

## Thomas E. Hughes

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## Personal Information

Born April 12, 1958, United States Citizen  
Married to Anne Marie Quinn

## Education

B.S. in Biology 1981, Tufts University  
Ph.D. in Anatomy 1986, Duke University

## Experience

1981-1986	Graduate Student, Department of Anatomy, Duke University. (Advisor: Dr. William C. Hall).
1985	Instructor, Department of Psychology, Duke University.
1986-1989	Postdoctoral Fellow, Department of Neurosciences, University of California, San Diego. (Advisor: Dr. Harvey J. Karten).
1989	Visiting Fellow, Max-Planck-Institute für Hirnforschung, Frankfurt, Germany. (Advisor: Dr. Heinz Wässle).
1990 - 1993	Assistant Research Scientist, Department of Neurosciences, University of California, San Diego.
1991-1993	Visiting Scientist, Molecular Neurobiology Laboratory, The Salk Institute for Biological Studies. (Host: Dr. Stephan Heinemann).
1993 to 1998	Assistant Professor, Department of Ophthalmology & Visual Science and Section of Neurobiology, Yale University Medical School.
1993 to 1998	Assistant Professor, Department of Neurobiology, Yale University Medical School.
1998 - 2003	Associate Professor, Department of Ophthalmology & Visual Science, Yale University Medical School.

- 1998 - 2003 Associate Professor, Department of Neurobiology, Yale University Medical School.
- 2003 - present Associate Professor, Department of Cell Biology & Neuroscience, Montana State University, (2003 - present).

### **Major Honors and Awards**

- 1993 - 1996 Research to Prevent Blindness Dolly Green Scholar
- 2004 Montana State University Alumni Association Faculty award.

### **Experience In Training (Students, Postdoctoral Fellows and Medical Residents)**

- 1995 - 1997 Instructor in the Society for Neuroscience Short Course: *Advanced techniques in Molecular biology*. 1996 Co-organizer, Yale Interdepartmental Neuroscience Program annual retreat.
- 1997 - 1999 Lecturer, Markee course on *Molecular Techniques* for Residents at Yale Medical School. 1997 - 2001 Member, Interdepartmental Neuroscience Program Admissions Committee.
- 1999 - 2003 Member, Yale Interdepartmental Neuroscience Program Executive Committee.
- 1999 - 2003 Principle Investigator of National Eye Institute training grant: Visual Sciences Training Program.
- 2000 - 2003 Chairman, Interdepartmental Neuroscience Program Curriculum Committee.
- 2000 Member, National Eye Institute Special Emphasis Panel ZEY VSN 02 (Training grants)
- 2003 - present Hughes biology curriculum reform committee.
- 2004 - present Montana State University Executive committee for the Liberal Arts degree.
- 2003 - present Instructor & course organizer, Cold Spring Harbor Laboratories, *Advanced Techniques in Molecular Neuroscience*.

### **Administrative Experience (University and Public Service)**

- 1994 - 1995 Ad Hoc member, N.I.H. Visual Sciences C Study Section.
- 1996 - 1999 Member, N.I.H. Visual Sciences C Study Section.
- 1999 - 2000 Chairman, N.I.H. Visual Sciences C Study Section.
- 2001 - 2004 Chairman, N.I.H., CSR Special Emphasis Panels ZRG1 SSS-Q (2001 - 2004)
- 2003 Chairman N.I.H, N.E.I., Special Emphasis Panel (2003)

- 2005 Ad hoc member of ZEY1 VSN review committee (NIH/NEI) sponsored courses.
- 2000 & 2001 Ad hoc reviewer for the Italian funding agency "telethon"
- 1997 - 1999 Member, Yale Medical School Computing Committee.
- 1998 - 2003 Member, Department of Ophthalmology & Visual Science faculty search committees, successfully recruited 3 new faculty.
- 2001 Member, Yale Medical School Department of Physiology faculty search committee, successfully recruited 1 new faculty.
- 2004 - present Montana State University Faculty Advisory Committee to the Vice President of Research.
- 2005 Ad hoc reviewer, N.I.H., N.E.I. study section ZEY1 VSN (04) on U13 applications.
- 2005 Department of Neuroscience Tenure and Promotion Committee.
- 2006 Montana State University Strategic Planning Committee, appointed by the Provost.

## **Editorial Boards**

Editorial board, Visual Neuroscience 1999- 1992.

Ad hoc reviewer for: Journal of Comparative Neurology, Journal of Neuroscience, Neuron, Journal of Biological Chemistry, Journal of Cell Biology.

## **International Meetings**

Co-organizer (with Dr. Robert Duvoisin) of a workshop on "The Mouse Retina." FASEB Meeting on Retinal Neurobiology & Visual Processing (July 30-Aug. 4 2000) Copper Mountain, Colorado

## **Industrial Consulting**

- 2000 - 2002 Cogent Neuroscience, Durham North Carolina.
- 2002 GMP Companies, Inc., Fort Lauderdale Florida.
- 2000 - 2002 Red Shirt Imaging, New Haven Connecticut.
- 2006 Cure Huntingtin Disease Initiative (CHDI Inc.)
- 2006 Scientific advisory board of Montana Molecular LLC.

## **Teaching**

- 1982 - 1986 Teaching Assistant, Department of Anatomy, Duke Medical School: courses in Human Anatomy, Neuroanatomy, and Histology.
- 1985 Instructor, Duke University Department of Psychology: History of Neuroscience

- 1993 - 2003 Yale Medical School, Department of Neurobiology, Lecturer and Laboratory Instructor in Neurobiology 500b; "Structural and functional Organization of the Human Nervous System."
- 1997 - 2000 Yale Interdepartmental Neuroscience Program, Course director of Neuroscience 501a "Principles in Neuroscience."
- 1998 - 2003 Yale Medical School, Lecturer, Cell biology 502a & advanced seminar 601.
- 2004 - present Montana State University, Department of Cell Biology & Neuroscience, Created and taught *Gene Construction* (now Biol. 466 taught each fall) as a part of an HHMI initiative to revise under graduate biology curriculum.
- 2005 - present Montana State University, Department of Cell Biology & Neuroscience, Created and taught Molecular Medicine (Biology 480; spring 2005).
- 2004 - present Montana State University, Department of Cell Biology & Neuroscience, lectured in Neuroscience Grad course.
- 2004 - present Montana State University, WAMMI medical program, lectured in Neuroscience.
- 2003 - present Lectured in WWAMI Neuroscience & Histology courses (2003 to present)
- 1995 - 1997 Instructor in the Society for Neuroscience Short Course: *Advanced techniques in Molecular biology* (1995 - 1997)
- 2003 - present Instructor in the Cold Spring Harbor Laboratories summer course *Advanced techniques in Molecular Neuroscience* (2003 - present)
- 2003 - present *MSU for a Day*, teaching biology in high schools throughout Montana and Wyoming (2003 - present)
- 2005 Montana State University, Department of Cell Biology & Neuroscience, Lectured in Biology 411, Animal Physiology.

### **Novel Technologies:**

- 2005 Provisional patent application: System for detecting Protein-Protein interactions. The invention report number at the I-Edison database is 1381004-05-0011. The invention report was submitted on 09/12/05.

### **Invited Lectures (selected since 2000):**

- 2000 Jackson Laboratories, Bar Harbor Maine: *New ways of measuring the neural retina.*

- 2001 National Institute of Neurological Disease and Stroke, Bethesda Maryland: *Using the Green Fluorescent Protein to probe the nervous system.*
- 2002 The Vollum Institute, [Oregon Health Sciences University](#): *New ways of looking at neurons and the proteins they use: Adventures with the Green Fluorescent Protein.*
- 2005 University of Nebraska Medical School: *Green mice and green proteins; new tools for probing the structure and function of the nervous system.*
- 2006 University of Washington Medical School [Science in Medicine Series](#): *Jumping green genes; using transposons and jellyfish to create new biosensors in medical research.*
- 2006 University of Massachusetts Medical School, Neuroscience program: *New ways to build GFP-based biosensors.*
- 2006 FlaSH, SPARK, FlaRE, what's next in the world of fluorescent voltage sensors? Montana Neuroscience retreat at Seely Lake
- 2006 Duke University, Department of Neuroscience. Forward genetics, fluorescent proteins, and functional screens.

## Grants:

### Completed

#### **"Building libraries of GFP-tagged neuronal proteins"**

Principal Investigator: Thomas Hughes

Agency: National Institute of Neurological Disorders and Stroke

Type: R21 (R21NS044883-01)

Period: 12/01/2002 - 11/30/04

Total direct for all years: \$250,000

The goals of the project were to build better transposons, and a two color transposon with a hinge between the two fluorescent proteins optimized for FRET. The idea was to use these to saturate a few critical signaling proteins, the glutamate receptor subunit GluR2, the GABA-B receptor, and a G protein alpha subunit. This work is currently underway, and we have now extensively tagged GluR2, GluR4, Hslo, HERG, and GABA-B with new, two color transposons. This project is on going, through the use of a no-cost extension through 2005.

#### **"Transmitter/receptor specific circuitry in the retina"**

Principal Investigator: Thomas E. Hughes

Agency: National Eye Institute

Type: R01 EY 08362

Period: 1990 - 2002

Total direct for all years: ~\$1,800,000

The major goals of this project were to express fluorescent proteins in different retinal cell types. This work is completed, the mouse lines have been deposited in the MMRRRC ([www.nih.gov/science/models/mouse/resources/mmrrc.html](http://www.nih.gov/science/models/mouse/resources/mmrrc.html)), and this will not be renewed.

**“Visual Science Training Grant”**

Principle Investigator: Thomas Hughes  
Agency: National Eye Institute  
Type: 5T32EY007115  
Period: 2000 - 2005  
Total direct: \$725,000

This is a T32 training grant from the Eye Institute. It supported 2 postdoctoral fellows and 3 graduate students in an interdisciplinary program to train vision scientists.

**“Creating a Red/Green Cre recombinase reporter for studies of the living retina”**

Principal Investigator: Thomas Hughes  
Agency: National Eye Institute  
Type: R03 (EY014205)  
Period: 06/01/2002 - 07/31/2003  
Total direct: \$100,000

The major goal of this proposal was to create a red/green fluorescent reporter line of mice. This work was successful in the sense that it created new fluorescent reporters for Cre recombinase that have been distributed widely. However we were not successful in creating the line of reporter mice we wanted to create.

**“Research to Prevent Blindness Dolly Green Scholar”**

Principal Investigator: Thomas Hughes  
Agency: Research To Prevent Blindness Foundation.  
Total direct: \$65,000

**“Career Development Award”**

Principal Investigator: Thomas Hughes  
Agency: Research To Prevent Blindness Foundation.  
Period: 1993 - 1996  
Total direct: \$160,000

This was a grant to support my work of creating receptor-specific antibodies for studies of retinal circuitry. It provided the startup funds necessary to establish my laboratory.

## **Current**

### **“Creating libraries of Cone photoreceptor specific genes”**

Principal Investigator: Thomas Hughes  
Agency: the E. Matilda Ziegler Foundation  
Period: 06/01/2003 - 07/31/2006  
Total direct: \$140,000

This project focuses on the genes expressed by cone photoreceptors. Using the fluorescent mouse line we have created, we are in the process of purifying the cells and using the mRNA they express to identify cone-specific genes.

### **“Building Libraries of GFP-tagged neuronal proteins”**

Principal Investigator: Thomas Hughes  
Agency: NINDS/NIH  
Period: 12/09/2003 - 11/30/2006 (currently on a no-cost extension)  
Total direct: \$275,000

This project developed a series of synthetic, transposable elements to create libraries of fluorescently labeled neuronal proteins and biosensors. This project is currently being finished on a no-cost extension. This extension was necessary because the recent move of our laboratory to MSU slowed down our progress somewhat.

### **“Splitting GFP to look at signaling proteins”**

Principal Investigator: Thomas Hughes  
Agency: NINDS/NIH  
Period: 06/01/2006 - 07/31/2008  
Total direct: \$275,000

This project focuses on creating a new series of genetically encoded biosensors for the study of intracellular signaling.

## **Pending**

### **“Scan of proteins space for optical voltage probes”**

Principal Investigator: Larry Cohen  
Agency: NINDS/NIH  
Period: 012/01/2006 - 11/30/2011  
Total direct: \$1,414,256 to project #2 (the Hughes laboratory)

This U24 proposal to the NINDS is for a contracted research grant that would support 5 laboratories in their efforts to create a genetically encoded voltage reporter. Our laboratory would be responsible for the bulk of the molecular biology, generating thousands of fluorescent ion channels for screening by the other four laboratories (Cohen and Pieribone labs at Yale; Isacoff lab at UC Berkeley; Knopfel lab at the Riken Inst., Japan)

## Publications:

1. Hughes, T. E., and Hall, W. C. (1985). The transneuronal transport of horseradish peroxidase in the visual system of the frog, *Rana pipiens*. *Neuroscience* 17, 507-518.
2. Keyser, K. T., Hughes, T. E., Whiting, P. J., Lindstrom, J. M., and Karten, H. J. (1988). Cholinceptive neurons in the retina of the chick: an immunohistochemical study of the nicotinic acetylcholine receptors. *Visual Neuroscience* 1, 349-366.
3. Hughes, T. E., Carey, R. G., Vitorica, J., de Blas, A. L., and Karten, H. J. (1989). Immunohistochemical localization of GABA<sub>A</sub> receptors in the retina of the primate *Saimiri sciureus*. *Visual Neuroscience* 2, 565-581.
4. Hughes, T. E. (1990). A light and electron microscopic investigation of the optic tectum of the frog, *Rana pipiens*. I. The retinal Axons. *Visual Neuroscience* 4, 499-518.
5. Hughes, T. E. (1990). A light and electron microscopic investigation of the optic tectum of the frog, *Rana pipiens*. II. The neurons that give rise to the crossed tecto-bulbar pathway. *Visual Neuroscience* 4, 519-531.
6. Hughes, T. E., Grünert, U., and Karten, H. J. (1991). GABA<sub>A</sub> receptors in the retina of the cat: An immunohistochemical study of wholemounts, sections and dissociated cells. *Visual Neuroscience* 6, 229-238.
7. Rogers, S. W., Hughes, T. E., Hollmann, M., Gasic, G. P., Deneris, E. S., and Heinemann, S. (1991). The characterization and localization of the glutamate receptor subunit, GLuR1, in the rat brain. *Journal of Neuroscience* 11, 2713-2724.
8. Hughes, T. E., Hermans-Borgmeyer, I., and Heinemann, S. (1992). Differential expression of glutamate receptor genes (GluR1-5) in the rat retina. *Visual Neuroscience* 8, 49-55.
9. Grünert, U., and Hughes, T. E. (1993). Localization of GABA<sub>A</sub> receptors in the scotopic pathway of the cat retina. *Cell and Tissue Research* 274, 267-277.
10. Hamassaki-Britto, D. E., Hermans-Borgmeyer, I., Heinemann, S., and Hughes, T. E. (1993). Expression of glutamate receptor genes in the mammalian retina: the localization of GluR1 through GluR7 mRNAs. *Journal of Neuroscience* 13, 1888-98.
11. Gruberg, E. R., Hughes, T. E., and Karten, H. J. (1994). Synaptic Interrelationships Between the Optic Tectum and the Ipsilateral Nucleus Isthmi in *Rana pipiens*. *Journal of Comparative Neurology* 339, 353-364.
12. Rogers, S. W., Andrews, P. I., Gahring, L. C., Whisenand, T., Cauley, K., Crain, B., Hughes, T. E., Heinemann, S. F., and McNamara, J. O. (1994). Autoantibodies to Glutamate Receptor GluR3 in Rasmussen's Encephalitis. *Science* 265, 648-651.

13. Marshall, J., Molloy, R., Moss, G. W., Howe, J. R., and Hughes, T. E. (1995). The jellyfish green fluorescent protein: a new tool for studying ion channel expression and function. *Neuron* 14, 211-5.
14. Reid, S. N. M., Romano, C., Hughes, T., and Daw, N. W. (1995). Immunohistochemical study of two phosphoinositide-linked metabotropic glutamate receptors (mGluR1a and mGluR5) in the visual cortex before, during and after the peak of the critical period for eye specific connections. *Journal of Comparative Neurology* 355, 470-477.
15. Hughes, T. E. (1997). Are there ionotropic glutamate receptors on the rod bipolar cell of the mouse retina? *Visual Neuroscience* 14, 103-109.
16. Liu, J., Hughes, T. E., and Sessa, W. C. (1997). The first 35 amino acids and fatty acylation sites determine the molecular targeting of endothelial nitric oxide synthase into the Golgi region of cells: A green fluorescent protein study. *Journal of Cell Biology* 137, 1525-1535.
17. Reid, S. N. M., Romano, C., Hughes, T., and Daw, N. W. (1997). Developmental and sensory-dependent changes of phosphoinositide-linked metabotropic glutamate receptors. *Journal of Comparative Neurology* 389, 577-583.
18. Finger, F. P., Hughes, T. E., and Novick, P. (1998). Sec3p is a spatial landmark for polarized secretion in budding yeast. *Cell* 92, 559-571.
19. Lo, W., Rodgers, W., and Hughes, T. E. (1998). Making genes green: Creating green fluorescent protein (GFP) fusions with blunt-end PCR products. *BioTechniques* 25, 94-98
20. Singer, M. S., Hughes, T. E., Shepherd, G. M., and Greer, C. A. (1998). Identification of olfactory receptor mRNA sequences from the rat olfactory bulb glomerular layer. *Neuroreport* 9, 3745-8
21. Lo, W., Molloy, R., and Hughes, T. E. (1998). Ionotropic glutamate receptors in the retina: Moving from molecules to circuits. *Vision Research* 38, 1399-1410.
22. Sowa, G., Liu, J., Papapetropoulos, A., Rex-Haffner, M., Hughes, T. E. and Sessa, W.C. (1999) Trafficking of endothelial nitric oxide synthase in living cells: Quantitative evidence supporting the role of palmitoylation as a kinetic trapping mechanism limiting membrane diffusion. *Journal of Biological Chemistry* 274, 22524-31.
23. Fei, Y. & Hughes, T.E. (2000). Nuclear Trafficking of Photoreceptor Protein Crx: The Targeting Sequence and Pathological Implications. *Invest. Ophthalmol. Vis. Sci.* 41, 2849-2856.
24. Hughes, T., Zhang, H., Logothetis, D.E. and Berlot, C.H. (2001) Visualization of a functional Gaq-green fluorescent protein fusion in living cells: Association with the

plasma membrane is disrupted by mutational activation and by elimination of palmitoylation sites, but not by activation mediated by receptors or  $\text{AlF}_4^-$ . *Journal of Biological Chemistry* 276, 4227-4235.

25. Karpen, H. E., Bukowski, J. T., Hughes, T., Gratton, J. P., Sessa, W. C., and Gailani, M. R. (2001). The sonic hedgehog receptor patched associates with caveolin-1 in cholesterol-rich microdomains of the plasma membrane. *Journal of Biological Chemistry* 276, 19503-19511.
26. Robert, A., Irizarry, S.N., Hughes, T.E., and Howe, J.R. (2001) Subunit Interactions and AMPA-Receptor Desensitization. *Journal of Neuroscience* 21, 5574-5586.
27. Yang, Y. and Hughes, T. (2001) A Cre stoplight: a red/green fluorescent reporter of Cre recombinase activity in living cells. *Biotechniques* 31, 1036-1041
28. Fei, Y. and Hughes, T. (2001) Transgenic expression of the jellyfish Green Fluorescent Protein in the cone photoreceptors of the mouse. *Visual Neuroscience* 18, 615-623.
29. Gaudio, P.A., Gopinathan, U., Sangwan, V. and Hughes, T.E. (2002) Polymerase chain reaction based detection of fungi in infected corneas. *British Journal of Ophthalmology* 86(7), 755-60.
30. Sheridan, D.L., Berlot, C.H., Robert, A., Inglis, F., Jakobsdottir, K.B., Howe, J.R. and Hughes, T.E. (2002) A new way to rapidly create functional, fluorescent fusion proteins: random insertion of GFP with an in vitro transposition reaction. *BMC Neuroscience* 3:7.
31. Robert, A., Hyde, R., Hughes, T. E., and Howe, J. R. (2002). The Expression of Dominant-Negative Subunits Selectively Suppresses Neuronal AMPA and Kainate Receptors. *Neuroscience* 4, 1199-1210
32. Sheridan, D. L., and Hughes, T. E. (2004). A faster way to make GFP-based biosensors: two new transposons for creating multicolored libraries of fluorescent fusion proteins. *BMC Biotechnology* 4, 1
33. Boyd, C., Hughes, T., Pypaert, M. and Novick, P. (2004) Vesicles carry most exocyst subunits to exocytic sites marked by the remaining two subunits, Sec3p and Exo70p. *J. Cell. Biol.* 167, 889-901.
34. Olson VG, Zabetian CP, Bolanos CA, Edwards S, Barrot M, Eisch AJ, Hughes T, Self DW, Neve RL, Nestler EJ. (2005) Regulation of drug reward by cAMP response element-binding protein: evidence for two functionally distinct subregions of the ventral tegmental area. *Journal of Neuroscience* 25:5553-62

35. Giraldez, T., Hughes, T.E., Sigworth, F.J. (2005) Generation of functional fluorescent BK channels by random insertion of GFP variants. *Journal of General Physiology*. 126, 429-438.
36. T. Rex, J. A. Peet, E.M. Surace, P. D. Calvert, S. S. Nikonov, A. L. Lyubarsky, E. Bendo, T. Hughes, E.N. Pugh, Jr., and J. Bennett. (2005). The distribution, concentration, and toxicity of EGFP in retinal cells after genomic or somatic (virus-mediated) gene transfer. *Molecular Vision* 11:1236-45.
37. Sheridan, D.L., Robert, A., Cho, C-H, Howe, J.R. and Hughes, T.E. (In Press) Regions of AMPA receptor subunits that are permissive for the insertion of GFP. *Neuroscience*.

## **Letters, Reviews & Chapters**

1. Hughes, T.E. (1983). Tackling homology. *Nature* 302, 286
2. Hollmann, M., Rogers, S. W., O'Shea-Greenfield, A., Deneris, E. S., Hughes, T. E., Gasic, G. P., and Heinemann, S. (1990). Glutamate receptor GluR-K1: structure, function, and expression in the brain. In *The Brain* (Plainview New York: Cold Spring Harbor Laboratory Press), pp. 41-56.
3. Heinemann, S., Bettler, B., Boulter, J., Deneris, E., Gasic, G., Hartley, M., Hollmann, M., Hughes, T. E., O'Shea-Greenfield, A., and Rogers, S. (1991). The glutamate receptors: genes, structure and expression. In *Neurotransmitter regulation of gene transcription.*, E. Costa and T. H. Joh, eds. (New York: Thieme Medical Publishers Inc.), pp. 341-356.
4. Heinemann, S., Bettler, B., Boulter, J., Deneris, E., Gasic, G., Hartley, M., Hollmann, M., Hughes, T. E., O'Shea-Greenfield, A., and Rogers, S. (1991). The glutamate receptor gene family. In *Excitatory Amino Acids*, B. S. Meldrum, F. Moroni, S. P. Simon and J. H. Woods, eds. (New York: Raven Press), pp. 109-134.
5. Heinemann, S., Bettler, B., Boulter, J., Deneris, E., Gasic, G., Hartley, M., Hollmann, M., Hughes, T. E., O'Shea-Greenfield, A., and Rogers, S. (1991). The glutamate receptor gene family: evidence that the GluR1, GluR2 and GluR3 subunits form multiple glutamate receptors. In *Transmitter amino acid receptors: structures, transduction and models for drug development.*, E. Barnard and E. Costa, eds. (New York: Thieme Medical Publishers Inc.), pp. 341-356.
6. Hughes, T. E. (1995). Transmembrane topology of the glutamate receptors. A tale of novel twists and turns. *Journal of Molecular Neuroscience* 5, 211-217.

7. Hughes, T. E. (1997). Heterologous expression of the Green Fluorescent Protein. (a contributed methods and protocols chapter). In *Cell Biology: A Laboratory Manual*, D. L. Spector, L. Leinwand and R. Goldman, eds. (Cold Spring Harbor, New York: Cold Spring Harbor Laboratory Press).
8. Hughes, T. E. (1997). Finding reason in the madness of glutamate receptors. A review of: The inotropic glutamate receptors. Edited by Daniel T. Monaghan & Robert J. Wenthold. Human Press. *Journal of Molecular Neuroscience* 163, 163-164.
9. Hughes, T.E. (2000). Looking at receptors: What have fluorescent receptors and channels told us? *The Neuroscientist* 6, 371-379.
10. Molloy, R., Robert, A., Howe, J., and Hughes, T.E.. (2001). Monitoring Intracellular Trafficking of Receptors. In *Receptors: A practical approach.*, S. C. Stanford, and R. W. Horton, eds. (Oxford, Oxford University Press), pp. 272.
11. Sheridan, D.L., Robert, A., Jakobsdottir, K.B., Howe, J.R. and Hughes, T.E. (2002) Jumping Green Genes: using the EZ::TN transposome to create libraries of fluorescent glutamate receptors. *Epicentre Forum*. 9, 4-5
12. Hynes, T. R., Hughes, T. E., and Berlot, C. H. (2003). Cellular Localization of GFP-tagged a subunits. In: *Methods in Molecular Biology*, vol 237: G proteins and Receptors (Totawa, N.J., Humana Press).
13. Sheridan, D., Robert, A., Jakobsdottir, K., and Hughes, T.E. (2003). Rapid Identification of Randomly Generated GFP-Fusion Proteins via Transient Mammalian Expression of Plasmid DNA Purified with Eppendorf's PerfectPREP® Plasmid 96 Vac Direct Bind Kits. Eppendorf Application Notes, No.54.

### **Independent publications from the laboratory:**

1. Fei, Y. (2002). Cone neurite sprouting: an early onset abnormality of the cone photoreceptors in the retinal degeneration mouse. *Mol Vis* 8, 306-314.
2. Fei, Y. (2003). Development of the cone photoreceptor mosaic in the mouse retina revealed by fluorescent cones in transgenic mice. *Mol Vis* 9, 31-42.

### **Abstracts (since 2000):**

1. Hyde, R., A. Robert, T. Hughes & J.R. Howe (2000) Expression of a Dominant-Negative Kainate Receptor GluR6 Subunit in HEK 293 and Cerebellar Granule Cells. *Society for Neuroscience Abstracts*, Prog # 191.8

2. Molloy, R.P, Hughes, T.E., Neve, R.L. (2000) NMDAR1-GFP Clusters in Cultured Hippocampal Neurons. Society for Neuroscience Abstracts, Prog # 521.3
3. Olson, V.G., D.H. Wolf, D.S. Russell, T. Hughes, R.L. Neve & E.J. Nestler (2000) Regulation of Drug Reward by CREB in the Ventral Tegmental Area. Society for Neuroscience Abstracts, Prog # 191.8
4. Fei, Y. & Hughes, T.E. (2000) Targeted Expression of GFP in Transgenic Mouse Cone Photoreceptors: Labeling of Live Cone Cells in Vivo. IOVS (ARVO Abstract) 2000;41(4):s597.
5. Sheridan, D. and T. Hughes (2001) Generating Random GFP Fusion Proteins via in vitro transposition; A New Tool To Study Neuronal Proteins. Society for Neuroscience Abstracts, Prog # 400.1
6. Olson, V.G., D.H. Wolf, D.S. Russell, T. Hughes, R.L. Neve & E.J. Nestler (2001) Regulation of Drug Reward by CREB in Ventral Midbrain. Society for Neuroscience Abstracts, Prog # 977.17
7. Gaudio, P.A., Gopinathan, U., Sangwan, V. & T. Hughes (2001) A polymerase chain reaction based assay for the detection of fungi on the ocular surface. IOVS (ARVO Abstract) 2001;42:s397.
8. Sheridan, D., Berlot, C., Robert, A., Inglis, F., Jakobsdottir, K., Howe, J. and Hughes, T. (2001) A new way to rapidly create functional, fluorescent fusion proteins: random insertion of GFP with an in vitro transposition reaction. FASEB summer research conference on Retinal Neurobiology and Visual Processing (July, 2002).
9. Sheridan, D, Hughes, T., Oak, L. and Tack, Lois. (2002) Automated Plasmid DNA Isolation for GFP Fusion Protein Transfections Using Eppendorf PERFECTprep Kits and PerkinElmer's MultiPROBE II Nucleic Acid Purification Workstation. 14th International Genome Sequencing and Analysis Conference (Oct 2-5 Boston, MA).
10. Giraldez, T., Sheridan, D.L., Hughes, T.E., and Sigworth, F.J. (2003) Random Insertion of GFP Analogs into the hsl0 channel. Biophys. J. (Annual Meeting Abstract #2640)
11. Sheridan, D.L., Jakobsdottir, K., Robert, A., Howe, J., and Hughes, T.E. (2003) Mapping permissive sites for GFP insertion into channels; random tagging with a Tn5 transposon. Biophys. J. (Annual Meeting Abstract #2408).

12. Sheridan, D.L., and Hughes, T.E. (2004) Improved transposon-based tools for generating random GFP fusion proteins. *Biophys. J.* (Annual Meeting Abstract # 3257).
13. Craig J. Gibson, Douglas L. Sheridan, Thomas E. Hughes, Barbara E. Ehrlich (2006). Visualizing Inositol 1,4,5-Trisphosphate Receptor Trafficking Using Internally-Inserted Fluorescent Tags. *Biophys. J.* (Supplement) Abstract # 867.
14. Butler, H, and Hughes, TE (2006) A FRET based strain gauge: a new Tn5 transposon for randomly inserting CFP::Venus pairs in proteins. *Biophys. J.* (Supplement) Abstract # 137.
15. Arnd Pralle, Robbie Mealer , Thomas Hughes, Ehud Isacoff (2006) Optical voltage sensor from random insertion of GFP fragments into the Shaker channel. *Biophys. J.* (Supplement) Abstract # 2271.
16. Robbie Mealer, Arnd Pralle, Ehud Isacoff, Thomas Hughes (2006) Scanning the Shaker channel subunit with fragments of GFP: Can complementing fragments on adjacent subunits produce a fluorophore? *Biophys. J.* (Supplement) Abstract # 2266