Is there substantial subcortical control of cortical functions?

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Is there dynamic 5HT modulation of decision making processes

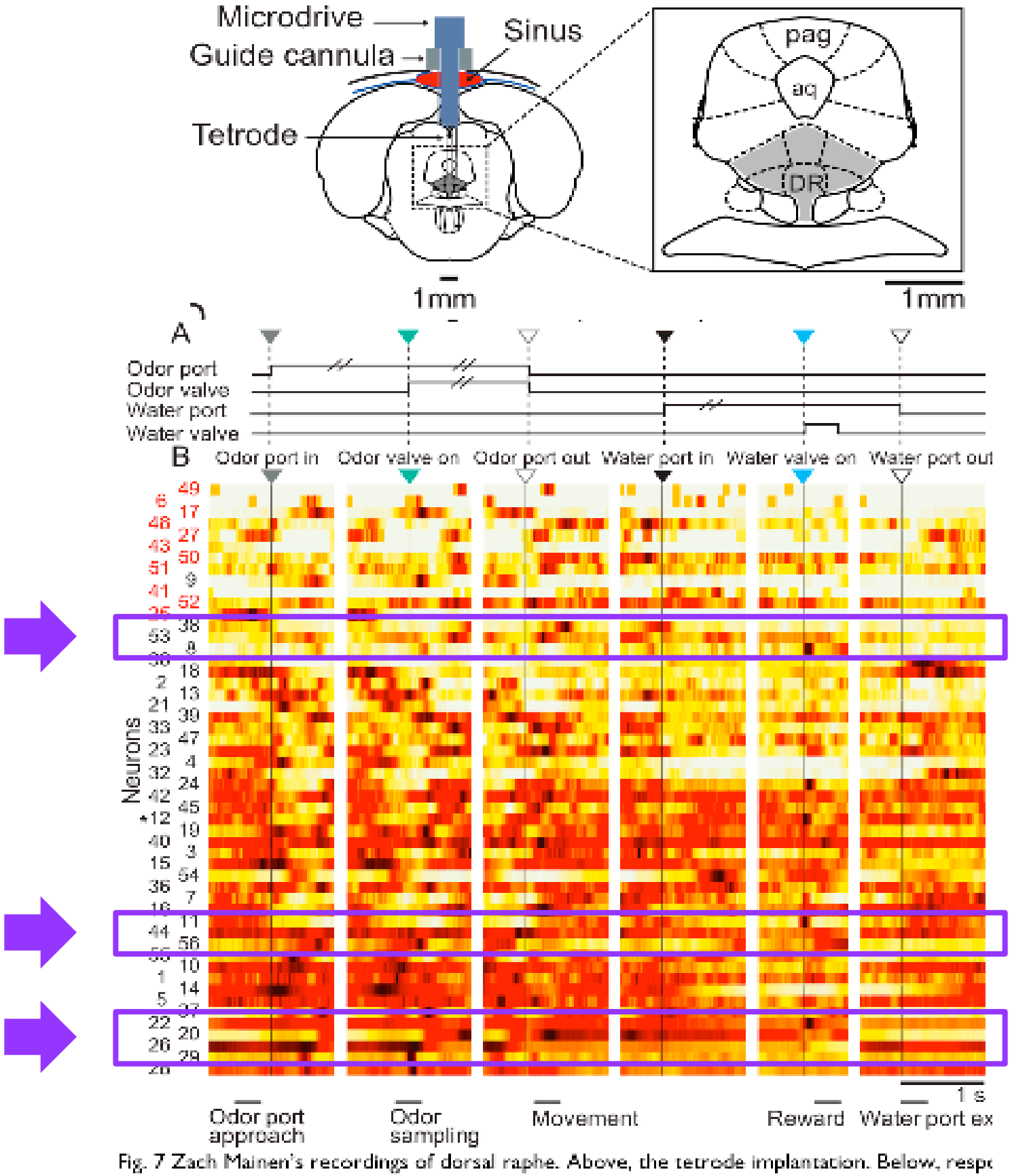

Fig. 7 Zach Mainen's recordings of dorsal raphe. Above, the tetrode implantation. Below, respo of each of a population of DR neurons during the course of the task.

Behavior Readout:
Setup: Olfactometer
Candidate Behavior: Temporal Discounting

Non-Behavioral Readout:
Voltammetry

There is dynamic 5HT modulation of decision making processes

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5HT levels change dynamically and meaningfully in relevant target area(s) during decision making tasks

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IC injection of **5HTR antagonists** (esp **5HT3A** antagonists)

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DR-Cre + AAV8-pCBA-DIO-ChR2(/NpHR):GFP

In vivo **Voltammetry** (Wightman)

DR-Cre x Rosa-GFP

DR-Cre x RGL

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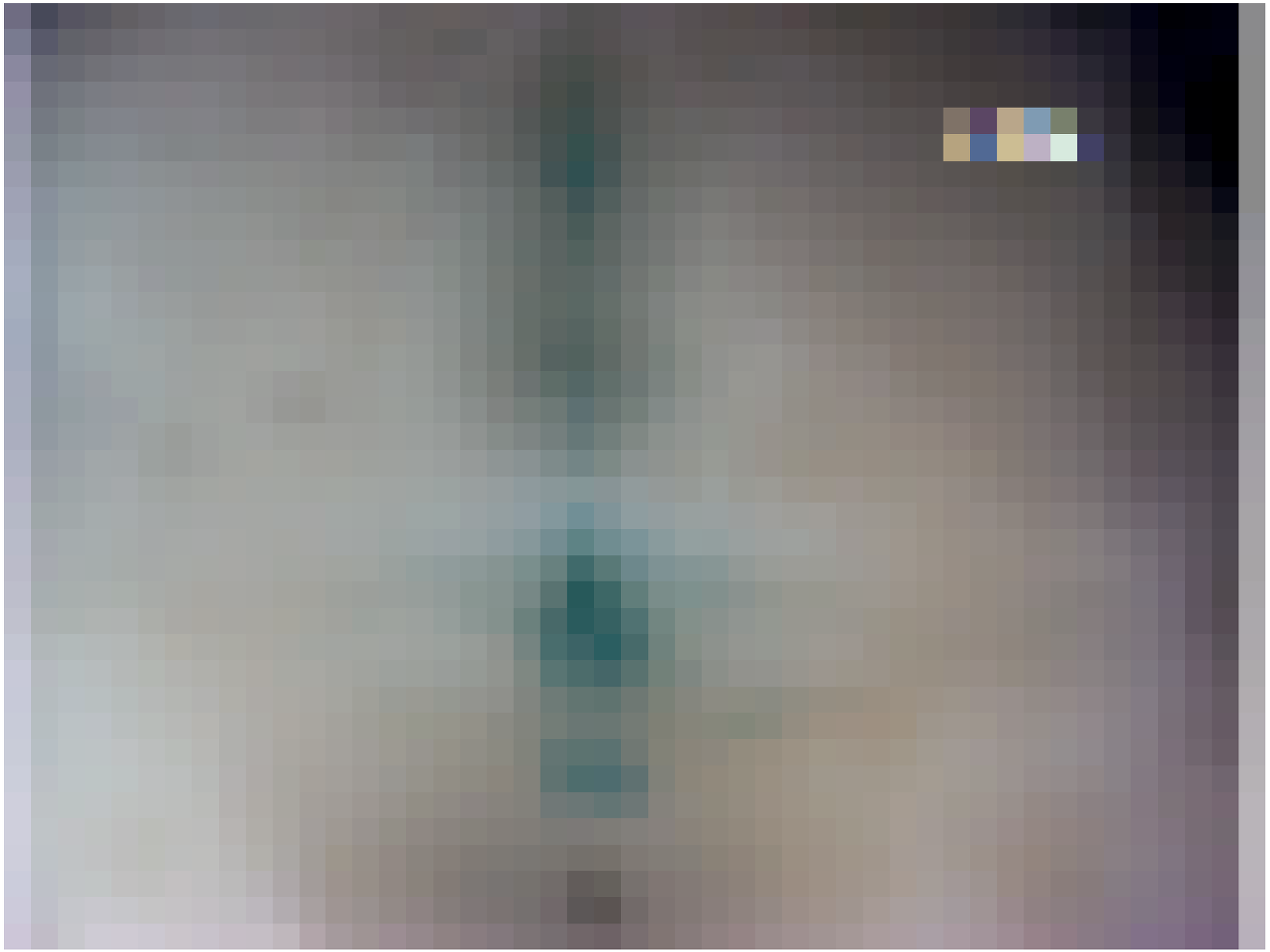
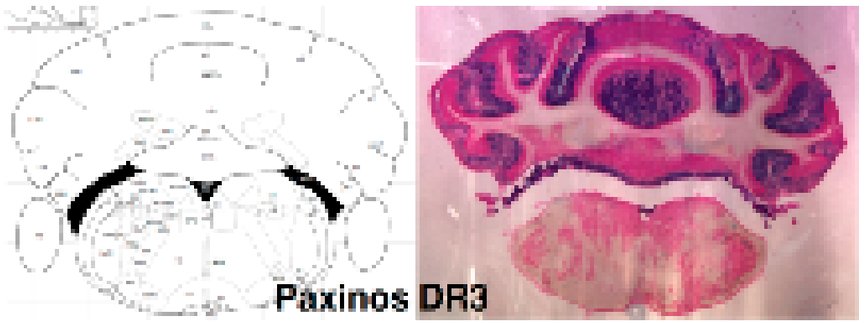
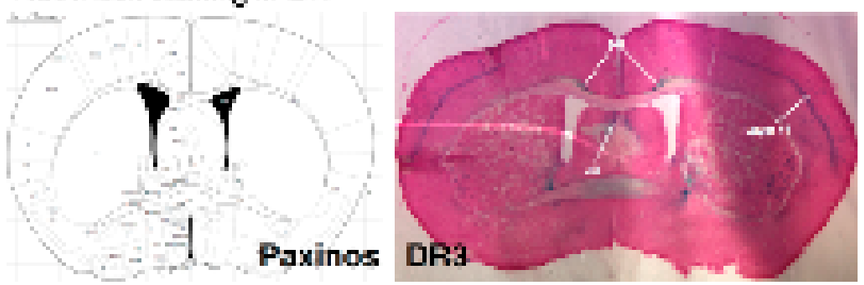
Genetic Targeting:
Cre Transgenic + Viral Delivery of DIO Constructs

DR-Cre





Not much staining in DR



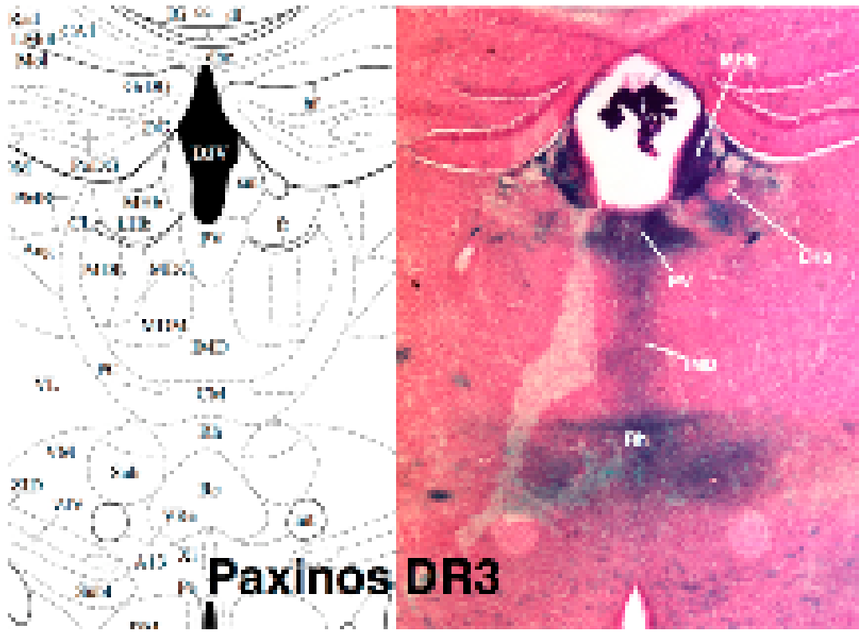
Cerebellum staining seems to bein purkinje cells

The staining in layer 4 of the cortex is unclear in nature (cell! Projection?)

Fig. 2 DR3-Cre x ROSA-RGL

LacZ Staining (unsure of nature, cellular or axonal) in Dorsal Raphe, purkinje cells of the cerebellum, Layer 4 of somatosensory cortex, singulate cortex(Cgl), paraventricular thalamic nucleus(PV), medial and lateral habenula(M and L H) and reuniens thalamic nucleus(Rh).

Faint staining in prefrontal cortex



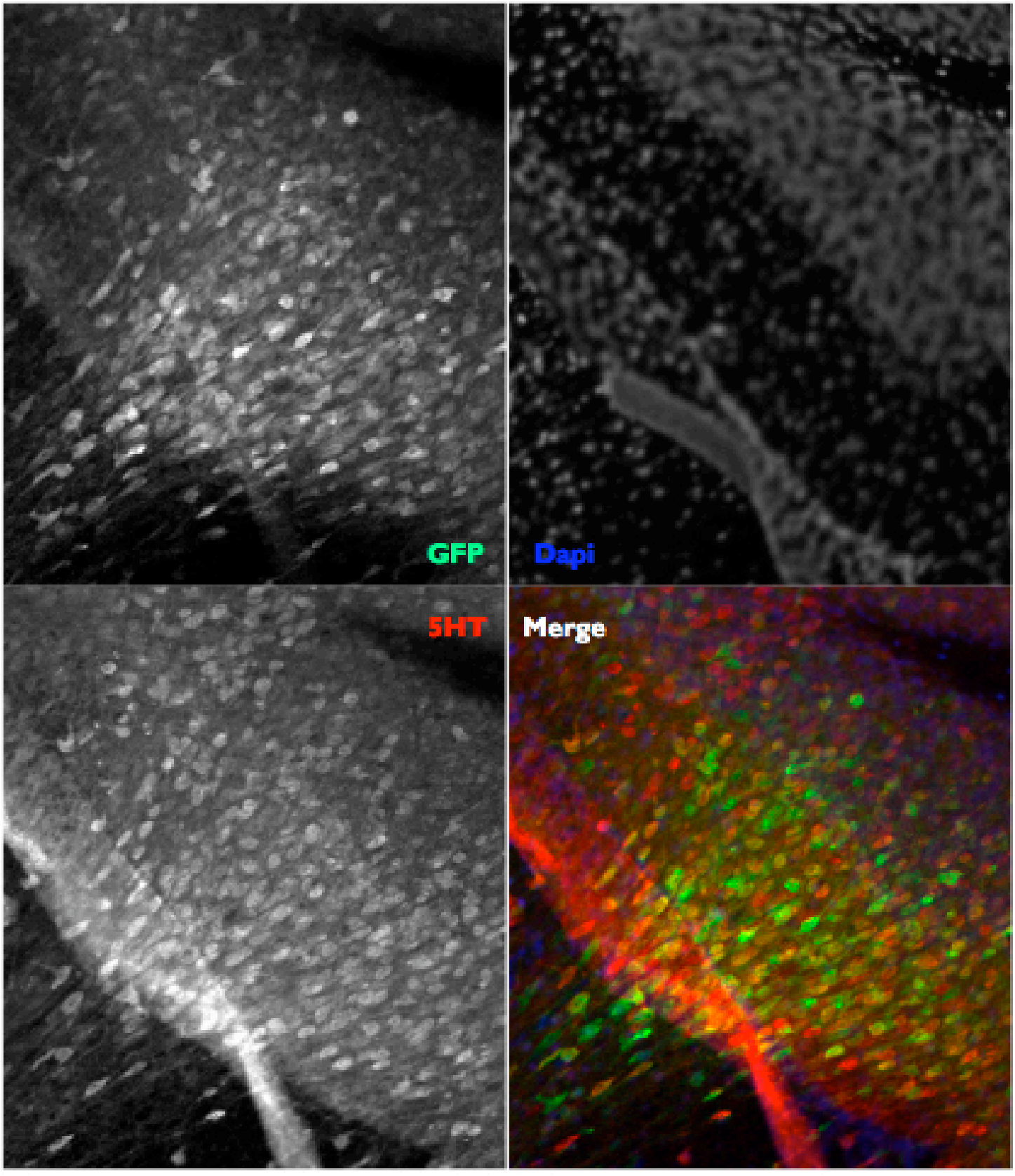


Fig. 6 Sagital view of dorsal raphe, 7 days after microinjection of 1 µL of AAV8-pCBA-DIO-ChR2:GFP into DR37 heterozygous male. Age: 8 weeks.

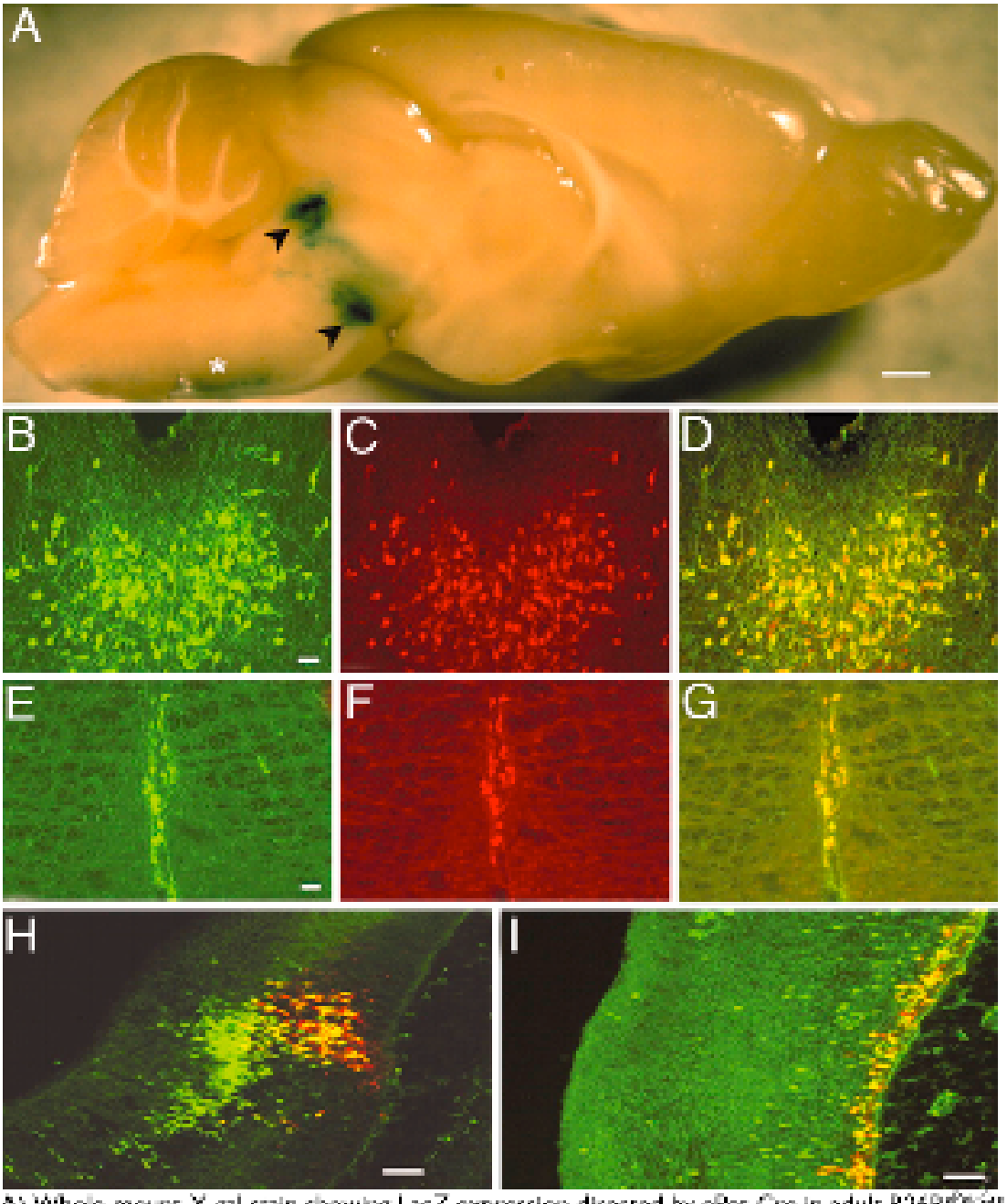


Fig. 3 cPet-Cre. (A) Whole-mount X-gal stain showing LacZ expression directed by cPet-Cre in adult R26R$^{cPet-Cre}$ brain. Black arrowheads, dorsal and median raphe. Asterisk, ventral medullary raphe. (B–I) cPet-Cre activity is restricted to developing and adult 5-HT neurons. Colocalization (D and G)of TPH (B and E) (FITC, anti-TPH 1:200) and β-gal (C and F) (Texas red, anti-β-gal 1:5,000) in B7 dorsal raphe nucleus (B–D) and B2 raphe obscurus nucleus (E–G). (H and I) Colocalization of Cre recombinase (FITC, anti-Cre recombinase 1:100) with 5-HT (Texas red, anti-5-HT 1:10,000) in rostral (H) and caudal (I) E12 hindbrain. (Scale bars: 800 μm, A;50 μm, B–I.)

Fig 4a. slc6a4-ER:Cre

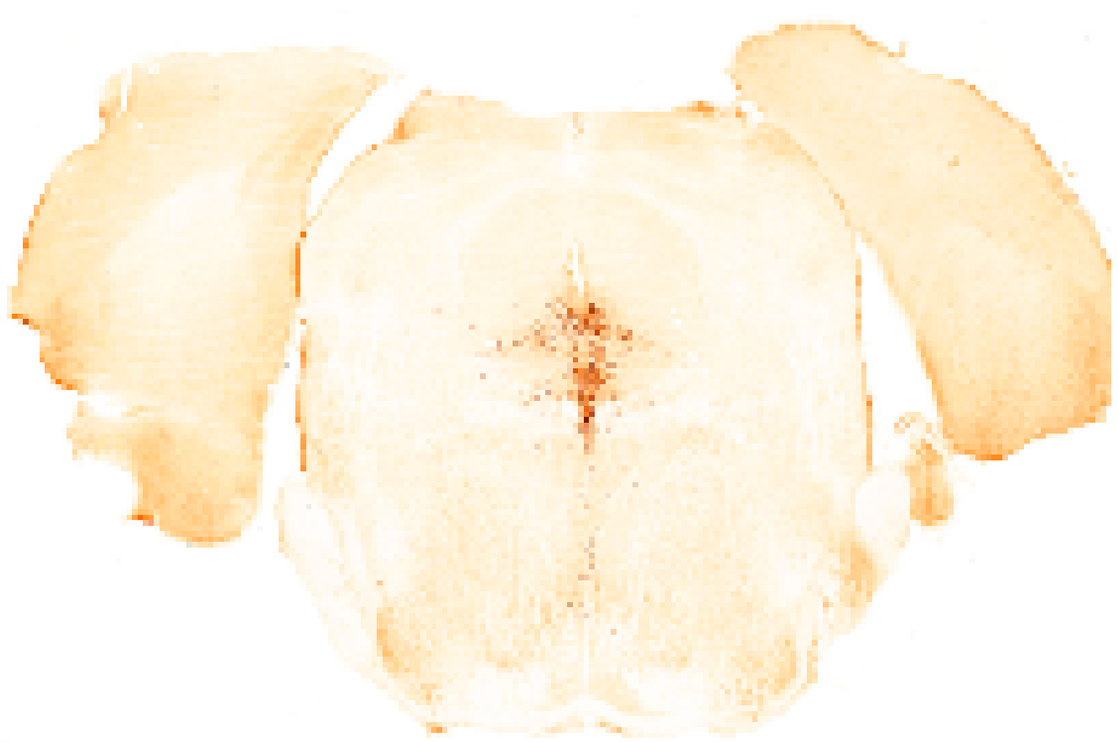


Fig 4b. slc6a4-Cre

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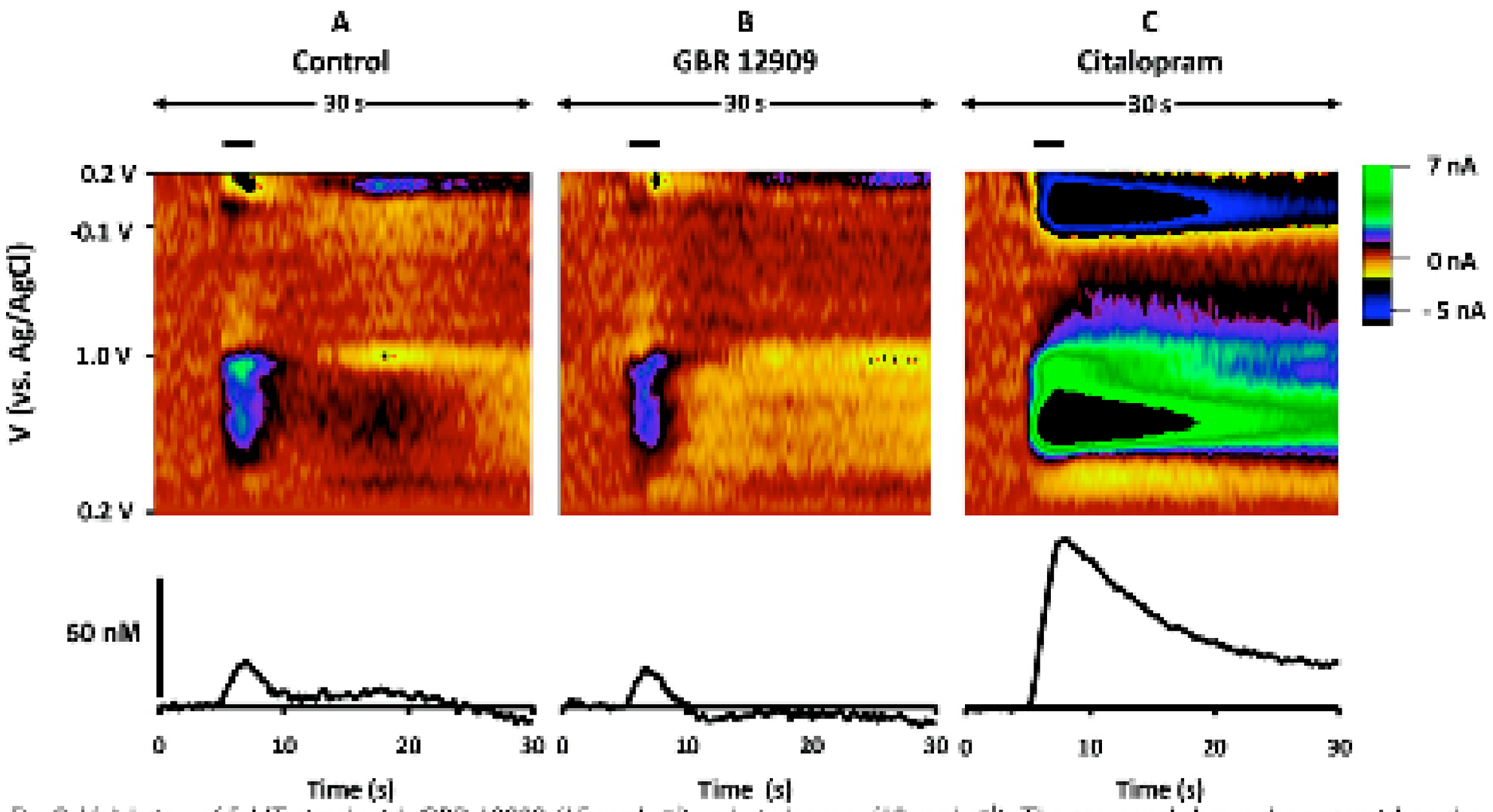

Fig. 8. Validation of 5-HT signal with GBR 12909 (15 mg kg^{-1}) and citalopram (10 mg kg^{-1}). The top panel shows the potential on the *y*-axis plotted against time on the *x*-axis; the current response is represented in false color. The black blocks horizontal to the *x*-axis are the durations of the stimulations. The bottom traces show concentration vs time. These responses are for (A) stimulation-evoked control response, (B) 40 min after systemic administration of GBR 12909, and (C) 40 min after systemic administration of citalopram.