

CURRICULUM VITAE

Henry A. Lester

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Born: July 4, 1945, in New York City
Family: Married 1978, to Margaret L. Hershey
Children: Beth Sarah Lester, born 1980; Benjamin Levy Lester, born 1983
1610 Bushnell Avenue, South Pasadena, CA 91030
Citizenship: U.S.A.
Also Germany, granted 2008 (Article 116 II 2 of German Constitution)
Education: 1963-1966 Harvard College. A.B. with Highest Honors in Chemistry & Physics
1966-1971 The Rockefeller University. Ph.D. in Biophysics (Advisors: F. A. Dodge, H.
K. Hartline, F. Ratliff)
1971-1973 Postdoctoral Fellow, Institut Pasteur, Paris (Advisor: J.-P. Changeux)

1. Professional History:

1973-present Assistant, Associate, Professor, and Bren Professor of Biology, Caltech
Sabbaticals: 1980-1981 Department of Biological Chemistry, Hebrew University, Jerusalem
2005 Howard Florey Institute, University of Melbourne
2014 Janelia Farm Research Campus, HHMI

2. Present Research Interests:

Ion Channels
Synaptic Transmission
Light-flash physiology
Neuronal engineering and interventional neuroscience
Mouse Models for Neurological and Psychiatric Diseases
Parkinson's Disease
Nicotine Addiction
Psychiatric disease

3. Fellowships and Honors:

NSF predoctoral (1966-1968)
NIH predoctoral (1968-1971)
NIH postdoctoral (1971-1973)
Alfred P. Sloan Research Fellowship (1974-1976)
NIH Research Career Development Award (1977-1982)
Senator Jacob Javits Investigator, NINDS (1985-1999)
Richard E. Heikkila Research Scholar Award, National Parkinson Foundation, 2000
American Academy of Arts and Sciences (Elected 2006)
K.S. Cole Award, Biophysical Society, 2007

Named and Keynote Lectureships:

Grass Foundation Visiting Scientist, Society for Neuroscience
Hawaii Chapter, 1989; Michigan Chapter, 1990; Birmingham AL Chapter, 1998
Bristol-Myers Lecture, State University of New York at Buffalo, 1991
Harvey Lecture, 1996
Keynote Lecture, Oregon Health Sciences University Graduate Research Forum, 1997
Vanzant Lecture, Rice University, 1997
DeCamp Lecture, Rockefeller University, 1998
Keynote Lecture, 1999 FASEB Conference on Transporters
Keynote Lecture, New England Pharmacologists 29th Annual Meeting, Brown University, 2000
Keynote Lecture, NINDS-NIMH Intramural Retreat, 2000
Nahum Lecture, Yale University School of Medicine, 2001
Keynote Lecture, NIMH Dynamical Neuroscience Symposium, 2002
Keynote Lecture, University of Southern California Neuroscience Retreat, 2005
Keynote Lecture, SFN Satellite: The 5-HT₃ Receptor
Watson Lecture, Caltech (1978 and 2002)
Q. R. Murphy Lecture, Univ. Wisconsin at Madison, 2006
Distinguished Lecture, Dept of Physiology & Membrane Biology, UC Davis (2006)
Uri Littauer Lecture, Israel Society for Biochemistry and Molecular Biology, 2009
Distinguished Lecture, University of Texas at Austin, 2009
Ray Fuller Lecture & Award, American Society for Pharmacology & Experimental Therapeutics, 2009
John Brookhart Lecture, Oregon Health Services University, 2009
Keynote Speaker, Texas Tech Research Week, 2010.
Keynote Speaker, Vanderbilt Student Research, 2010.
Basic Science Keynote Lecture, Society for Research on Nicotine and Tobacco, 2011
Keynote Speaker, USC Biochemistry Retreat, 2012
Keynote Speaker & Organizer, Cold Spring Harbor Asia Conf. on Ion Channels, 2012
Koppanyi Lecture, Georgetown Univ, 2013
Sackler Lecturer, Tel-Aviv University, 2014

4. National & international service

Societies:

American Association for the Advancement of Science (Fellow, 1987)
American Society for Pharmacology and Experimental Therapeutics
American Physiological Society (until 2010)
Biophysical Society (Council, 1992-1996; Exec Bd, 1994-1996; President, 2009-2010)
Society for Neuroscience
Society for Research on Nicotine and Tobacco
Society of Biological Psychiatry
Society of General Physiologists

Editorial Boards:

ACS Chemical Neurobiology, 2009-present
Journal of Biological Chemistry (1999-2002)
Journal of General Physiology (Advisory Editor, 1989-2005) 1989-present
Receptors and Channels (1992-1998)
Journal of Experimental Biology (1989-1998)
Molecular Membrane Biology (1991-1997)

Molecular Pharmacology (2007-present)

Molecular and Cellular Neuroscience (1996-2010)

Physiological Genomics (1999-present)

Channels (2006-present)

Reviews for journals:

ACNP, Am. J. Physiol, Arch Gen Psychiatry, Assay Drug Dev Tech, BBA, Biochem J, Biochemistry, Biological Psychiatry, Biomed Central, Biophys J, Biotechniques, Brain Res, Brit J Pharmacol, Cell, Cell Biochem Biophys, Cell Mol Neuroscience, Cellular Molecular Neurobiol, Chem BioChem, Circ Res, Develop Biol, EMBO Journal, Epilepsia, European J Biochem, European J Neurosci, FEBS J, Genes Brain + Behavior, Insect Biochem, J Am Chem Soc, J Biol Chem, J Cell Science, J Clinical Invest, J Exp Bi, J Experimental Med, J Gen Physiol, J Membrane Biology, J Mol Biol, J Neurobiol, J Neurochem, J Neurophysiol, J Neurosci, J Phys Chem, J Physiology, JPET, MCB, Mol Brain Research, Mol Pharm, Molecular Cell, Mol Membr Biol., Nature, Nature Cell Biol, Nature Chemical Biol, Nature Medicine, Nature Neurosci, Neuron, Neuropharmacology, Neuropsychopharmacology, Neuroscience, Neuroscience Letters, News Physiol Sci, Pflugers, Pharmacol Biochem Behavior, Photochem Photobiol Sci, Physiol Genomics, PloS, PNAS, Progress in Biophysics, Psychopharmacology, Psychoneuropharmacology, Science, STKE, Trends Neurosci, Trends Pharmacol

Major Grant Reviewing Activities:

I have served on NIH Study Sections in each of five successive calendar decades

National Institutes of Health:

Neurological Sciences Study Section (1981-1982)

Physiology Study Section (1985-1989)

NIMH Special Review Committee (1992-1994)

National Advisory Mental Health Council, NIMH (2000-2004)

NTRC Study Section, 2007-2011

American Heart Association:

Greater L. A. Affiliate, Research Committee (1983-5)

California Affiliate, Grant review

Courses and Conferences Organized:

Marine Biological Laboratory, Woods Hole, MA, Neurobiology Course Instructor (1985-1986)

Gordon Conference on Ion Channels, Chairman (1990)

NINDS Workshop on Channelopathies, 2002

Australian Course in Advanced Neuroscience, Queensland, 2007, 2008, 2009

Advisory Committees:

Cornell University, Section of Neurobiology and Behavior (Chairman) (1982)

CNRS Centre de Genetique Human, Montpellier (1997)

MRC Laboratory of Molecular Biology, Unit of Molecular Neurobiology (1997 and 2005)

FASEB Burroughs Wellcome Fund Visiting Professorships (1998-2001)

Transporter Program Project, Mount Sinai Medical School (1999-2004)

Center for Genetics and Genomics, Brown University (2000-2004)

FASEB Research Conferences (2001-2005)

Department of Chemistry, University of Montana (2005-)

Nicotinic Receptor PPG, Univ. of Chicago (1997-2011)

5. Center Directorships

Director, Silvio Conte NIMH Center for Neuroscience Research, Caltech (1992-2002)

Director, NIDA National Cooperative Drug Discovery Group in Smoking Cessation
(Caltech, University of Colorado at Boulder, Targacept), (2005-2010; 2010-2015)

6. Caltech service

Committees & leadership:

Biology Graduate Admissions Committee, 1975-2000 (most years)

Five Biology Search Committees, including two Chairs

Search Committee: Vice President for Student Affairs, 2002

Faculty Board (5 years total)

Vice Chair of the Faculty, 2003-2005

Chair of the Faculty, 2005-2007

Chair, Task Force on Mental and Suicide Prevention, 2009-2011

Executive Officer for Neuroscience, 2010-2013

Teaching and Training

1974-1999 (alternate years). Biology 161, Cellular Neurobiology Laboratory. Enrollment (Undergrad and Graduate), ~ 20

1974-2001 (alternate years). Biology 211, Topics in Membrane and Synaptic Physiology, Enrollment (Primarily Graduate), ~15

Director, Postdoctoral Training Grant in Neurobiology, 1987-1992.

Director, Predoctoral Training Grant in Neurobiology, 1993-1998.

2000-2006 (annual). Biology 1, "Drugs and the Brain". This is Caltech's required core course in biology. Enrollment (primarily Freshmen), 180.

2007-present. Biology 150, Introduction to Neuroscience (with Mary Kennedy, Ralph Adolphs).

2012 – present, Coursera MOOC, *Drugs and the Brain*. <https://www.coursera.org/course/drugsandbrain>

2012-13:4400 Statements of Achievement.

2014; > 2000 Statements of Achievement

Professor of the Month, March 2013

7. Industry

Industrial Activities (via Gooseberry Data):

Axon Instruments, Inc. Union City, CA. Board of Directors 1984-2004 (Australian Stock Exchange. Acquired by Molecular Devices, 2004).

Synaptic Pharmaceuticals, Inc., Paramus, NJ, 1988-2002 (Acquired by Lundbeck, 2002). Consultant

Neurion Pharmaceuticals, Inc. Pasadena, CA.

2002-2008. Co-founder; Board of Directors; Co-chair of SAB.

Encode Bio, Inc. Pasadena, CA.

2006-present. Co-chair of SAB.

Ophidian Bio, 2008- (Consultant)

Photoswitch Bio, 2008- (Consultant)

Trademark

pCLAMP, issued to California Institute of Technology for software, 1989 (see Kegel et al., 1985; Refereed paper #27).

U. S. Patents

- 5,728,535 Lester, et. al. 1998. Method for determining agents that modulate an inward rectifier, G-protein activated, mammalian, potassium KGA channel polypeptide
- 5,734,021 Lester, et. al. 1998. Inward rectifier, G-protein activated, mammalian potassium KGA channel polypeptide
- 5,744,324 Lester, et. al. 1998. Nucleic acids encoding potassium channels which form inward rectifier, G-protein activated, mammalian, heteromultimeric, potassium channels and uses thereof
- 5,747,278 Lester, et al. 1998. DNA encoding inward rectifier, G-protein activated, mammalian, potassium KGA channel and uses thereof
- 6,255,459 Lester, et al. 2001. Antibodies to a G protein-activated, inward rectifying KGA channel.
- 6,753,456 Lester et al, 2004. Point Mutant Mice with Hypersensitive Alpha4 Nicotinic Receptors: Dopaminergic Pathology and Increased Anxiety.
- 6,750,375 Schwarz et al, 2004. Transgenic mice comprising a disruption an in RGS9 gene.
- 7,138,248 Lester et al, 2006. Method of inhibiting inward rectifier, G-protein activated, mammalian potassium channels and uses thereof.
- 8,642,352 Moss et al., 2014. Methods and Systems for Detection of Stoichiometry by Forster Resonance Energy Transfer

8. Publications of Henry A. Lester

Abstracts may be retrieved by Searching PubMed for “Lester HA”

According to Google Scholar, h-index = 85.

PDF files of most papers may be retrieved from

[http://orphanin.caltech.edu/~lester/world/Reprints from our lab/](http://orphanin.caltech.edu/~lester/world/Reprints%20from%20our%20lab/)

Refereed Papers:

1. Lester, H. A. (1970) Transmitter release by presynaptic impulses in the squid stellate ganglion. *Nature* 227, 493-496.
2. Lester, H. A. (1970) Postsynaptic action of cobra toxin at the myoneural junction. *Nature* 227, 727-728.
3. Lester, H. A. (1972) Blockade of acetylcholine receptors by cobra toxin: electrophysiological studies. *Mol. Pharmacol.* 8, 623-631.
4. Lester, H. A. (1972) Vulnerability of desensitized or curare-treated acetylcholine receptors to irreversible blockade by cobra toxin. *Mol. Pharmacol.* 8, 632-644.
5. Lester, H. A., Changeux, J. -P. and Sheridan, R. E. (1975) Conductance increases produced by bath application of cholinergic agonists to *Electrophorus* electroplaques. *J. Gen. Physiol.* 65, 797-816.
6. Sheridan, R. E. and Lester, H. A. (1975) Relaxation measurements on the acetylcholine receptor. *Proc. Natl. Acad. Sci. USA* 72, 3496-3500.
7. Sheridan, R. E. and Lester, H. A. (1977) Rates and equilibria at the acetylcholine receptor of *Electrophorus* electroplaques. A study of neurally evoked postsynaptic currents and of voltage-jump relaxations. *J. Gen. Physiol.* 70, 187-219.
8. Lester, H. A. and Chang, H. W. (1977) Response of acetylcholine receptors to rapid photochemically produced increases in agonist concentration. *Nature* 266, 373-374.
9. Lester, H. A., Koblin, D. D. and Sheridan, R. E. (1978) Role of voltage-sensitive receptors in nicotinic transmission. *Biophys. J.* 21, 181-194.
10. Nass, M. M., Lester, H. A. and Krouse, M. E. (1978) Response of acetylcholine receptors to photoisomerizations of bound agonist molecules. *Biophys. J.* 24, 135-160.
11. Lester, H. A. (1978) Analysis of sodium and potassium redistribution during sustained permeability increases at the innervated face of *Electrophorus* electroplaques. *J. Gen. Physiol.* 72, 847-862.
12. Koblin, D. D. and Lester, H. A. (1979) Voltage-dependent and voltage-independent blockade of acetylcholine receptors by local anesthetics in *Electrophorus* electroplaques. *Mol. Pharmacol.* 15, 559-580.
13. Armstrong, D. and Lester, H. A. (1979) The kinetics of tubocurarine action and restricted diffusion within the synaptic cleft. *J. Physiol.* 294, 365-386.
14. Wathey, J. C., Nass, M. M. and Lester, H. A. (1979) Numerical reconstruction of the quantal event at nicotinic synapses. *Biophys. J.* 27, 145-164.
15. Lester, H. A., Krouse, M. E., Nass, M. M., Wassermann, N. H. and Erlanger, B. F. (1979) Light-activated drug confirms a mechanism of ion channel blockade. *Nature* 280, 509-510.
16. Lester, H. A., Krouse, M. E., Nass, M. M., Wassermann, N. H. and Erlanger, B. F. (1980) A covalently bound photoisomerizable agonist. Comparison with reversibly bound agonists at *Electrophorus* electroplaques. *J. Gen. Physiol.* 75, 207-232 .

17. Nargeot, J., Lester, H. A., Birdsall, N. J., Stockton, M. J., Wassermann, N. H. and Erlanger, B. F. (1982) A photoisomerizable muscarinic antagonist. Studies of binding and of conductance relaxations in frog heart. *J. Gen. Physiol.* 79, 657-678.
18. Lester, H. A., Steer, M. L. and Levitzki, A. (1982) Prostaglandin-stimulated GTP hydrolysis associated with activation of adenylate cyclase in human platelet membranes. *Proc. Natl. Acad. Sci. USA* 79, 719-723.
19. Lester, H. A. and Nerbonne, J. M. (1982) Physiological and pharmacological manipulations with light flashes. *Ann. Rev. Biophys. Bioeng.* 11, 151-175.
20. Lester, H. A., Steer, M. L. and Michaelson, D. M. (1982) ADP-ribosylation of membrane proteins in cholinergic nerve terminals. *J. Neurochem.* 38, 1080-1086.
21. Sheridan, R. E. and Lester, H. A. (1982) Functional stoichiometry at the nicotinic receptor. The photon cross section for phase 1 corresponds to two Bis-Q molecules per channel. *J. Gen. Physiol.* 80,499-515.
22. Steer, M. L., Braun, S., Lester, H. A. and Levitzki, A. (1982) Activation of adenylate cyclase from purified platelet membranes by prostaglandin E₁ and its inhibition by l-epinephrine: mechanistic effects. *J. Cyclic Nucleotide Res.* 8, 309-322.
23. Nerbonne, J. M., Sheridan, R. E., Chabala, L. D. and Lester, H. A. (1983) *cis*-Bis-Q: Purification and properties at acetylcholine receptors of *Electrophorus* electroplaques. *Mol. Pharmacol.* 23, 344-349.
24. Nargeot, J., J. M. Nerbonne, J. Engels, and Lester, H. A. (1983) Time course of the increase in the myocardial slow inward current after a photochemically generated jump of intracellular cAMP. *Proc. Natl. Acad. Sci. USA* 80, 2395-2399.
25. Nerbonne, J. M., Richard, S., Nargeot, J. and Lester, H. A. (1984) New photoactivatable cyclic nucleotides produce intracellular jumps in cyclic AMP and cyclic GMP concentrations. *Nature* 310, 74-76.
26. Richard, S., Nerbonne, J. M., Nargeot, J., Lester H. A. and Garnier, D. (1985) Photochemically produced intracellular concentration jumps of cAMP mimic the effects of catecholamines on excitation-contraction coupling in frog atrial fibers. *Pflügers Arch.* 403, 312-317.
27. Kegel, D. R., Wolf, B. D., Sheridan, R. E. and Lester, H. A. (1985) Software for electrophysiological experiments with a personal computer. *J. Neurosci. Meth.* 12, 317-330.
28. Krouse, M. E., Lester, H. A., Wassermann, N. H. and Erlanger, B. F. (1985) Rates and equilibria for a photoisomerizable antagonist at the acetylcholine receptor of *Electrophorus* electroplaques. *J. Gen. Physiol.* 85, 235-256.
29. White, M. M., Mixer Mayne, K., Lester, H. A. and Davidson, N. (1985) Mouse-*Torpedo* hybrid acetylcholine receptors: functional homology does not equal sequence homology. *Proc. Natl. Acad. Sci. USA* 82, 4852-4856.
30. Chabala, L. D., Gurney, A. M. and Lester, H. A. (1985) Photoactivation and dissociation of agonist molecules at the nicotinic acetylcholine receptor in voltage-clamped rat myoballs. *Biophys. J.* 48, 241-246.
31. Gurney, A. M., Nerbonne, J. M. and Lester, H. A. (1985) Photoinduced removal of nifedipine reveals mechanisms of calcium antagonist action on single heart cells. *J. Gen. Physiol.* 86, 353-379.
32. Dascal, N., Lotan, I., Gillo, B., Lester, H. A. and Lass, Y. (1985) Acetylcholine and phorbol esters inhibit potassium currents evoked by adenosine and cAMP in *Xenopus* oocytes. *Proc. Natl. Acad. Sci. USA* 82, 6001-6005.

33. Chabala, L. D., Gurney, A. M. and Lester, H. A. (1986) Dose-response analysis of acetylcholine receptor channels opened by a flash-activated agonist in voltage-clamped rat myoballs. *J. Physiol.* 371, 407-433.
34. Dascal, N., Snutch, T. P., Lübbert, H., Davidson, N. and Lester, H. A. (1986) Expression and modulation of voltage-gated calcium channels after RNA injection in *Xenopus* oocytes. *Science* 231, 1147-1150.
35. Chabala, L. D. and Lester, H. A. (1986) Activation of acetylcholine receptor channels by covalently bound agonists in cultured rat myoballs. *J. Physiol.* 379, 83-108.
36. Dascal, N., Ifune, C., Hopkins, R., Snutch, T. P., Lübbert, H., Davidson, N., Simon, M. I. and Lester, H. A. (1986) Involvement of a GTP-binding protein in mediation of serotonin and acetylcholine responses in *Xenopus* oocytes injected with rat brain messenger RNA. *Molec. Brain Res.* 1, 201-209.
37. Goldin, A. L., Snutch, T. P., Lübbert, H., Dowsett, A., Marshall, J., Auld, V., Downey, W., Fritz, L. C., Lester, H. A., Dunn, R., Catterall, W. A. and Davidson, N. (1986) Messenger RNA coding for only the α subunit of the rat brain Na channel is sufficient for expression of functional channels in *Xenopus* oocytes. *Proc. Natl. Acad. Sci. USA* 83, 7503-7507.
38. Leonard, J. P., Nargeot, J., Snutch, T., Davidson, N. and Lester, H. A. (1987) Ca channels induced in *Xenopus* oocytes by rat brain mRNA. *J. Neurosci.* 7, 875-881.
39. Lübbert, H., Snutch, T. P., Dascal, N., Lester, H. A. and Davidson, N. (1987) Rat brain 5-HT_{1C} receptors are encoded by a 5-6 kbase mRNA size class and are functionally expressed in injected *Xenopus* oocytes. *J. Neurosci.* 7, 1159-1165
40. Gurney, A. M., Tsien, R. Y. and Lester, H. A. (1987) Activation of a potassium current by rapid photochemically generated step increases of intracellular calcium in rat sympathetic neurons. *Proc. Natl. Acad. Sci. USA* 84, 3496-3500
41. Gurney, A. M. and Lester, H. A. (1987) Light-flash physiology with synthetic photosensitive compounds. *Physiol. Revs.* 67, 583-617.
42. Mayne, K., Yoshii, K., Yu, L., Lester, H. A. and Davidson, N. (1987) Expression of mouse-Torpedo acetylcholine receptor subunit chimeras and hybrids in *Xenopus* oocytes. *Mol. Brain Res.* 2, 191-197.
43. Yoshii, K., Yu, L., Mixer-Mayne, K., Davidson, N. and Lester, H. A. (1987) Equilibrium properties of mouse-Torpedo acetylcholine receptor hybrids expressed in *Xenopus* oocytes. *J. Gen. Physiol.* 90, 553-573.
44. Lübbert, H., Hoffman, B., Snutch, T. P., van Dyke, T., Levine, A. J., Hartig, P. R., Lester, H. A. and Davidson, N. (1987) cDNA cloning of a serotonin 5-HT_{1C} receptor by electrophysiological assays of mRNA injected *Xenopus* oocytes. *Proc. Natl. Acad. Sci. USA* 84, 4332-4336.
45. Sutton, F., Davidson, N. and Lester, H. A. (1988) Tetrodotoxin-sensitive voltage-dependent Na currents recorded from *Xenopus* oocytes injected with mammalian cardiac muscle RNA. *Mol. Brain Res.* 3, 187-192.
46. Krafte, D. A., Snutch, T. P., Leonard, J. P., Davidson, N. and Lester, H. A. (1988) Evidence for the involvement of more than one mRNA species in controlling the inactivation process of rat and rabbit brain Na channels expressed in *Xenopus* oocytes. *J. Neurosci.* 8, 2859-2868.
47. Auld, V. J., Goldin, A. L., Krafte, D. S., Marshall, J., Dunn, J. M., Catterall, W. A., Lester, H. A., Davidson, N. and Dunn, R. J. (1988) A rat brain Na channel α subunit with novel gating properties. *Neuron* 1, 449-461.

48. Iverson, L. E., Tanouye, M. A., Lester, H. A., Davidson, N. and Rudy, B. (1988) A-type potassium channels expressed from Shaker locus cDNAs. *Proc. Natl. Acad. Sci. USA.* 85, 5723-5727.
49. Rudy, B., Hoger, J., Lester, H. A. and Davidson, N. (1988) At least two mRNA species contribute to the properties of rat brain "A"-type potassium channels expressed in *Xenopus* oocytes. *Neuron* 1, 649-658.
50. Fong, T. M., Davidson, N. and Lester, H. A. (1988) Properties of two classes of rat brain acidic amino acid receptors induced by distinct mRNA populations in *Xenopus* oocytes. *Synapse* 2, 657-665.
51. Leonard, R. J., Labarca, C. G., Charnet, P., Davidson, N. and Lester, H. A. (1988) Evidence that the M2 membrane spanning region lines the ion channel pore of the nicotinic receptor. *Science* 242, 1578-1581.
52. Lester, H. A. (1988) Heterologous expression of excitability proteins: route to more specific drugs? *Science* 241, 1057-1063.
53. Krafte, D. S. and Lester, H. A. (1989) Expression of functional sodium channels in stage II-III *Xenopus* oocytes. *J. Neurosci. Meth.* 26, 211-215.
54. Leonard, R. J., Karschin, A., Jayashree-Aiyar, S., Davidson, N., Tanouye, M. A., Thomas, L., Thomas, G. and Lester, H. A. (1989) Expression of Shaker potassium channels in mammalian cells using recombinant vaccinia virus. *Proc. Natl. Acad. Sci. USA,* 86, 7629-7633.
55. Fong, T. M., Davidson, N. and Lester, H. A. (1989) Further evidence that N-methyl-D-aspartate and kainate activate distinct ion channels. *Synapse* 4, 88-95.
56. Yu, L., Blumer, K. J., Davidson, N., Lester, H. A. and Thorner, J. (1989) Functional expression of the yeast α -factor receptor in *Xenopus* oocytes. *J. Biol. Chem.* 264, 20847-20850.
57. Charnet, P., Labarca, C., Leonard, R. J., Vogelaar, N. J., Czyzyk, L., Gouin, A., Davidson, N. and Lester, H. A. (1990) An open-channel blocker interacts with adjacent turns of alpha helices in the nicotinic acetylcholine receptor. *Neuron* 2, 87-95.
58. Auld, V. J., Goldin, A. L., Krafte, D. S., Marshall, J., Dunn, J. M., Catterall, W. A., Lester, H. A., Davidson, N. and Dunn, R. J. (1990) A neutral amino acid change in segment IIS4 dramatically alters the gating properties of the voltage-dependent sodium channel. *Proc. Natl. Acad. Sci. USA* 87, 7629-7633.
59. Snutch, T. P., Leonard, J. P., Gilbert, M. M., Lester, H. A. and Davidson, N. (1990) Rat brain expresses a heterogeneous family of calcium channels. *Proc. Natl. Acad. Sci. USA* 87, 3391-3395.
60. Guastella, J. G., Nelson, N., Nelson, H., Czyzyk, L., Keynan, S., Miedel, M. C., Davidson, N., Lester, H. and Kanner, B. (1990) Cloning and expression of a rat brain GABA transporter. *Science* 249, 1303-1306.
61. Krafte, D. S., Goldin, A. L., Auld, V. J., Dunn, R. J., Davidson, N. and Lester, H. A. (1990) Inactivation of cloned Na channels expressed in *Xenopus* oocytes. *J. General Physiol.* 96, 689-706.
62. Ahmed, C.M.I., Auld, V. J., Lester, H. A., Dunn, R. and Davidson, N. (1990) Both sodium channel II and IIA alpha subunits are expressed in rat brain. *Nucl. Acids Res.* 18, 5907.
63. Hoger, J. H., Rudy, B., Lester, H. A. and Davidson, N. (1991) Characterization of maintained voltage-dependent K channels induced in *Xenopus* oocytes by rat brain mRNA. *Molec. Brain Res.* 10, 1-11.
64. Lester, H. A. (1991) Strategies for studying permeation at voltage-gated ion channels. *Ann. Rev. Physiol.* 53, 477-496.

65. Karschin, A., Aiyar, J., Gouin, A., Davidson, N. and Lester, H. (1991) K channel expression in primary cell cultures mediated by vaccinia virus. *FEBS Lett.* 278, 229-233.
66. Hoger, J. H., Walter, A. E., Vance, D., Yu, L., Lester, H. A. and Davidson, N. (1991) Modulation of a cloned mouse brain potassium channel. *Neuron* 6, 1-10.
67. Yu, L., Leonard, R. J., Davidson, N. and Lester, H. A. (1991) Single-channel properties of mouse-*Torpedo* acetylcholine receptor hybrids expressed in *Xenopus* oocytes. *Mol. Brain Res.* 10, 203-211.
68. Yang, X.-C., Karschin, A., Labarca, C., Elroy-Stein, O., Moss, B., Davidson, N. and Lester, H. A. (1991) Expression of ion channels and receptors in *Xenopus* oocytes using vaccinia virus. *FASEB J.* 5, 2209-2215.
69. Karschin, A., Ho, B. Y., Labarca, C., Elroy-Stein, O., Moss, B., Davidson, N. and Lester, H. A. (1991) Heterologously expressed serotonin 1A receptors couple to muscarinic K⁺ channels in heart. *Proc. Natl. Acad. Sci. USA* 88, 5694-5698.
70. Walter, A. E., Hoger, J. H., Labarca, C., Yu, L., Davidson, N. and Lester, H. A. (1991) Low molecular weight mRNA encodes a protein(s) that controls the serotonin 5-HT_{1C} and acetylcholine M₁ receptor sensitivity in *Xenopus* oocytes. *J. Gen. Physiol.* 98, 399-417.
71. Yu, L., Nguyen, H., Lee, H., Bloem, L. J., Kozak, C. A., Hoffman, B. J., Snutch, T. P. Lester, H. A., Davidson, N. and Lubbert, H. (1991) The mouse 5-HT_{1C} receptor contains 8 hydrophobic domains and is X-linked. *Mol. Brain Res.* 11, 143-149.
72. Dascal, N., Chilcott, G. and Lester, H. A. (1991) Recording of voltage and Ca²⁺-dependent currents in *Xenopus* oocytes using an intracellular perfusion method. *J. Neurosci. Methods* 39, 29-38.
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