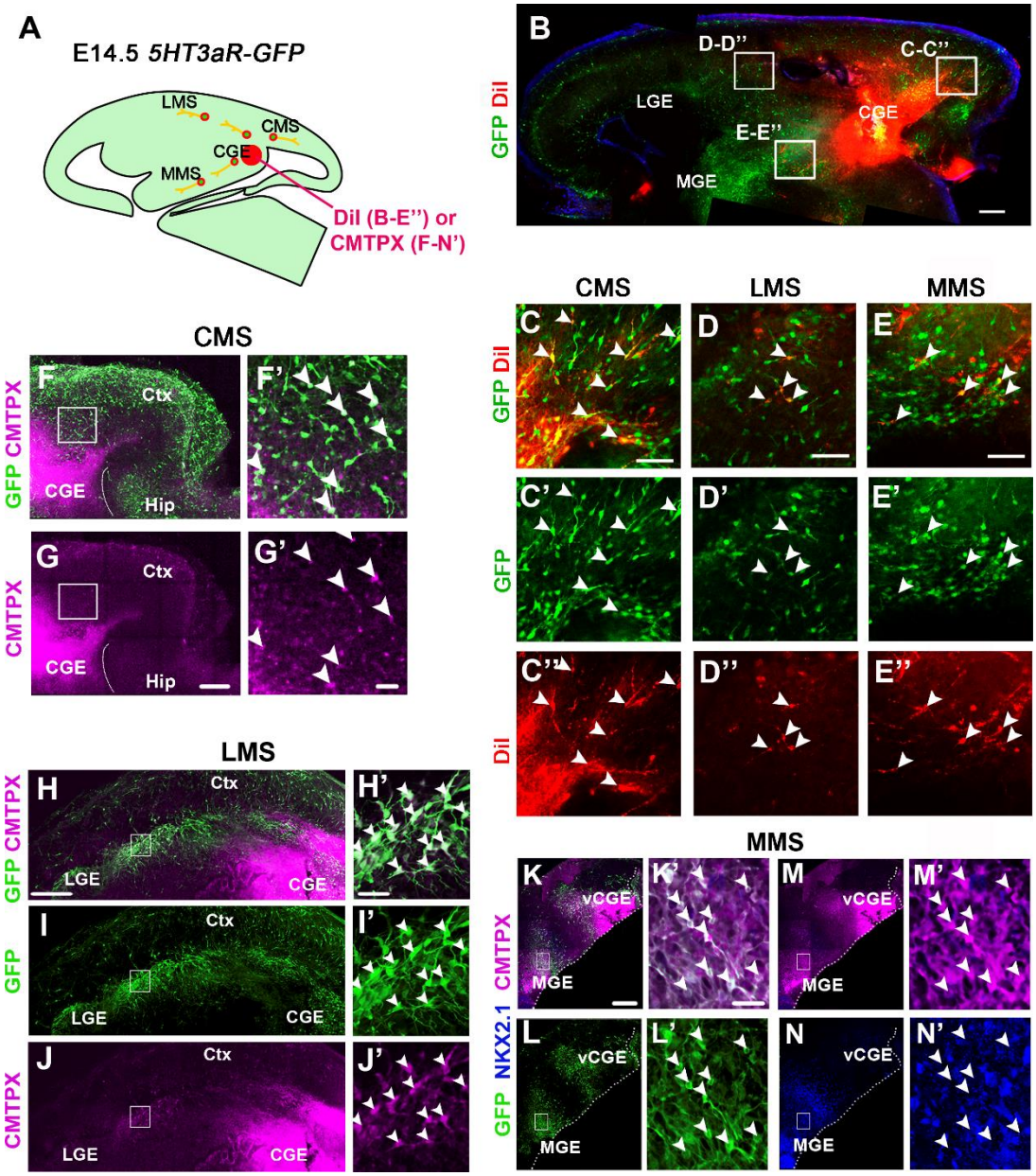

Fig. S3. Further experimental validation of rostrally and caudally CGE-derived *5HT3aR-GFP*+ migration. (**A**) Schematic of the experimental approach illustrating the positions of the resin ball soaked with CMTPX or DiI in the CGE of E14.5 horizontal organotypic sections. (**B**) Whole view of a horizontal *5HT3aR-GFP*+ section injected with DiI after 2 DIV of culture. Boxes indicate the region highlighted in C-E''. (**C-E''**) High magnification views of the boxes shown above indicate (white arrowheads) the cells that have integrated the DiI and express GFP. Note that these cells are present in all three streams. (**F-G'**) Caudal views showing the localization of the cell tracker CMTPX in the CGE and in migrating cells (**G, G'** in magenta) and its co-localization with GFP (**F, F'** GFP in green) in the caudal migratory stream (CMS). (**H-J'**) Dorsal views illustrating the localization of the cell tracker CMTPX, the GFP staining and their co-localization in the lateral migratory stream (LMS). (**K-N'**) Ventral views depicting the localization of the cell tracker CMTPX, the GFP and the MGE marker NKX2.1. Cells co-expressing the CMTPX and GFP in the medial migratory stream (MMS) become white (arrowheads in K') and do not express NKX2.1 (in blue, N'). To the right, high magnification views of the boxes depicted to the left. Note that the intensity of the CMTPX staining in the CGE region has been highly enhanced so that single-traced cells are highlighted. *Abbreviations*: *LGE, lateral ganglionic eminence; MGE, medial ganglionic eminence; CGE, caudal ganglionic eminence; Ctx, cortex; Hip, hippocampus. Scale bars: (B,F-N) 300µm, (C-E'', F'-N'), 50µm.*

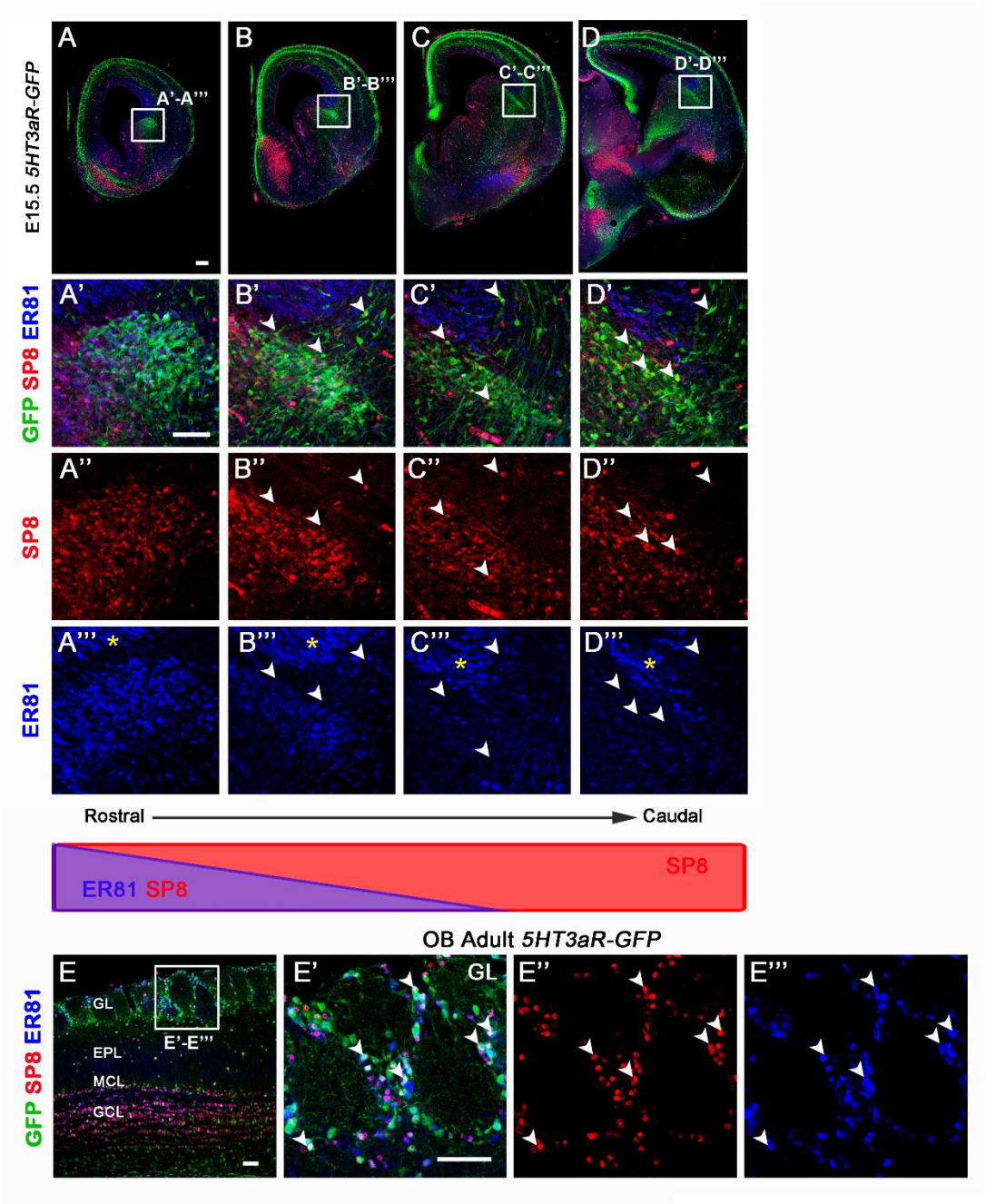

Fig. S4. ER81 is expressed in the rostral dLGE during development and in OB interneurons in adult mice. (**A-D**) Coronal sections of E15.5 *5HT3aR-GFP* embryos at four different rostrocaudal levels. The sections were immunostaining for GFP, SP8 and ER81. (**A'-D'''**) High magnification views taken from the boxes depicted in A-D. GFP and SP8 are expressed in the whole dLGE and in some neurons migrating through the intermediate zone to the cortex (white arrowheads in B'-D"). ER81 is expressed in the dLGE only at rostral levels and in the ventricular zone of the ventral pallium (yellow asterisks in A'''-D'''). Note that ER81 expression decreases from medial to caudal levels of the LGE and CGE. The arrowheads in B''' to D''' indicate double $GFP^{+}SP8^{+}$ cells and negative for ER81, migrating from the LMS to the cortex. (**E**) Coronal section of the olfactory bulb (OB) of adult *5HT3aR-GFP* mice showing the expression of GFP, SP8 and ER81 in different layers of the OB. (**E'-E'''**) High magnification views taken from the boxed area in (E) showing the expression of GFP, SP8 and ER81 in the glomerular layer (GL) of the OB. The majority of the GFP+ interneurons in the GL are positive for SP8 and ER81 (white arrowheads). *Abbreviations: GL, glomerular layer; EPL, external plexiform layer; MCL, mitral cell layer; GCL, granular cell layer. Scale bars: (A-D, E-E''') 100µm, (A'-D'''), 50µm.*

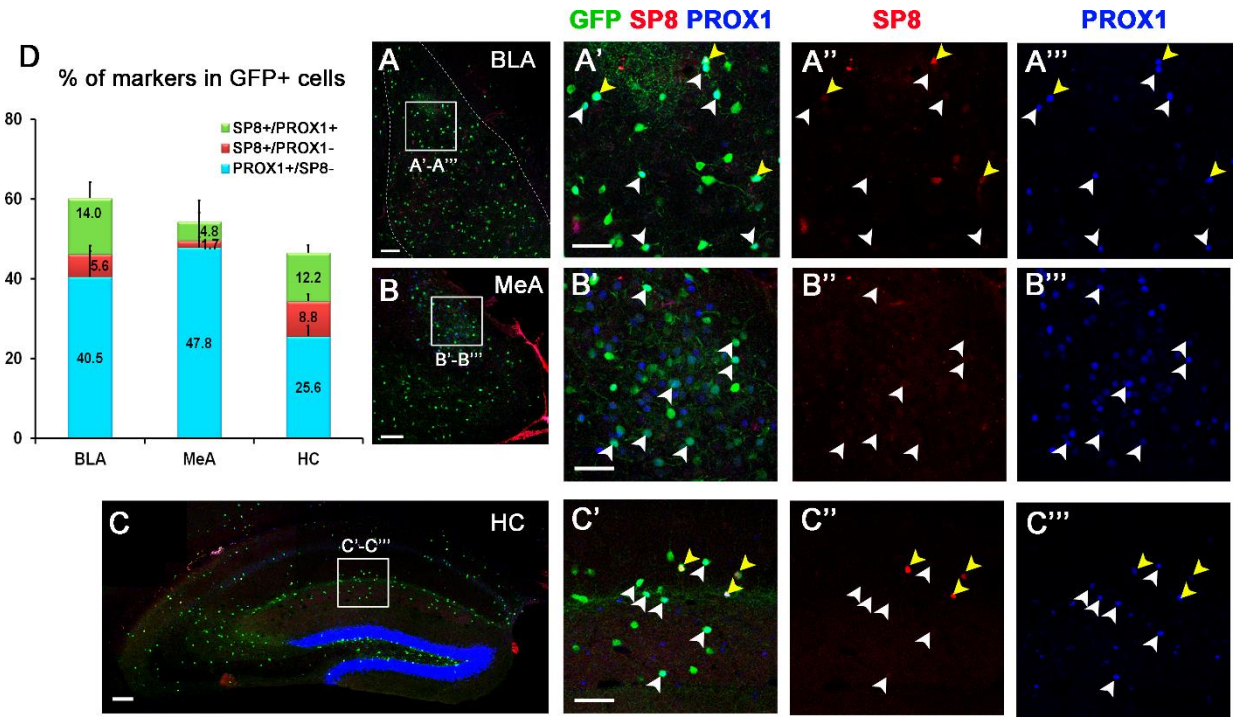

Fig. S5. GFP interneurons express SP8 and PROX1 in the amygdala and the hippocampus. (**A-C**) Coronal sections of adult *5HT3aR-GFP* mice in the basolateral complex of the amygdala (BLA), the medial amygdala (MeA) and the hippocampus (HC). The sections were immunostained for GFP, SP8 and PROX1. (**A'-C'''**) High magnification views taken from the boxed areas in A-C. The majority of GFP+ cells is positive for PROX1(white arrowheads), while a minor number of GFP+ cells is positive for SP8 (yellow arrowheads). (**D**) Graph showing the percentage of co-expression with PROX1and SP8 in the GFP+ population. In the amygdala, almost half of the GFP+ cells are positive for the transcription factor PROX1 and very few are positive only for SP8. *Scale bars: (A, B, C) 100µm, (A'-C''') 50µm.*