David W. Matthews

Lab Address
7108 Urey Hall, Mail Code 0374
Laboratory of Neurophysics
9500 Gilman Drive, La Jolla, California 92093-0374
University of California, San Diego
La Jolla, CA 92093

Home Address
9114-A Regents Road
La Jolla, CA 92037
(609) 240-4491
bohemianscientist.org
dm@ucsd.edu

EDUCATION

UC San Diego and The Salk Institute La Jolla, CA present (advanced August 2009)
Computational Neurobiology, Ph.D. Candidate

- National Science Foundation Graduate Research Fellow
- National Science Foundation Center for Theoretical Biological Physics Fellow
- Thesis research in the Neurophysics Laboratory of David Kleinfeld
- Coursework: neurosciences, signal processing, dynamical systems, and biophysics
- Affiliations: Dept. of Neuroscience and the Divisions of Physical and Biological Sciences
- Rotations: E.J. Chichilnisky, Dan Feldman, David Kleinfeld, and Pam Reinagel

Princeton University, Princeton, NJ May 2005
Molecular Biology, A.B. cum laude; Neuroscience, Cert.; Bioengineering, Cert.

- Relevant coursework: biochemistry, cellular and developmental biology, differential equations, dynamical systems, genetics, linguistics, neurosciences (molecular, cellular, cognitive, systems), neural networks, philosophy of mind.

Institute for Research in Cognitive Neuroscience, Philadelphia, PA June 2002

- NSF-funded lecture and laboratory series at the University of Pennsylvania in computer science, neurobiology, linguistics, psychology, and philosophy of mind.

Beijing Normal University, Beijing, China August 2001

- Second-year language coursework Mandarin Chinese. Supported by competitive grants from Freeman-Asia/Institute of International Education and the East Asian Studies Department of Princeton University.

Upper Moreland High School, Willow Grove, PA June 2000

- Salutatorian (of 257), Cumulative GPA: 103.25, National Merit.

Tufts University European Center Program, Talloires, France July 1999

- Coursework in International Relations and French literature, culture, and art history; scholarship student, one of 15 selected.

Oxford Advanced Studies Program, Oxford, England July 1998

- Received one of four Academic Honors Prizes among the 90 select students.

RESEARCH EXPERIENCE

David Kleinfeld Laboratory September 2006 - present
University of California, San Diego (La Jolla, CA)
Dissertation research on (1) somatosensory transduction in a murine model system; (2) the encoding and merging of distinct sensory information modalities; (3) calcium activity in neuronal populations of the follicle sinus complex; (4) anatomy of the brainstem trigeminal nuclei; (5) computational models of the above.

Sam Wang Laboratory September 2003 - May 2005
Princeton University (Princeton, NJ)
Undergraduate thesis research on the biochemistry and physiology of spike-timing dependent plasticity at the parallel fiber-Purkinje cell synapse in rat cerebellum. Built an electrophysiology setup for whole-cell patch recording and multiple electrode stimulation. Selected to HHMI-funded Summer Research Program at Princeton for continued thesis work in 2004.

Ken Norman Laboratory February-June 2003
Princeton University (Princeton, NJ)
Built a neural network model of the hippocampus to determine the effect of neurogenesis on human hippocampal function in memory formation and storage.

Dan Simons Laboratory May-August 2003
University of Pittsburgh Center for Neuroscience (Pittsburgh, PA)
One of eleven fellows chosen from over 250 in this NSF-funded research opportunity. Studied the biophysical properties of the follicle-sinus complex and their implications for neural circuitry in the rat sensory system.

Doug Smith Laboratory Jan-Sept 2002
Dept. of Neurosurgery, Univ. Pennsylvania Medical School (Phila, PA)
Studied axonal injury using in vivo and in vitro models to understand the mechanics of head trauma and Alzheimers disease. Also examined cytoskeletal dynamics after cellular insult and during continuous elongation.

Pennsylvania Oncology and Hematology Associates June 2001
University of Pennsylvania (Philadelphia, PA)
Contributed to clinical studies of trial drugs for Kaposi's Sarcoma and non-Hodgkins lymphoma patients; also helped to build patient databases and organize Center events.

MAJOR ACADEMIC RECOGNITION

NSF Center for Theoretical Biological Physics Fellow	2007-2008
National Science Foundation Graduate Research Fellowship	2005-2008
Princeton University Department of Molecular Biology Honors Diploma	2005
Howard Hughes Medical Institute Summer Research Fellowship	2004
National Science Foundation Summer Research Fellowship	2003
National Science Foundation Undergraduate Colloquium Fellowship	2002
Freeman-Asia and Institute for International Education Award	2001
East Asian Studies Department Grant for Study in Asia	2001
USA Todays All-USA High School Academic Team	2000
US Academic Decathlon Gold Medalist and Record Setter	2000
Eleanor Gallo Prize for Academic Achievement	2000
Discover Card Tribute Award Scholarship Program Pennsylvania Gold Medalist	1999

PROFESSIONAL PUBLICATIONS AND PRESENTATIONS

Matthews DW, Karten HJ, Kleinfeld D. (2010) *Peripheral and central organization of trigeminal afferents in the mouse.* Janelia Farm Conference (poster presentation). Washington, DC.

Sakurai K, **Matthews DW**, Kleinfeld D, Wang F. (2010) *Axonal projections of subclasses of whisker innervating neurons.* Janelia Farm Conference (poster presentation). Washington, DC.

Valmianski I, Shih, AY, Driscoll J, **Matthews DW**, Kleinfeld D and Freund Y. (2009) *Near real-time adaptive processing of two-photon images of neuronal and vascular dynamics.* under review.

Valmianski I, Shih AY, Driscoll JD, **Matthews DW**, Freund Y, Kleinfeld D. (2009) *Automated detection of neurons and astrocytes from in vivo two photon laser scanning microscopy data using boosted classifiers.* Society for Neuroscience Abstracts, 672.14. Chicago, IL.

Matthews DW*, Valmianski I*, Shih, AY, Driscoll J, Kleinfeld D and Freund Y. (2009) *Adaptive processing of two-photon in vivo and ex vivo images of neuronal and vascular dynamics.* Janelia Farm BioImage Conference (poster presentation). Washington, DC.

Kleinfeld, D, Curtis JC, Hill DN, **Matthews DW**, Mehta SB. (2007) *The Fusion of Touch and Position Signals for Localization of Sensation in Body-Centered Coordinates.* Human Frontier Science Program (conference proceedings). Melbourne, Aus.

Driscoll JD, Larson SD, Aimone JB, **Matthews DW**, Cauwenberghs G. (2006) *A Tunable Silicon Hodgkin-Huxley Neuron.* Institute for Neural Computation (poster presentation). La Jolla, CA.

Sarkisov DY, **Matthews DW**, Wang S.S.-H. (2004) *Roles for IP3 Receptor Dynamics and Calcium Buffers in the Induction of Cerebellar LTD.* Society for Neuroscience Abstracts, 169.14. San Deigo, CA.

Matthews DW, Sarkisov DY, Wang S.S.-H. (2004) *Timing Dependence of Long-Term Depression in Purkinje Cells.* Princeton University Molecular Biology Concentration Research Fair (poster presentation). Princeton, NJ.

Matthews DW, Sarkisov DY, Wang S.S.-H. (2004) *Timing Dependence of Long-Term Depression in Purkinje Cells.* Princeton University Summer Research Fellowship (poster presentation). Princeton, NJ.

Matthews DW and Simons DJ. (2004) *Trigeminal ganglion neuronal activity during normal and hypertensive blood pressures.* Princeton University Undergraduate Research Symposium Abstract. Princeton, NJ.

Matthews DW. (2003) *Biomechanical dynamics of the follicle-sinus complex affect trigeminal ganglion neuronal activity.* Center for Neuroscience at the University of Pittsburgh, National Science Foundation Summer Fellowship Talk. Pittsburgh, PA.

Matthews DW, Shoykhet M, Simons DJ. (2003) *Trigeminal ganglion neuronal activity during normal and hypertensive blood pressures.*Duquesne University Research Symposium (poster presentation). Pittsburgh, PA.

[Technical work (p 4613)] Iwata A, Stys PK, Wolf JA, Chen XH, Taylor AG, Meaney DF, Smith DH. (2004). *Traumatic axonal injury induces proteolytic cleavage of the voltage-gated sodium channels modulated by tetrodotoxin and protease inhibitors.* J Neurosci. 24 (19): 4605-13.

LABORATORY SKILLS

- *Electrophysiological*: in vitro whole-cell patch clamping and in vitro and in vivo single- and multi-unit and field recordings. electromyogram of facial muscles.
- *Computational*: Comfortable on all platforms; technical computing in Matlab and Labview; programming in several languages and comfort learning new ones.
- *Microscopy*: two-photon laser scanning, confocal, and epifluorescence microscopy. GRIN lens optics. Calcium imaging with organic, and genetic dyes.
- *Biological*: all standard molecular biology techniques; immunohistochemistry; tissue culture; cell isolation.
- *Surgical*: Many rat and mouse neurosurgical procedures, including craniotomy and skull imaging windows, stereotaxy, tracheotomy, catheterization, tracer injection, respiration.
- *Linguistic*: Some fluency in oral Mandarin Chinese.