

Curriculum vitae

GARRETT A. KAAS, Ph.D

Research Assistant Professor • Department of Pharmacology • Vanderbilt University School of Medicine • 468 Robinson Research Building • 2200 Pierce Ave • Nashville, TN 37232-6600 • 615-875-9476 • garrett.kaas@vanderbilt.edu

EDUCATION

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| <i>University of Alabama at Birmingham</i> Postdoctoral Fellow – Department of Neurobiology Advisor: Dr. J. David Sweatt | 2011-2015 |
| <i>University of Iowa</i> Ph.D. – Genetics Advisor: Dr. Toshihiro Kitamoto | 2004-2010 |
| <i>University of Wisconsin at Stevens Point</i> B.S. – Biology (Genetics and Cell biology emphasis), Minor in Chemistry Advisor: Dr. Diane Caporale | 1999-2003 |

GRANTS, FELLOWSHIPS, AWARDS

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| UAB Center for the Integration of Research, Teaching and Learning (CIRTL) Associate Award | 2013 |
| NIMH National Research Service Awards for Individual Predoctoral Fellows (1F31MH081788-01A2) Project title: Genetic Analysis of Lithium-Responsive Neurological Processes | 2009-2010 |
| University of Iowa Genetics Retreat- 2st place Poster Presentation | 2009 |
| University of Iowa Interdisciplinary Program in Genetics Internal Training Grant | 2007-2008 |
| University of Iowa Genetics Retreat- 1st place Oral Presentation | 2007 |
| University of Iowa Graduate Student Senate Travel Grant | 2007 |
| University of Wisconsin at Stevens Point Undergraduate Research Grant | 2006 |

RESEARCH/EMPLOYMENT EXPERIENCE

Research Assistant Professor: Vanderbilt University SOM 2016-Present

I am currently performing and overseeing research related to the role of active DNA demethylation in nervous system function together with Dr. J. David Sweatt. I also actively teach several iSeminar courses for incoming Vanderbilt freshmen.

Instructor: University of Alabama at Birmingham 2015-2016

I designed and taught two undergraduate courses for the UAB Undergraduate Neuroscience Program and for the UAB Science and Technology Honors program. During this time, I also continued to work in the lab as a senior member of the lab of Dr. J. David Sweatt

Postdoctoral Fellow: University of Alabama at Birmingham 2011-2015

Techniques: Chromatin Immunoprecipitation, Real time RT-PCR, Molecular Cloning (Gibson Assembly®, Golden Gate assembly®, restriction digests, primer design, plasmid construction), Sanger sequencing, stereotaxic surgery, rodent behavioral paradigms, immunohistochemistry, RNA/DNA extraction

Graduate Student: University of Iowa 2004-2010

Techniques: Drosophila husbandry and genetic crossing schemes, immunohistochemistry, *in situ* hybridization, microarray analysis, behavioral analysis (sleep, locomotion, feeding), Molecular cloning, classic genetic mapping, RNA/DNA extraction, Sanger sequencing, experimental design

Undergraduate: University of Wisconsin at Madison Summer 2003

Techniques: Bacterial culture, sterile technique, sonication, protein extraction, biochemical enzyme assays

Undergraduate: University of Wisconsin at Stevens Point 2001-2002

Techniques: Biological field work, genomic DNA extraction, Sanger sequencing

PUBLICATIONS

- 1. Kaas G.A.**, Kasuya J, Lansdon P, Ueda A, Iyengar A, Wu C.F., Kitamoto T. Lithium-Responsive Seizure-Like Hyperexcitability Is Caused by a Mutation in the *Drosophila* Voltage-Gated Sodium Channel Gene *<i>paralytic</i>*. *eNeuro*. 2016 Sep-Oct;3(5)
2. Heyward F.D., Gilliam D, Coleman M.A., Gavin C.F., Wang J, **Kaas G**, Trieu R, Lewis J, Moulden J, Sweatt JD (2016) Obesity Weighs down Memory through a Mechanism Involving the Neuroepigenetic Dysregulation of SirtI. *J Neurosci* 36:1324-1335
3. Kumar D, Aggarwal M, **Kaas G.A**, Lewis J, Wang J, Ross D.L., Zhong C, Kennedy A, Song H, Sweatt J.D. (2015) TetI Oxidase Regulates Neuronal Gene Transcription, Active DNA Hydroxy-methylation, Object Location Memory, and Threat Recognition Memory. *Neuroepigenetics* 4:12-27
4. **Kaas, G.A.**, Zhong, C., Eason, D.E., Ross, D.L., Vachhani, R.V., Ming, G.L., King, J.R., Song, H., and Sweatt, J.D. (2013). TET1 controls CNS 5-methylcytosine hydroxylation, active DNA demethylation, gene transcription, and memory formation. *Neuron* 79, 1086-1093.
5. Zovkic, I.B., Meadows, J.P., **Kaas, G.A.**, and Sweatt, J.D. (2013). Interindividual Variability in Stress Susceptibility: A Role for Epigenetic Mechanisms in PTSD. *Front Psychiatry* 4, 60.

6. Kasuya, J., **Kaas, G.A.**, and Kitamoto, T. (2009). A putative amino acid transporter of the solute carrier 6 family is upregulated by lithium and is required for resistance to lithium toxicity in *Drosophila*. *Neuroscience* 163, 825-837.

7. Kasuya, J., **Kaas, G.**, and Kitamoto, T. (2009). Effects of lithium chloride on the gene expression profiles in *Drosophila* heads. *Neurosci Res* 64, 413-420.

BOOK CHAPTERS

1. Ross, D.L., **Kaas G.A.** (2016) Simultaneous Quantification of Global 5mC and 5hmC Levels in the Nervous System Using an HPLC/MS Method. *Epigenetic Methods in Neuroscience Research* (Karpova, N., ed), pp 87-96, New York, NY: Springer New York.

2. **Kaas G.A.**, Hawkins K.E., Sweatt, J.D. (2017) Genetic Mechanisms of Memory Disorders (Excluding Alzheimer Disease). *Learning and Memory: A Comprehensive Reference. Volume 4: Mechanisms of Memory* (Bryne, J.H., ed) pp 371-396. Elsevier/Academic Press

3. Xing, Z, Li, Y, Pao, A, **Kaas G.**, Yu Y.E. (2017) CRISPR/Cas9-Facilitated Chromosome Engineering to Model Human Chromosomal Alterations. *Advances in Research on Down Syndrome* (Day, S., ed), pp 1-12. Intech Open

4. Brown, J.A., Sweatt, J.D., **Kaas, G.A.** (2018) Locus-specific DNA methylation assays to study glutamate receptor regulation. *Glutamate Receptors: Methods and Protocols* (Burger, C and Velardo, M.J., eds). Humana Press, USA

MANUSCRIPTS SUBMITTED OR IN PREPARATION

1. *G.A. Kaas, C.B. Greer, S.P. Moran, J. Wright, J.D. Weiss, P.J. Kingsley, J. Zhu, K.S. Chronister, A.Y. Jin, P.J. Conn, L.J. Marnett, A.J. Kennedy, J.D. Sweatt (2019) TetI is expressed as two distinct isoforms with differing roles in the mammalian nervous system. *In prep.*

2.

ABSTRACTS

Kaas G.A., Wright J., Greer C.B., Weiss J.D., Kingsley P.J., Zhu J., Jin A.Y., Chronister K.S., Kennedy A.J., Marnett L.J., Sweatt, J.D. (2018) TetI is expressed as two distinct isoforms in the mouse brain with differing effects on learning and memory. MCCS Symposium and Poster Session. 48th annual Neuroscience meeting. San Diego, CA

Kaas G.A., Wright J., Greer C.B., Zhu J., Kennedy, A.J., Sweatt, J.D. (2017) TetI is expressed as two distinct isoforms with differing roles in the mammalian nervous system. 16th Annual MCCS Symposium and Poster Session. Washington, D.C.

Kaas G.A., Jewel R., Ishimoto H., Kasuya J., Kitamoto T. 2010 *Shudderer*, a dominant mutation in *Drosophila* causing lithium-responsive neurological defects, is allelic to the voltage-gated

sodium channel gene *paralytic*. 41st Annual Neuroscience Meeting, San Diego, CA

Kaas G.A., Kasuya, J., Kitamoto, T. 2009 Possible involvement of the calcineurin A subunit gene, *CanA-14F*, in the neurological phenotype of the lithium-responsive *Drosophila* mutant, *Shudderer*. 40th Annual Neuroscience Meeting, Chicago, IL

Kaas G.A., Ishimoto H, Kasuya J. Kitamoto T. 2008 Upregulation of the Ca²⁺-activated protein phosphatase calcineurin in *Shudderer*, the lithium-responsive neurological mutant in *Drosophila melanogaster*. University of Iowa Genetics Retreat, Iowa City, IA

Kitamoto T, **Kaas G.A.**, Ishimoto H, Kasuya J. 2007. Calcineurin and innate immune response genes are upregulated in *Shudderer*, the lithium responsive neurological mutant in *Drosophila*. 37th Annual Neuroscience Meeting, San Diego, CA

Kaas G.A., Kasuya, J., Ishimoto, H., Kitamoto, T. 2007. Possible involvement of calcineurin in the neurological phenotype of the *Drosophila* mutant, *Shudderer*. University of Iowa Genetics Retreat, Iowa City, IA

Kaas, G.A., Ishimoto, H., Kasuya, J., Kitamoto, T. 2007. Phenotypic analysis of lithium-responsive neurological mutant, *Shudderer*. Cold Spring Harbor Laboratories Neurobiology of *Drosophila* meeting, Cold Spring Harbor, NY

Kaas, G.A., Ishimoto, H., Kasuya, J., Kitamoto, T. 2006. *Shudderer*: a *Drosophila* model to study the molecular mechanisms of lithium action. 36th Annual Neuroscience Meeting, Atlanta, GA

Kaas, G.A., Caporale, D.A., 2003. Infection rates of HGE and Babesiosis in Wisconsin. UWSP College of Letters and Science 4th Annual Undergraduate Research Symposium

TEACHING EXPERIENCE

Fundamental Genetics (002:128:005)

Role: Teaching Assistant (TA)

Semesters Taught: Fall 2007, University of Iowa

Frequency of meetings: 3 lectures per week and 1 discussion

Enrollment & Student Profile: 125~150, undergraduates (biology majors)

Course Description: The course covered all major concepts in genetics (classical transmission genetics, molecular genetics, developmental genetics, genomics) except population genetics. In class time consists of a mixture of lectures, quizzes, group problem-solving and concept activities, and short group presentations. The professor and TAs work as a team to facilitate the in class problem-solving, quizzes and concept activities

Experimental Biochemistry (99:140:000)

Role: Teaching Assistant (TA)

Semesters Taught: Spring 2008, University of Iowa

Frequency of meetings: 1 lecture per week, 2 lab sessions per week (7hrs+)

Enrollment & Student Profile: 2 sections of 20~25 students, undergraduates

Course Description: The use of relevant instruments and modern techniques to fractionate, identify and characterize constituents of biochemical systems.

STH-299-2DA Interdisciplinary Seminar: NBL Neurobiology of Learning and Memory

Roles: Assistant director, Co-director, Director, Instructor

Semesters Taught: Falls 2011-present, UAB

Frequency of meetings: 2 lectures per week, 1.25 hrs

Enrollment & Student Profile: 12-18 students, Science and Technology Honors undergraduates

Course Description: Team-taught course with faculty from several disciplines addressing how a complex problem is addressed in the scientific community. This course illustrates the synergy achieved by interdisciplinary analysis of problems. Students read scientific papers and write a research proposal.

Introduction to Neuroscience I & II (PY355-PY356)

Role: Co-director and Instructor

Semesters Taught: Spring and Fall 2013, UAB

Frequency of meetings: 2 lectures per week, 1.25 hrs

Enrollment & Student Profile: 25-30, neuroscience majors

Course Description: Introduction to the cellular and molecular biology, biochemistry, biophysics, genetics and function of the mammalian nervous system. This course will emphasize mechanisms of synaptic transmission, sensory systems, neuropharmacology, and synaptic plasticity; and introduce the molecular basis of diseases and disorders of the central and peripheral nervous systems

Learning and Memory (NBL 245)

Role: Course Director and Instructor

Semesters Taught: Spring and Fall 2015, UAB

Frequency of meetings: 3 lectures per week, 50 mins

Enrollment & Student Profile: 30-40, undergraduates, mixed majors

Course Description: This course focuses on the biological mechanisms involved in the processes of learning and memory in the nervous system. We will examine these mechanisms at the molecular, cellular and systems levels of the brain. Topics range from memory-associated molecules and synaptic plasticity to animal models and human behavior. In addition, students will be introduced to the many behavioral paradigms and molecular genetic techniques used by neuroscientists to study learning and memory in the brain.

The Epigenetics Era: What new Discoveries in Epigenetics Tell us about the Interface of Genes and Environment (NSC 1001.01)

Role: Course Co-director and Instructor

Semesters Taught: Spring and 2017, Vanderbilt University

Frequency of meetings: 10 min lectures, 1 per week, 75 mins

Enrollment & Student Profile: 14, freshman undergraduates, mixed majors

Course Description: We will explore the topic using a combination of out-of-class readings, in-class discussions and group presentations. Students will come away from this commons seminar with a basic understanding of epigenetics and why this research area has expanded exponentially in recent years, impacting nearly every area of biomedicine and its related basic science disciplines.

Principles of Molecular Biology (315/519)

Location: University of Wisconsin at Stevens point

Date 10-9-18

Title: Using TALEs and Crispr-CAS9 to study epigenetic mechanisms in memory formation

Introduction to Biological Drugs

Location: Vanderbilt SOM

Date: 3-19-18 and 3-21-18

Title: *RNA-based therapeutics*

Vanderbilt Pharmacology Department seminar series (work in progress)

Location: Vanderbilt SOM

Date: 11-1-17

Title: *Tet1 is expressed as two distinct isoforms with differing roles in the mammalian nervous system*

Neuroscience Research Methods (NBL 390)

Location: UAB

Date: 3-31-15

Title: *Brave New World: Using CRISPR-Cas9 and TALE technology to target, edit and regulate the genome*

2015 Alabama Brain Bee Competition

Keynote Speaker

Location: UAB

Date 2-28-15

Title: *The involvement of epigenetic mechanisms in memory formation*

Undergraduate Neuroscience colloquium

Location: UAB

Date: 2-21-2014

Title : *Epigenetics and the nervous system*

Mechanisms of Memory (NBL/PY 434)

Location: UAB

Date: 9-16-2013

Title: Mechanisms of Memory: Chapter 3. Non-Associative Learning and Memory

Oakwood chemistry department weekly seminar series

Location: Oakwood University

Date: 2-7-2013

Title: *TET1 Oxidase Controls CNS 5-methylcytosine Hydroxylation, Active DNA Demethylation, Gene Transcription, and Memory formation*

Advanced Neuroscience (PY460)

Location: UAB

Date: 10-23-2012

Title: *Epigenetics in Plasticity and Memory*

MENTORING EXPERIENCE

Eve Moll, Vanderbilt University. Junior (current)

Karen Osei-Boamah, Xavier University of Louisiana. Sophomore
Vanderbilt Leadership Alliance FYRE student

Junqin Zhu, Vanderbilt University. Junior (current)
Molecular Biology Undergraduate

Keagan Chronister, Vanderbilt University. Junior
Neuroscience Undergraduate

Richard J. Trieu, UAB. Junior
UAB Science and Technology Honors Student
Thesis project: Role of Active DNA Demethylation in Cued Fear Memory

Rachel Schroeder, Wartburg College, Junior
UAB Summer Program In Neuroscience (SPIN)

Piyush Borse, UAB, sophomore
Neuroscience Undergraduate

Meredith Tittle, University of Alabama, Post graduate
Volunteer and Research Assistant

Raj Vachhanni, UAB, Junior
UAB Science and Technology Honors Student
Thesis project: Role of Active DNA Demethylation in Cued Fear Memory

Kelsea Sandefur, Skidmore College, Junior
UAB Summer Program In Neuroscience (SPIN)

Joshua Cohen, UAB, MSTP student
Rotation student in the Sweatt Lab

Shin Xu, Birmingham Southern College, Junior
UAB Summer Program In Neuroscience (SPIN)

Daniel Frana, University of Iowa, Freshmen
Undergraduate Research Assistant in the Kitamoto Lab

Thomas Balata, University of Iowa, Senior
Undergraduate Research Assistant in the Kitamoto Lab

AD HOC REVIEWER

Biological Psychiatry

EMBO

NeuroReports

Nature Communications