

## References

1. R. W. Doty, Electrical stimulation of the brain in behavioral context. *Annu. Rev. Psychol.* **20**, 289 (1969).
2. P. G. Shinkman, R. A. Swain, R. F. Thompson, Classical conditioning with electrical stimulation of cerebellum as both conditioned and unconditioned stimulus. *Behav. Neurosci.* **110**, 914 (1996).
3. R. Romo, A. Hernández, A. Zainos, E. Salinas, Somatosensory discrimination based on cortical microstimulation. *Nature* **392**, 387 (1998).
4. H. Jasper, W. Penfield, *Epilepsy and the Functional Anatomy of the Human Brain* (Little, Brown, Boston, ed. 2, 1954).
5. D. Huber *et al.*, Sparse optical microstimulation in barrel cortex drives learned behaviour in freely moving mice. *Nature* **451**, 61 (2008).
6. L. Luo, E. M. Callaway, K. Svoboda, Genetic dissection of neural circuits. *Neuron* **57**, 634 (2008).
7. T. Kenet, D. Bibitchkov, M. Tsodyks, A. Grinvald, A. Arieli, Spontaneously emerging cortical representations of visual attributes. *Nature* **425**, 954 (2003).
8. J. Fiser, C. Chiu, M. Weliky, Small modulation of ongoing cortical dynamics by sensory input during natural vision. *Nature* **431**, 573 (2004).
9. J. N. MacLean, B. O. Watson, G. B. Aaron, R. Yuste, Internal dynamics determine the cortical response to thalamic stimulation. *Neuron* **48**, 811 (2005).
10. D. L. Ringach, Spontaneous and driven cortical activity: Implications for computation. *Curr. Opin. Neurobiol.* **19**, 439 (2009).
11. L. G. Reijmers, B. L. Perkins, N. Matsuo, M. Mayford, Localization of a stable neural correlate of associative memory. *Science* **317**, 1230 (2007).
12. G. M. Alexander *et al.*, Remote control of neuronal activity in transgenic mice expressing evolved G protein-coupled receptors. *Neuron* **63**, 27 (2009).

13. N. Matsuo, L. Reijmers, M. Mayford, Spine-type-specific recruitment of newly synthesized AMPA receptors with learning. *Science* **319**, 1104 (2008).
14. S. G. Anagnostaras, G. D. Gale, M. S. Fanselow, Hippocampus and contextual fear conditioning: Recent controversies and advances. *Hippocampus* **11**, 8 (2001).
15. P. W. Frankland, V. Cestari, R. K. Filipkowski, R. J. McDonald, A. J. Silva, The dorsal hippocampus is essential for context discrimination but not for contextual conditioning. *Behav. Neurosci.* **112**, 863 (1998).
16. J. H. Han *et al.*, Neuronal competition and selection during memory formation. *Science* **316**, 457 (2007).
17. J. H. Han *et al.*, Selective erasure of a fear memory. *Science* **323**, 1492 (2009).
18. Y. Zhou *et al.*, CREB regulates excitability and the allocation of memory to subsets of neurons in the amygdala. *Nat. Neurosci.* **12**, 1438 (2009).
19. G. Girardeau, K. Benchenane, S. I. Wiener, G. Buzsáki, M. B. Zugardo, Selective suppression of hippocampal ripples impairs spatial memory. *Nat. Neurosci.* **12**, 1222 (2009).
20. G. B. Choi *et al.*, Driving opposing behaviors with ensembles of piriform neurons. *Cell* **146**, 1004 (2011).
21. D. Tse *et al.*, Schema-dependent gene activation and memory encoding in neocortex. *Science* **333**, 891 (2011); 10.1126/science.1205274.
22. D. Tse *et al.*, Schemas and memory consolidation. *Science* **316**, 76 (2007).
23. E. Korzus, M. G. Rosenfeld, M. Mayford, CBP histone acetyltransferase activity is a critical component of memory consolidation. *Neuron* **42**, 961 (2004).
24. G. M. McKhann 2nd, H. J. Wenzel, C. A. Robbins, A. A. Sosunov, P. A. Schwartzkroin, Mouse strain differences in kainic acid sensitivity, seizure behavior, mortality, and hippocampal pathology. *Neuroscience* **122**, 551 (2003).