

Crick was right

... but there is more about the thin sheath of GABAergic neurons that surrounds the thalamus

Arne

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Tea talk
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The thalamic reticular nucleus (TRN)

Francis Crick (1984)

“It is suggested that in the brain the **internal attentional searchlight**, proposed by Treisman and others, **is controlled by the reticular complex of the thalamus** (including the closely related perigeniculate nucleus) and that the expression of the searchlight is the production of rapid bursts of firing in a subset of thalamic neurons.”

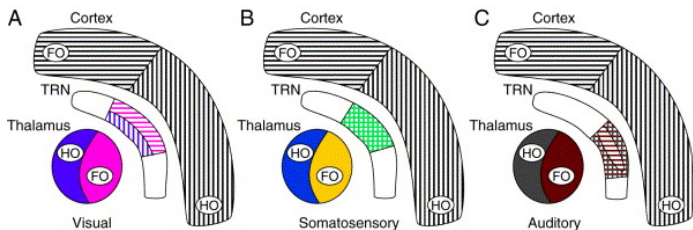
- Attentional gating (e.g., Halassa et al. 2014, Wimmer et al. 2015)

The thalamic reticular nucleus (TRN)

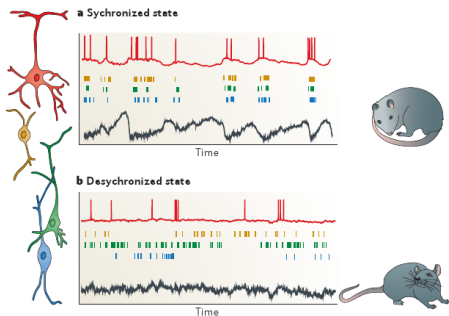
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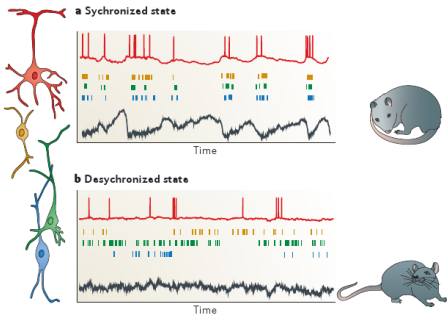
BUT: the TRN does not only control gating but also cortical state



Harris & Thiele 2011

- **Fast and local modulation** of state in sensory cortex (Halassa et al. 2011)
- Activity in TRN **correlates** with arousal (Halassa et al. 2014)

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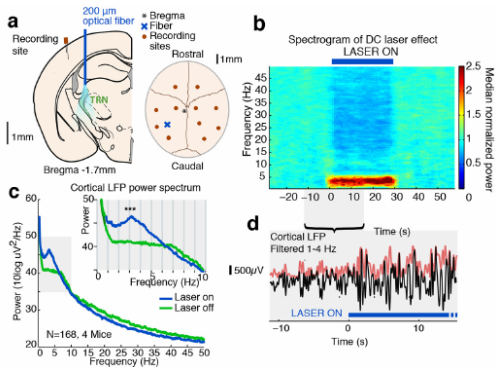
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Thalamic reticular nucleus induces fast and local modulation of arousal state

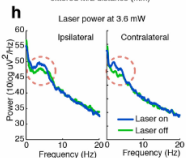
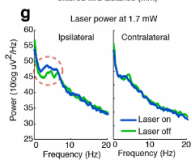
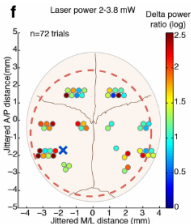
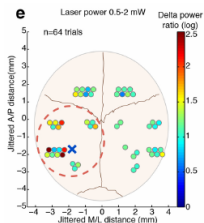
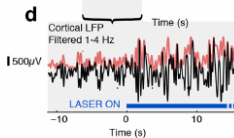
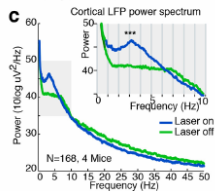
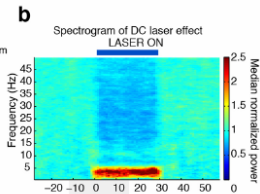
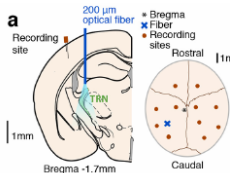
Laura D Lewis^{1,2,3†}, Jakob Voigts^{3†}, Francisco J Flores^{3,4,5}, L Ian Schmitt⁶, Matthew A Wilson^{3,7}, Michael M Halassa^{6*‡}, Emery N Brown^{3,4,5,8,9*‡}

- Optogenetic activation of TRN to **test causality**
- Impact onto behavior
- Focus on slow wave activity (e.g., drowsiness and non-REM sleep)

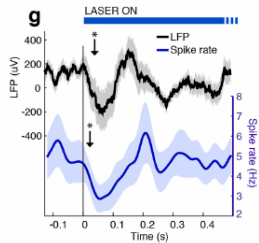
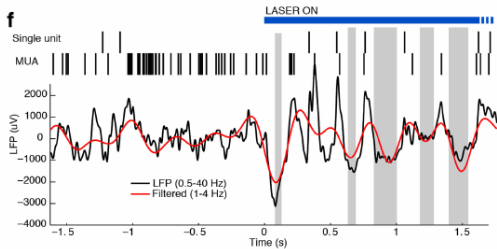
Tonic optogenetic stimulation of TRN neurons produces local cortical slow waves



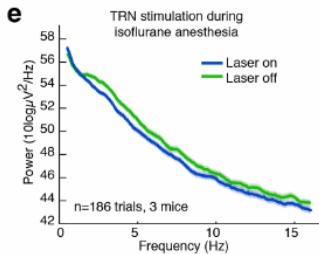
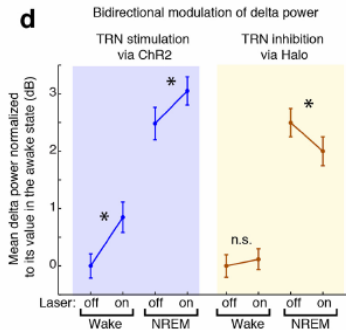
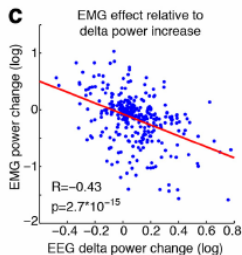
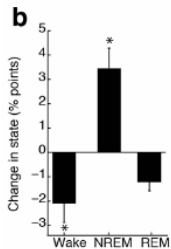
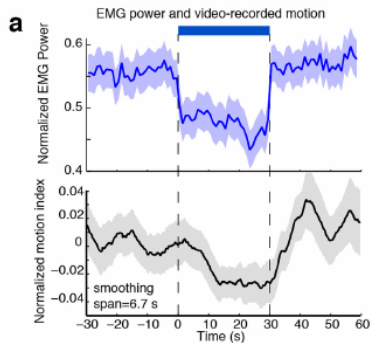
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Rapid modulation of state in sensory cortex



Behavior: TRN modulates arousal state



Looks promising but

- Rather anecdotal evidence
- Recording from TRN is very difficult
- Diversity of response properties in TRN (not shown)
- TRN activation only very small effect on behavior in freely moving mice (not shown)