

## Barry W. Connors

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### EDUCATION:

University of Dayton	B.S.	Biology	1971-74
Duke University	Ph.D.	Physiology & Pharmacology (mentor: George G. Somjen)	1975-79
Stanford University	Postdoctoral fellow	Neuroscience (mentors: David A. Prince, Stephen G. Waxman)	1979-82

### ACADEMIC APPOINTMENTS:

1982-87	Assistant Professor	Dept. of Neurology	Stanford University
1987-89	Assistant Professor	Section of Neurobiology	Brown University
1989-94	Associate Professor	Dept. of Neuroscience	Brown University
1994-present	Professor	Dept. of Neuroscience	Brown University
2000-present	L. Herbert Ballou University Professor of Neuroscience		Brown University
2006-16	Chair	Dept. of Neuroscience	Brown University

### FELLOWSHIPS AND HONORS:

1975-79	NIH predoctoral fellowship
1979-81	NIH postdoctoral fellowship
1981-82	Lennox Postdoctoral Fellowship, American Epilepsy Society
1985-88	Klingenstein Fellowship in the Neurosciences
1985-91	Research Career Development Award, NIH
1989	Master of Arts <i>ad eundem</i> , Brown University
1992	Grass Foundation Traveling Scientist
1997	Dozor Visiting Professor, Ben-Gurion University, Israel
1997-04	Javits Neuroscience Investigator Award, NIH, NINDS
2001	Keynote speaker, "Neuroscience at Storrs", University of Connecticut
2004	Special Lecturer, Society for Neuroscience Annual Meeting
2000-present	L. Herbert Ballou University Professor of Neuroscience
2000-07	Associate, Neurosciences Research Program (NRP), La Jolla, CA
2004-08	Dean's Teaching Excellence Award, Alpert Medical School, Brown
2009	Plenary Lecturer (could not attend), Japan Neuroscience Society, Nagoya
2009	Keynote Speaker, International Gap Junction Conference, Sedona AZ
2009-14	Certificate for Exemplary Teaching, Alpert Medical School, Brown
2011	Herbert Jasper Lecturer, Montreal Neurological Institute, McGill University
2012	Fellow of the American Association for the Advancement of Science (AAAS)

**EDITORIAL BOARDS:**

1996-2000	<i>Journal of Neuroscience</i> , Associate Editor
2000-03	<i>Journal of Neuroscience</i> , Reviewing Editor
2003-06	<i>Journal of Neuroscience</i> , Senior Editor
2001-08	<i>Thalamus and Related Systems</i> , Editorial Board
2008-12	<i>Frontiers in Cellular Neuroscience</i> , Associate Editor
1999-2014	<i>Journal of Neurophysiology</i> , Editorial Board
2009-14	<i>Epilepsy Currents</i> , Contributing Editor
1996-present	<i>Cerebral Cortex</i> , Associate Editor
2006-present	<i>Brain Structure and Function</i> , Editorial Board

**SERVICE COMMITTEES (recent):**

1998-2002	NIH study section, IFCN-8, regular member
2008-11	NIH study section, NST-2; K99/R00 Pathway to Independence Awards, regular member
2010	Blueprint Undergraduate Research Diversity (R25) Applications, NIMH, ad hoc reviewer
2010	External reviewer, Neuroscience Graduate Program, Harvard University
2011	External advisory board, Center for Neural Basis of Cognition, Carnegie-Mellon & U Pitt
2012	NIH special emphasis panel, ZRG1 IFCN-Q, ad hoc reviewer
2013	NIH study section, ZMH1 ERB-S, ad hoc reviewer
2013	NIH special emphasis panel, ZRG1 IFCN-T, ad hoc reviewer
2010-13	Committee on Neuroscience Depts and Programs (Soc for Neuroscience), member
2014	NIH study section, ZMH1 ERB-S, 04, ad hoc reviewer
2014	NIMH Board Scientific Counselors, ad hoc reviewer
2015	NIH study section (ZMH1 ERB-S), ad hoc reviewer
2015	NIH study section (ZRG1 IFCN-T-02), ad hoc reviewer
2016	NINDS Special Emphasis Panel (ZNS1 SRB-E 07), R35 reviewing, ad hoc reviewer
2016	NIMH Special Emphasis Panel (ZMH1 ERB-X 01), R25 reviewing, ad hoc reviewer
2017	NIH Neurotransporters, Receptors, Calcium study section, ad hoc reviewer
2017	Co-organizer (with A Pereda, M Feller, N Spruston), <i>Electrical Synapses</i> conference, Janelia Farm Research Campus, HHMI

**PRIMARY JOURNAL ARTICLES:**

Links to my published work are available [HERE](#).

Connors B, Dray A, Fox P, Hilmy M, Somjen G. LSD's effect on neuron population in visual cortex gauged by transient responses of extracellular potassium evoked by optical stimuli. *Neurosci Lett*, 13: 147-150, 1979.

Kinnes CG, Connors BW, Somjen GG. The effects of convulsant doses of penicillin on primary afferents, dorsal root ganglion cells and on "presynaptic" inhibition in the spinal cord. *Brain Res*, 192: 495-512, 1980.

Connors BW. A comparison of the effects of pentobarbital and diphenylhydantoin on the GABA sensitivity and excitability of adult sensory ganglion cells. *Brain Res*, 207: 357-369, 1981.

Gutnick MJ, Connors BW, Ransom BR. Dye-coupling between glial cells in the guinea pig neocortical slice. *Brain Res*, 213: 486-492, 1981.

Kocsis JD, Malenka RC, Connors BW, Waxman SG, Cummins KL. Population response characteristics of fiber tracts in central white matter. *Prog Clin Biol Res*. 52: 17-32, 1981.

- Foster RE, Connors BW, Waxman SG. Rat optic nerve: Electrophysiological, pharmacological and anatomical studies during development. *Develop Brain Res*, 3: 371-386, 1982.
- Connors BW, Prince DA. Effects of the local anesthetic QX-314 on the membrane properties of hippocampal pyramidal neurons. *J Pharmacol Exp Therap*, 220: 476-481, 1982.
- Connors BW, Ransom BR, Kunis D, Gutnick MJ. Activity-dependent K<sup>+</sup> accumulation in the developing rat optic nerve. *Science*, 216: 1341-1343, 1982.
- Connors BW, Gutnick MJ, Prince DA. Electrophysiological properties of neocortical neurons *in vitro*. *J Neurophysiol*, 48: 1302-1320, 1982.
- Gutnick MJ, Connors BW, Prince DA. Mechanisms of neocortical epileptogenesis *in vitro*. *J Neurophysiol*, 48: 1321-1335, 1982.
- Connors BW, Benardo LS, Prince DA. Coupling between neurons of the developing rat neocortex. *J Neurosci*, 3: 773-782, 1983.
- Connors BW, Benardo LS, Prince DA. Carbon dioxide sensitivity of dye-coupling among glia and neurons of the neocortex. *J Neurosci*, 4: 1324-1330, 1984.
- Connors BW. Initiation of synchronized neuronal bursting in neocortex. *Nature*, 310: 685-687, 1984.
- Connors BW, Ransom BR. Chloride conductance and extracellular potassium concentration interact to modify the excitability of rat optic nerve fibres. *J Physiol (Lond)*, 355: 619-633, 1984.
- Ransom BR, Yamate CL, Connors BW. Activity-dependent shrinkage of extracellular space: A developmental study. *J Neurosci*, 5: 532-535, 1985.
- McCormick DA, Connors BW, Lighthall JW, Prince DA. Comparative electrophysiology of pyramidal and sparsely spiny neurons of the neocortex. *J Neurophysiol*, 54: 782-806, 1985.
- Connors BW, Kriegstein AR. Cellular physiology of the turtle visual cortex: Distinctive properties of pyramidal and stellate neurons. *J Neurosci*, 6: 164-177, 1986.
- Kriegstein AR, Connors BW. Cellular physiology of the turtle visual cortex: Synaptic properties and intrinsic circuitry. *J Neurosci*, 6: 178-191, 1986.
- Connors BW, Ransom BR. Electrophysiological properties of ependymal cells (radial glia) in dorsal cortex of the turtle, *Pseudmys scripta*. *J Physiol (Lond)* 385: 287-306, 1987.
- Chervin RD, Pierce PA, Connors BW. Periodicity and directionality in the propagation of epileptiform discharges across neocortex. *J Neurophysiol*, 60: 1695-1713, 1988.
- Connors BW, Malenka RC, Silva LR. Two inhibitory postsynaptic potentials, and GABA<sub>A</sub> and GABA<sub>B</sub> receptor-mediated responses in neocortex of rat and cat. *J Physiol (Lond)*, 406: 443-468, 1988.
- Chagnac-Amitai Y, Connors BW. Horizontal spread of synchronized activity in neocortex, and its control by GABA-mediated inhibition. *J Neurophysiol*, 61: 747-757, 1989.
- Agmon, A., Connors BW. Repetitive burst-firing neurons in the deep layers of mouse somatosensory cortex. *Neurosci Lett*, 99: 137-141, 1989.
- Chagnac-Amitai Y, Connors BW. Synchronized excitation and inhibition driven by intrinsically bursting neurons in neocortex. *J Neurophysiol*, 62: 1149-1162, 1989.
- Silva LR, Amitai Y, Connors BW. Intrinsic oscillations of neocortex generated by layer 5 pyramidal neurons. *Science*, 251: 432-435, 1991.
- Agmon A, Connors BW. Thalamocortical responses of mouse somatosensory (barrel) cortex *in vitro*. *Neuroscience*, 41: 365-380, 1991.
- Silva LR, Gutnick MJ, Connors BW. Laminar distribution of neuronal membrane properties in neocortex of normal and reeler mouse. *J Neurophysiol*, 66: 2034-2040, 1991.
- Agmon A, Connors BW. Correlation between intrinsic firing patterns and thalamocortical responses of mouse barrel cortex neurons. *J Neurosci*, 12: 319-330, 1992.
- Bear MF, Press WA, Connors BW. Long-term potentiation in slices of kitten visual cortex and the effects of NMDA receptor blockade. *J Neurophysiol*, 67: 841-851, 1992.

- Amitai Y, Friedman, A., Connors BW, Gutnick MJ. Regenerative activity in the apical dendrites of pyramidal cells in neocortex. *Cerebral Cortex*, 3: 26-38, 1993.
- Kim HG, Connors BW. Apical dendrites of the neocortex: correlation between sodium- and calcium-dependent spiking and pyramidal cell morphology. *J Neurosci*, 13: 5301-5311, 1993.
- Cauler LJ, Connors BW. Synaptic physiology of horizontal afferents to layer I of primary somatosensory cortex in rats. *J Neurosci*, 14: 751-762, 1994.
- Kim HG, Fox K, Connors BW. Properties of excitatory synaptic events in neurons of the primary somatosensory cortex of neonatal rats. *Cerebral Cortex*, 2:148-157, 1995.
- Castro-Alamancos MA, Donoghue JP, Connors BW. Different forms of synaptic plasticity in somatosensory and motor areas of the neocortex. *J Neurosci*, 15: 5324-5333, 1995.
- Kim HG, Beierlein M, Connors BW. Inhibitory control of excitable dendrites in neocortex, *J Neurophysiol*, 74: 1810-1814, 1995.
- Castro-Alamancos MA, Connors BW. Short-term synaptic enhancement and long-term potentiation in neocortex. *Proc Natl Acad Sci USA*, 93: 1335-1339, 1996a.
- Castro-Alamancos MA, Connors BW. Short-term plasticity of a thalamocortical pathway dynamically modulated by behavioral state. *Science*, 272: 274-277, 1996b.
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- Castro-Alamancos MA, Connors BW. Spatiotemporal properties of short-term plasticity in sensorimotor thalamocortical pathways of the rat. *J Neurosci*, 16: 2767-2779, 1996c.
- Nicoll A, Kim HG, Connors BW. Laminar origins of inhibitory synaptic inputs of pyramidal neurons in rat neocortex. *J Physiol (London)*, 497: 109-117, 1996.
- Castro-Alamancos MA, Connors BW. Cellular mechanisms of the augmenting response: short-term plasticity in a thalamocortical pathway. *J Neurosci*, 16: 7742-7756, 1996d.
- Castro-Alamancos MA, Connors BW. Distinct forms of synaptic plasticity in pathways of hippocampus and neocortex. *Proc Natl Acad Sci USA*, 94: 4161-4166, 1997.
- Gil Z, Connors BW, Amitai Y. Differential regulation of neocortical synapses by activity and neuromodulators. *Neuron*, 19: 679-686, 1997.
- Cauler LJ, Clancy B, Connors BW. Backward cortical projections to primary somatosensory cortex in rats extend long horizontal axons in layer I. *J Comp Neurol*, 390: 297-310, 1998.
- Telfeian AE, Connors BW. Layer-specific pathways for the horizontal propagation of epileptiform discharges in neocortex. *Epilepsia*, 39: 700-708, 1998.
- Zhu JJ, Connors BW. Intrinsic firing patterns and whisker-evoked synaptic responses of neurons in the rat barrel cortex. *J Neurophysiol*, 81: 1171-1183, 1999.
- Gil Z, Connors BW, Amitai Y. Efficacy of thalamocortical and intracortical synaptic connections: quanta, innervation, and reliability. *Neuron*, 23: 385-397, 1999.
- Finnerty GT, Roberts LS, Connors BW. Sensory experience modifies short-term dynamics of neocortical synapses. *Nature*, 400: 367-371, 1999.
- Telfeian AE, Connors BW. Epileptiform propagation patterns mediated by NMDA and nonNMDA receptors in neocortex. *Epilepsia*, 40: 1580-1586, 1999.
- Gibson JR, Beierlein M, Connors BW. Two networks of electrically coupled inhibitory neurons in neocortex. *Nature*, 402: 75-79, 1999.
- Beierlein M, Gibson JR, Connors BW. An electrically coupled network of interneurons drives synchronized inhibition in neocortex. *Nature Neurosci*, 3: 904-910, 2000.
- Finnerty GT, Connors BW. Modest alterations of short-term synaptic dynamics follow sensory deprivation without competition. *Proc Natl Acad Sci USA*, 97: 12864-12868, 2000.
- Deans MR, Gibson JR, Sellitto C, Connors BW, Paul DL. Synchronous activity of inhibitory networks in neocortex requires electrical synapses containing connexin36. *Neuron*, 31: 477-485, 2001.

- Landisman CE, Long MA, Beierlein M, Deans MR, Paul DL, Connors BW. Electrical synapses in the thalamic reticular nucleus. *J Neurosci*, 22: 1002-1009, 2002.
- Amitai Y, Gibson JR, Beierlein M, Patrick SL, Ho AM, Connors BW, Golomb D. The spatial dimensions of electrically coupled networks of interneurons in neocortex. *J Neurosci*, 22: 4142-4152, 2002.
- Beierlein M, Connors BW. Efficacy and dynamics of excitatory synapses to layer 6 neurons in neocortex depend on input source. *J Neurophysiol*, 88: 1924-1932, 2002.
- Long MA, Deans MR, Paul DL, Connors BW. Rhythmicity without synchrony in the electrically uncoupled inferior olive. *J Neurosci*, 22: 10898-10905, 2002.
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- Landisman CE, Connors BW. Modulation of electrical synapses in the mammalian thalamus. *Science*, 310:1809-1813, 2005.
- Patrick SL, Connors BW, Landisman CE. Developmental changes in somatostatin-positive interneurons in a freeze-lesion model of epilepsy. *Epilepsy Res*, 70: 161-171, 2006.
- Venkataramani S, Davitt KM, Zhang J, Xu H, Song YK, Connors BW, Nurmikko AV. Semiconductor ultraviolet light emitting diodes for flash photolysis. *J Neurosci Meth*, 160:5-9, 2007.
- Mancilla JG, Lewis TJ, Pinto DJ, Rinzel J, Connors BW. Synchronization of electrically coupled pairs of inhibitory interneurons in neocortex. *J Neurosci*, 27:2058-2073, 2007.
- Cruikshank SJ, Lewis TJ, Connors BW. Synaptic basis for intense thalamocortical activation of feedforward inhibitory cells in neocortex. *Nature Neurosci*, 10: 462-468, 2007.

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- Fanselow EE, Richardson KA, Connors BW. Selective, state-dependent activation of somatostatin-expressing inhibitory interneurons in mouse neocortex. *J Neurophysiol*, 100: 2640-2652, 2008.
- Zhang J, Laiwalla F, Kim JA, Urabe H, Wagenen Van R, Song Y-K, Connors BW, Zhang F, Deisseroth K, Nurmikko AV. Integrated device for optical stimulation and spatiotemporal electrical recording of neural activity in light sensitized brain tissue. *J Neural Engin*, 6: 55007, 2009.
- Parker PRL, Cruikshank SJ, and Connors BW. Stability of electrical coupling despite massive developmental changes of intrinsic neuronal physiology. *J Neurosci*, 29: 9761-9770, 2009.
- Zhang J, Laiwalla F, Kim JA, Urabe H, Van Wagenen R, Song YK, Connors BW, Nurmikko AV. A microelectrode array incorporating an optical waveguide device for stimulation and spatiotemporal electrical recording of neural activity. *Conf Proc IEEE Eng Med Biol Soc*. 1: 2046-2049, 2009.
- Cruikshank SJ, Urabe H, Nurmikko AV, Connors BW. Pathway-specific feedforward circuits between thalamus and neocortex revealed by selective optical stimulation of axons. *Neuron*, 65: 230-245, 2010.
- Lee S-C, Cruikshank SJ, Connors BW. Electrical and chemical synapses between relay neurons in developing thalamus. *J Physiol (London)*. 588: 2403-2415, 2010.
- Fanselow EE, Connors BW. The role of somatostatin-expressing (GIN) and fast-spiking interneurons in UP-DOWN states of mouse neocortex. *J Neurophysiol*. 104: 596-606, 2010.
- Hayut I, Fanselow EE, Connors BW, Golomb D. LTS and FS inhibitory interneurons, short-term synaptic plasticity, and cortical circuit dynamics. *PLoS Comput Biol*. 7(10): e1002248, 2011.
- Sills JB, Connors BW, Burwell RD. Electrophysiological and morphological properties of neurons in layer 5 of the rat postrhinal cortex. *Hippocampus*, 22: 1912-1922, 2012.
- Kim JA, Connors BW. High temperatures alter physiological properties of pyramidal cells and inhibitory interneurons in hippocampus. *Frontiers Cell Neurosci*, 6: 27, 2012.
- Cruikshank SJ, Ahmed OJ, Stevens TR, Patrick SL, Gonzalez AN, Elmaleh M, Connors BW. Thalamic control of layer 1 circuits in prefrontal cortex. *J Neurosci*, 32: 17813-17823, 2012.
- Normand ER, Crandall SR, Thorn CA, Murphy EM, Voelcker B, Browning C, Machan JT, Moore CI, Connors BW, Zervas M. Temporal and mosaic Tsc1 deletion in the developing thalamus disrupts thalamocortical circuitry, neural function, and behavior. *Neuron*, 78: 895-909, 2013.
- Lee S-C, Patrick SL, Richardson KA, Connors BW. Two functionally distinct networks of gap junction-coupled inhibitory neurons in the thalamic reticular nucleus. *J Neurosci*, 34:13170-13182, 2014.
- Neske GT, Patrick SL, Connors BW. Contributions of diverse excitatory and inhibitory neurons to recurrent network activity in cerebral cortex. *J Neurosci*, 35:1089-1105, 2015.
- Crandall SR, Cruikshank SJ, Connors, BW. A corticothalamic switch: controlling the thalamus with dynamic synapses. *Neuron*, 86:768-782, 2015.
- Ho JW, Poeta DL, Jacobson TK, Zolnik TA, Neske GT, Connors BW, Burwell RD. Bidirectional Modulation of Recognition Memory. *J Neurosci*, 35:13323-13335, 2015.
- Zolnik TA, Connors BW. Electrical synapses and the development of inhibitory circuits in the thalamus. *J Physiol (London)*, 594:2579-2592, 2016.
- Neske GT, Connors BW. Distinct roles of SOM and VIP interneurons during cortical Up states. *Frontiers Neural Circuits*, 10:52. DOI: 10.3389/fncir.2016.00052, 2016.
- Neske GT, Connors BW. Synchronized gamma-frequency inhibition in neocortex depends on excitatory-inhibitory interactions but not electrical synapses. *J Neurophysiol*, 116:351-368, 2016.
- Blaeser AS, Connors BW, Nurmikko AV. Spontaneous dynamics of neural networks in deep layers of prefrontal cortex. *J Neurophysiol*, 117:1581-1594, 2017.

**REVIEWS, ESSAYS, AND BOOK CHAPTERS:**

- Somjen G, Dingledine R, Connors B, Allen B. Extracellular potassium and calcium activities in the mammalian spinal cord and the effect of changing ion levels on mammalian neural tissues. In: *Ion Selective Microelectrodes and Their Use in Excitable Tissues*. E Sykova et al. (eds.), Plenum Press, pp. 159-180, 1981.
- Somjen G, Connors B, Kinnes C. Calcium activity and seizure mechanisms in the spinal cord of cats. In: *Physiology and Pharmacology of Epileptogenic Phenomena*. M Klee et al. (eds.), Raven Press, New York, pp. 309-318, 1982.
- Prince DA, Connors BW, Benardo LS. Mechanisms underlying interictal-ictal transitions. *Advances in Neurology, Vol. 34: Status Epilepticus*. AV Delgado-Escueta et al. (eds.), Raven Press, New York, pp. 179-189, 1982.
- Connors BW, Gutnick MJ. Neocortex: Cellular properties and intrinsic circuits. In: *Brain Slices*. R Dingledine (ed.), Plenum Press, New York, pp. 313-339, 1984.
- Prince DA, Connors BW. Mechanisms of epileptogenesis in cortical structures. *Ann. Neurol.* 16:S59-S64, 1984.
- Connors BW, Gutnick MJ. Cellular mechanisms of neocortical epileptogenesis in an acute experimental model. In: *Electrophysiology of Epilepsy* P Schwartzkroin, H Wheal (eds.), Academic Press, pp. 79-105, 1984.
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- Connors BW, Chagnac-Amitai Y. Synaptic inhibition, intrinsically bursting neurons, and synchronization in neocortex. *Exp. Brain Res. Ser.* 20, 11-15, 1991.
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- Cauler LJ, Connors BW. Functions of very distal dendrites: Experimental and Computational studies of layer I inputs to layer V pyramidal neurons in neocortex. In: *Single Neuron Computation*, T McKenna, J Davis, SF Zornetzer (eds.), Academic Press, pp. 199-230, 1992.
- Silva LR, Connors BW. Synchronized oscillations intrinsic to the neocortex. In: *Epilepsy and Inhibition*, EJ Speckmann, MJ Gutnick (eds.), Urban & Schwarzenberg, Munich, pp. 215-227, 1992.
- Connors BW, Amitai Y. Generation of epileptiform discharge by local circuits of neocortex. In: *Epilepsy: Models, Mechanisms and Concepts*, PA Schwartzkroin (ed.), Cambridge University Press, pp. 388-423, 1993.
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- Amitai Y, Connors BW. Intrinsic physiology and morphology of single neurons in neocortex. In: *Cerebral Cortex, Vol. 11, The Barrel Cortex of Rodents*, E.G. Jones, I Diamond (eds.), Plenum Press, pp.299-331, 1995
- Connors BW, Amitai Y. Functions of local circuits in neocortex: synchrony and laminae. In: *The Cortical Neuron*, I Mody, MJ Gutnick (eds.), Cambridge Press, pp. 123-141, 1995.
- Connors BW, Castro-Alamancos MA, Beierlein M. Diverse neuronal functions of the cerebral cortex. In: *Excitatory Amino Acids and the Cerebral Cortex*, F Conti, TP Hicks (eds.), MIT Press, pp. 21-32, 1996.
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- Connors BW. Dendritic and synaptic variety in the neocortex. *Develop Neuropsychol*, 16: 311-313, 1999.
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- Connors BW, Telfeian AE. Dynamic properties of cells, synapses, circuits and seizures in neocortex. In: *Neocortical Epilepsies*, Williamson PD et al. (eds), *Advances in Neurology*, 84:141-152, 2000.
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- Connors BW, Long MA. Electrical synapses in the mammalian brain. *Ann Rev Neurosci*, 27: 393-418, 2004.
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