

CURRICULUM VITAE

(as of 15 May 2008)

Thomas A. Christensen, PhD

Senior Research Scientist

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Old Address:

Arizona Research Laboratories

Division of Neurobiology

The University of Arizona

Present Address:

Speech, Language & Hearing Sci.

515 Speech & Hearing Building

1131 E. 2nd Street (PO Box 210071)

Tucson, AZ 85721-0071

EDUCATION:

State University of New York at Stony Brook

State University of New York at Stony Brook

Columbia University

Degree

B.S. in Biology

Ph.D. in Neurobiology & Behavior

Post-Doctoral Fellow

Year

1979

1983

1983-85

DOCTORAL DISSERTATION: Dorsal Unpaired Median Neurons and the Bilateral Regulation of Luminescence in the Firefly; Albert D. Carlson, Advisor

MAJOR FIELDS OF RESEARCH:

Neurobiology of animal communication and experience-dependent plasticity

- systems-level electrophysiological analysis of primary sensory networks; mapping sensory projections into the brain; statistical analysis of neural-ensemble codes for sensory signals
- modulation of sensory circuits by amine transmitters (5HT, dopamine, octopamine)
- electrophysiology, anatomy, and synaptic pharmacology of inhibitory pathways
- fMRI analysis of memory and attentional modulation of language centers in healthy adults and others experiencing language disorders

EXPERIENCE:

Academic Appointments

1978-80 Graduate Teaching Ass't, Dept. of Neurobiology & Behavior, SUNY Stony Brook
1981-83 Graduate Research Ass't, Dept. of Neurobiology & Behavior, SUNY Stony Brook
1983-85 Postdoctoral Research Fellow, Dept. of Biological Sciences, Columbia University
1985-87 Postdoctoral Research Associate, ARLDN, U. Arizona
1987-92 Assistant Research Scientist, ARLDN, U. Arizona
1992-00 Associate Research Scientist (Continuing Status as of 1995), ARLDN, U. Arizona
2000- Research Scientist in ARLDN, U. Arizona
2006- Senior Research Scientist in Speech, Language & Hearing Sciences, U. Arizona

Other Experience and Professional Service

1996-98 Counselor, Exec. Committee - Assoc. for Chemoreception Sciences
1998 Co-Organizer (w/Rick Levine), Western Nerve Net, Tucson AZ
2000-2002 Membership Chair, Exec. Committee - Assoc. for Chemoreception Sciences
2004- Member, NIH Study Section, Somatosensory & Chemosensory Systems

EDITORIAL ACTIVITIES:

2005 Book Editor, "Advances in Insect Sensory Neuroscience" by CRC Press

HONORS & ACHIEVEMENTS:

1983-86 Individual NIH/NRSA Postdoctoral Research Award

1988 First Place Award for a presentation at the Eighth International Biennial Congress of the European Chemoreception Research Organization

1991-92 Visiting Professor, University of Trondheim, Norway

1994 Kenji Nakanishi Award for Excellence in Olfactory Research; the Takasago Corp. & the Assoc. for Chemoreception Sciences (first insect neurobiologist so honored)

1996-on 22 invited presentations in the US, Europe and Japan

2006 Appointed adjunct faculty member - Dept. of Speech, Language & Hearing Sciences, UA

2007 NIH Career Development Award

MEMBERSHIPS:

Organization for Human Brain Mapping
International Brain Research Organization
International Society for Neuroethology
Society for Neuroscience

SERVICE & OUTREACH:**A. Local/State/National**

1987-present Organizer, Lab Demonstrations / Tours of ARLDN for primary and middle school science classes; on average 2/year
1996 Grand Awards Judge, International Science & Engineering Fair, May '96
1996-98 Counselor, Assoc. for Chemoreception Sciences
1997 Faculty Lecture and Lab Tour: Pima Community College students - Oct '97
1997 Judge, Student Showcase '97
1998 Meeting Organizer, Western Nerve Net '98; co-organizer with Rick Levine; held in Tucson April '98
1999 Public Lecture: "The Neurobiology of Olfaction: Lessons from Insects" Kiwanis of Green Valley, lecture celebrating Brain Awareness Week, March '99
2000 Public Lecture: "The Neurobiology of Olfaction: Lessons from Insects" Retired TWA Employees of Southern Arizona, lecture for Brain Awareness Week, March '00
2000-02 Membership Chair, Assoc. for Chemoreception Sciences
2002-present Insect Demonstrations, GWIZ Science Center, Sarasota Florida (in connection with annual AChemS meeting)
2004 Insect Demonstrations, UA Science Library Junior Scientists Day, October '04
2004-2007 Member, NIH Study Section, Somatosensory & Chemosensory Systems
2008 Member, NIH Study Section, Loan Repayment Program Special Emphasis Panel

B. Departmental/University

1995 Member, ARLDN Committee for Academic Program Review
1995 Member, Peer Review Panel, OVPR Small Grants Program
1995 Member, Committee to Establish Review Criteria for Continuing Status and Promotion, Office of the Vice President for Research
1995 Chair, Standing Committee on Continuing Status and Promotion, Office of the Vice President for Research
1995- present Supervisor, Animal Rearing Facility (A.A. Osman, chief operator; hire and co-supervise student assistants
1996 Member, Search Committee for ARL Systems Analyst
1996-99 Member, Standing Committee on Continuing Status and Promotion, Office of the Vice President for Research
1999 Grader, UA Undergraduate Writing Proficiency Exams

CURRENT RESEARCH SUPPORT:

1 K01 DC008812-01 Christensen (PI) 04/01/07-03/31/12
NIH/NIDCD

Brain Mechanisms Linking Language, Attention and Memory

Major goals: to define the functional neural architecture of attentional control over auditory learning and language processing using high-field fMRI in normal and language-impaired populations.

TEACHING / MENTORING:**A. Research trainees (since 1995)**

Postdoctoral research associates trained:

Sue Hannaford, 1/94-10/94

Jane Roche King, 8/95-01

Vonnie Shields, 11/95-01

Neil Vickers, 1/95-10/98

Hong Lei, 4/99-present

Pablo Guerenstein, 12/99-present

Carolina Reisenman, 07/01-present

Corinna Thom, 06/03-07/05

Graduate students trained and on whose committees I served:

Thomas Heinbockel - CN, served on PhD committee; graduated 1997
Aaron King, Applied Math, served on PhD committee through mid-97
Katja Selchow - CN, served on PhD committee; graduated 1998
Jianhua Ren - CN, lab rotation Fall 1998
Davide Dulcis - CN, served on PhD committee; summer 1999-summer 2004
Lisa Minkin - Gen Biol Pgm for Teachers, committee Chair; summer 2001-summer 2005
Marco Herrera - Math, fall 2000 - 2002; Phys. Sci., fall 2002-fall 2003
Caroline Wilson - CN, serve on PhD committee; summer 2001-present
Andrew Dacks - Insect Science, serve on PhD committee; fall 2001 – 2007
Mary Pankratz – Speech & Hearing, PhD committee; fall 2005 – present
Angelique Paulk - Insect Science, serve on PhD committee; fall 2003 – present
Josh Martin - CN, serve on PhD committee; summer 2006-present

Undergraduate research students trained:

Sarah Dixon, 09/95-05/96
Dave Stein, 01/96-05/96
L. Nicole Giedinghagen, 06/96-05/97
Jennifer Leverich, 09/96-05/98
Brandon Williams, 01/00-09/00
A.J. Pittner, 01/01-07/01
Daniel Doty, 06/01-01/02
Avin Sigurani, 01/02-07/01
Erin McKiernan, 09/02-06/05
Marco Rosales, 06/04-10/04
Katie Skinner, 11/04-06/05
Naghmeh Saghafi, 11/04-06/05
Julie Lockwood, 9/06-present
Megan Kittleson, 9/06-present

Visiting Scientists/Instructors (since 1995)

Simone Jacobson, Teacher-Research Program participant, summer 95
Peter Teal, USDA Gainesville, 1 week 5/95 and 1 week 5/96
Jean-Pierre Rospars, INRA, Versailles, France, 3 weeks 6/96,
Tor Jorgen Almaas, U. Trondheim, Norway, 1 year starting 7/99
Paul Moore, Bowling Green Univ, 1 week Oct. 2005

B. Classroom Teaching

Spring 1995 H295 Mechanics of the Mind, 25% responsibility
Spring 1996 H295 Mechanics of the Mind, 20% responsibility
Spring 1998 NRSC 195B Contemporary Neuroscience: A Field Guide to the Brain
co-instructor, Lynne Oland, 50% resp.
Spring 1999 NRSC 195B Contemporary Neuroscience: A Field Guide to the Brain
co-instructor, Lynne Oland, 50% resp.
Spring 2001 NRSC 195C Contemporary Neuroscience: A Field Guide to the Brain
co-instructor, Lynne Oland, 50% resp.
Spring 2002 NRSC 195C Contemporary Neuroscience: A Field Guide to the Brain
co-instructor, Lynne Oland, 50% resp.
Fall 2003 Mentor, Bio 181 Honors students
Fall, 2004 Mentor, Bio 181 Honors students

C. Independent Study

Fall 1998 PHPR499 Jason Lashbrook, Dept. Pharmacy, 2 units
Spring 1999 PHPR499 Jason Lashbrook, Dept. Pharmacy, 2 units
Summer 2001 NRSC 599 Lisa Minkin 1 cr.
Summer 2003 NRSC 900 Lisa Minkin 2 cr.
Fall 2004 NRSC 900 Josh Martin 1 cr.
Spring 2006 MCB 499 Yeeck Sim 2 cr.

INVITED PRESENTATIONS

- 1996 "Interphyletic Issues in Neuroscience", AZ Neuroscience '96
- 1997 "GABAergic mechanisms that shape the temporal response to odors in moth olfactory projection neurons" Symposium on "Synaptic Processing of Chemosensory Signals" at AChemS XIX, San Diego, CA, July 1997
- 1997 "Processing of olfactory information in the insect brain", guest lecture in BIO197, Pima Community College, Oct 1997
- 1997 "Neural Encoding and Sensory Filters" DARPA/ONR Symposium on Tracing Odor Plumes, Woods Hole, MA, Dec 4-5, 1997
- 1998 "Context-dependent odor responses reveal dual GABA-dependent spike codes in single olfactory projection neurons", Symposium at AChemS XX, Sarasota, FL, April 1998
- 1999 "Using multiunit recording to sniff out the olfactory code in the moth brain" CN DataBlitz, Feb 1999
- 1999 "Neural Processing of Olfactory Information in the Brain", faculty lecture in BIO197, Pima Community College, April 1999
- 1999 "Contextual Influences on the Central Processing of Chemical Signals by Ensembles of Olfactory Interneurons in the Moth Antennal Lobe", ESITO, Tutzing, Germany, Sept 1999
- 2000 "Representation of olfactory information in microbrains: multi-neuron recordings reveal context-dependent modulation of odor-specific neural ensembles", meeting of the Japanese Zoological Soc., Tokyo, Japan, September 21
- 2000 "Probing the olfactory code using multi-neuron recordings in the insect brain", Developments in Multichannel Recording IV, satellite symposium of SN meeting, New Orleans, LA, November 4
- 2001 "Into the minds of moths: recording patterns of brain activity with multichannel silicon microelectrode arrays"; International Soc. of Chem. Ecol., July 7, Lake Tahoe, CA
- 2001 "Neurocryptography in microbrain research: deciphering olfactory codes in the moth antennal lobe"; Int. Symp. on Neuronal Architecture and Plasticity in the Microbrain System, October 13, Tsukuba, Japan.
- 2002 "Ensembles Within Ensembles: What Multi-Electrode Recordings Tell Us About Odor Coding" Olfaction Symposium at the Free University, Sept., Berlin, Germany
- 2002 "Ensembles within Ensembles: Exploring Dynamic Olfactory Codes with Multi-Neuron Recordings" Dept. of Neurobiology & Anatomy, U. Maryland, Oct., Baltimore, MD
- 2002 "Olfactory Conditioning in the Moth: Central Representations and Motor Behaviors Evoked by Odor Are Modulated by Stimulus Context" UA Motor Control Colloquium, November
- 2003 "Picking up the scent: how insects recognize and discriminate host-plant odors" UA Plant-Insect Interaction Seminar Series, January
- 2003 "Into the mind of the moth: Decoding odor-evoked patterns of neural activity in the insect brain" UA Dept. of Entomology, February
- 2003 "Olfactory Conditioning in the Moth: Central Representations and Behaviors Evoked by Odor Are Modulated by Stimulus Context" ESITO VIII, Harstad, Norway, July
- 2003 "Olfactory Conditioning in the Moth: Central Representations and Behaviors Evoked by Odor Are Modulated by Stimulus Context" IBRO World Congress of Neuroscience, Prague, Czech Republic, July
- 2004 "Making scents out of spatial and temporal codes in specialist and generalist olfactory networks" ISOT/JASTS 2004, Kyoto, Japan, July 5-9
- 2004 "Olfactory Information Processing: Actions of GABA on Signal Transformations in the Glomerular Layer" International Symposium on Chemical Senses & Insect Behavior, Kyoto, Japan July 10-11
- 2004 "Neuroinformatics and the Quest to Understand the Brain" Shaping the Future of IT, UA Eller College Symposium, Nov. 3
- 2005 "Making scents out of information coding strategies in the insect olfactory system" University of Utah, May 17, Salt Lake City, UT
- 2008 "Functional neuroanatomy and neurochemistry of human attention networks" Auditory Cognitive Science Society, University of Arizona, Jan. 11, Tucson, AZ

PUBLICATIONS (selected out of a total of more than 100 papers, reviews, chapters)

1. Books

Methods in Insect Sensory Neuroscience, TA Christensen (ed), CRC Press, Boca Raton, FL 2005

2. Peer-Reviewed Articles since 1995

Human Audition & Brain Mapping

Christensen TA, Antonucci SM, Lockwood JL, Kittleson M, Plante E (2008) Cortical and subcortical contributions to the attentive processing of speech. *NeuroReport* (in press)

Insect Olfaction

- Christensen TA, Harrow ID, Cuzzocrea C, Randolph PW, Hildebrand JG (1995) Distinct projections of two populations of olfactory receptor axons in the antennal lobe of the sphinx moth *Manduca sexta*. *Chemical Senses* 20:313-323
- Christensen TA, Mustaparta H, Hildebrand JG (1995) Chemical communication in heliothine moths VI. Parallel pathways for information processing in the macroglomerular complex of the male tobacco budworm moth *Heliothis virescens*. *J Comp Physiol A* 177:545-557
- Christensen TA and Hildebrand, JG (1997) Coincident stimulation with pheromone components improves temporal pattern resolution in central olfactory neurons. *J Neurophysiology* 77:775-781
- Vickers NJ, Christensen, TA (1998) A combinatorial model of odor discrimination using a small array of contiguous, chemically defined glomeruli. *Ann. N.Y. Acad. Sci.* 855:514-516.
- Christensen TA, Waldrop B, Hildebrand JG (1998a) Multitasking in the olfactory system: Context-dependent responses to odors reveal dual GABA-regulated coding mechanisms in single olfactory projection neurons. *J. Neurosci.* 18:5999-6008
- Christensen TA, Waldrop B, Hildebrand JG (1998b) GABAergic mechanisms that shape the temporal response to odors in moth olfactory projection neurons. *Ann N.Y. Acad. Sci.* 855:475-481
- Vickers NJ, Christensen TA, Hildebrand JG (1998) Combinatorial odor discrimination in the brain: attractive and antagonist odor blends are represented in distinct combinations of uniquely identifiable glomeruli. *J Comp Neurol* 400:35-56
- Heinbockel T, Christensen TA, Hildebrand JG (1999) Temporal tuning of odor responses in pheromone-sensitive projection neurons in the brain of the sphinx moth *Manduca sexta*. *J Comp Neurol* 409:1-12
- King JR, Christensen TA, Hildebrand JG (2000) Response characteristics of an identified, sexually dimorphic olfactory glomerulus. *J Neurosci* 20:2391-2399
- Christensen TA, Pawlowski VM, Lei H, Hildebrand JG (2000) Multi-unit recordings reveal context-dependent modulation of synchrony in odor-specific neural ensembles. *Nature Neurosci.* 3:927-931
- Vickers NJ, Christensen TA, Baker TC, Hildebrand JG (2001) Odour-plume dynamics influence the brain's olfactory code. *Nature* 410:466-470
- Christensen TA, D'Alessandro G, Lega J, Hildebrand JG (2001) Morphometric modeling of olfactory circuits in the insect antennal lobe: I. Simulations of spiking local interneurons. *BioSystems* 61:143-153
- Lei H, Christensen TA, Hildebrand JG (2002) Local inhibition modulates odor-evoked synchronization of glomerulus-specific output neurons. *Nature Neuroscience* 5:557-565.
- Christensen TA, Lei H, Hildebrand JG (2003) Coordination of central odor representations through transient, non-oscillatory synchronization of glomerular output neurons. *Proc Natl Acad Sci USA* 100:11076-11081
- Vickers NJ, Christensen TA (2003) Functional divergence of spatially conserved olfactory glomeruli in two related moth species. *Chem Senses* 28:325-338
- Reisenman CE, Christensen TA, Francke W, Hildebrand JG (2004) Enantioselectivity of projection neurons innervating identified olfactory glomeruli. *J Neurosci* 24:2602-2611
- Daly KC, Christensen TA, Lei H, Smith BH, Hildebrand JG (2004) Learning modulates the ensemble representations for odors in primary olfactory networks. *Proc Natl Acad Sci* 101:10476-10481
- Heinbockel T, Christensen TA, Hildebrand JG (2004) Representation of binary pheromone blends by glomerulus-specific olfactory projection neurons. *J Comp Physiol A* 190:1023-1037
- Guerenstein PG, Christensen TA, Hildebrand JG (2004) Sensory processing of ambient CO₂ information in the brain of the moth *Manduca sexta*. *J Comp Physiol A* 190:707-725
- Lei H, Christensen TA, Hildebrand JG (2004) Spatial and temporal organization of ensemble representations for different odor classes in the moth antennal lobe. *J Neurosci* 24:11108-11119

- Reisenman CE, Christensen TA, Hildebrand JG (2005) Chemosensory selectivity of output neurons innervating an identified, sexually isomorphic olfactory glomerulus. *J Neurosci* 25:8017-8026
- Dacks AM, Christensen TA, Agricola HJ, Wollweber L, Hildebrand JG (2005) Octopamine-immunoreactive neurons in the brain and subesophageal ganglion of the hawkmoth *Manduca sexta*. *J Comp Neurol* 488:255-268
- Abrell L, Guerenstein PG, Mechaber WL, Stange G, Christensen TA, Nakanishi K, Hildebrand JG (2005) Effect of elevated atmospheric CO₂ on oviposition behavior in *Manduca sexta* moths. *Global Change Biology*
- Dacks AM, Dacks JB, Christensen TA, Nighorn AJ (2006) The cloning of one putative octopamine receptor and two putative serotonin receptors from the tobacco hawkmoth, *Manduca sexta*. *Insect Biochemistry and Molecular Biology* 36: 741-747
- Dacks AM, Christensen TA, Hildebrand JG (2006) Phylogeny of a serotonin-immunoreactive neuron in the primary olfactory center of the insect brain. *Journal of Comparative Neurology* 498: 727-746
- Wilson CH, Christensen TA, Nighorn AJ (2007) Inhibition of nitric oxide and soluble guanylyl cyclase signaling affects olfactory neuron activity in the moth *Manduca sexta*. *J Comp Physiol A* 193: 715-728
- Dacks AM, Christensen TA, Hildebrand JG (2008) Modulation of olfactory information processing in the antennal lobe of *Manduca sexta* by serotonin. *Journal of Neurophysiology* 99:2077-2085

3. Reviews / Chapters

- Christensen TA (1997) Anatomical and physiological diversity in the central processing of sex-pheromonal information in different moth species. In: RT Cardé & AK Minks (eds), *Insect Pheromone Research: New Directions*, Chapman & Hall, New York, pp. 184-193
- Sorensen PW, Christensen TA, Stacey NE (1998) Discrimination of pheromonal cues in fish: emerging parallels with insects. *Curr Opin Neurobiol* 8:458-467.
- Vickers NJ, Christensen TA, Hildebrand JG (1998a) Primary processing of pheromone odours: the functional organization of the macroglomerular complex in heliothine moths. *The Biochemist* 20:22-25.
- Vickers NJ, Christensen TA, Hildebrand JG (1998b) Integrating behavior with neurobiology: odor-mediated moth flight and olfactory discrimination by glomerular arrays. *Integrative Biology* 1:224-230.
- Hansson BS, Christensen TA (1999) Functional characteristics of the antennal lobe. In: BS Hansson (ed), *Insect Olfaction*, Springer Verlag, Berlin, pp. 126-161.
- Christensen TA, White J (2000) Representation of olfactory information in the brain. In: TE Finger, WL Silver, D Restrepo (eds), *Neurobiology of Taste and Smell, Vol II.*, John Wiley & Sons, New York.
- Christensen TA, Hildebrand JG (2001) Electrophysiological analysis of olfactory coding in the CNS. In: SA Simon, MAI Nicolelis (eds), *Methods and Frontiers in Chemosensory Research*, CRC Press, Boca Raton, pp. 325-337
- Christensen TA, Hildebrand JG (2002) Pheromonal and host-odor processing in the insect antennal lobe: how different? *Current Opinion in Neurobiology* 12:393-399
- Tolbert LP, Oland LA, Christensen TA, Goriely AR. (2003) Neuronal and glial morphology in olfactory systems: Significance for information processing and underlying developmental mechanisms. *Brain and Mind* 4:27-49
- Pawlowski VM, Christensen TA, Lei H, Hildebrand JG (2005) A primer on multichannel neural ensemble recording in insects. In: Christensen TA (ed), *Methods in Insect Sensory Neuroscience*, CRC Press, Boca Raton, FL, pp. 393-415
- Christensen TA (2005) Making scents out of spatial and temporal codes in specialist and generalist olfactory networks. *Chem Senses* 30:i283-284
- Lei H, Qiu YT, Christensen TA (2005) Olfaction in Insects: Structural Correlates of Function. In: Liu T & Kang L (eds) *Entomological Research: Progress and Prospect*, Science Press, Beijing, pp. 133-169