*Curriculum Vitae*

# Bruno van Swinderen

## Personal


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| Address | 22 Camborne Place<br>Chapel Hill, Qld 4069<br>Australia |
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| e-Mail | b.vanswinderen@uq.edu.au |
| Date of Birth | June 19, 1970 |
| Place of Birth | Nairobi, Kenya |
| Nationality | Australian |


## Research Interests

Selective attention, perception, arousal, sleep, general anesthesia, behavior genetics, gene interactions, quantitative genetics and evolution.

## Education

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|---|---|
| 1988 - 1992 | B.A. Brandeis University, B.A., Biology<br>Waltham, Massachusetts, USA. |
| 1992 -1998 | PhD., Washington University, St Louis, Division of Biology and Biomedical Sciences, Program in Evolutionary and Population Biology. "Genetic determinants of general anesthesia in *Caenorhabdatis elegans*." (With C.M. Crowder). |

## Positions held

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|---|---|
| 1999-2003 | Postdoctoral research, The Neurosciences Institute, San Diego, USA |
| 2003-2007 | Associate Fellow, The Neurosciences Institute, San Diego, USA. |
| 2008-present | Principal Research Fellow, The Queensland Brain Institute, University of Queensland, Brisbane Qld 4072 Australia. |
| 2010-2014 | ARC Future Fellow |

Teaching

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| 2013- | Lecturer for BIOM3333, School of Biomedical Sciences |
| 2010-13 | Lecturer for Master of Neuroscience programme, QBI |
| 2011-2013 | Lecturer for "Invertebrate Neuroethology" School of Biology, The University of Queensland, Australia |
| 2009, 2010 | Lecturer for "The integrated brain", School of Biomedical Sciences, The University of Queensland, Australia |
| 2009-2013 | Lecturer for "Sensory Neuroscience", School of Psychology, The University of Queensland, Australia |
| July 2005-2007, 2009 | Visual learning in *Drosophila*, Cold Spring Harbor Lab, New York |

PhD student Supervision

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| 2013- | Michael Troup, Phd candidate. "General anaesthesia mechanisms in the fly brain" |
| 2012- | Chelsie Rohrscheib, PhD candidate (co-supervisor, with Jeremy Brownlie, Griffith University). |
| 2012- | Danny Bosch, PhD candidate (co-supervisor, with Sean Millard, SBMS, The University of Queensland). |
| 2012- | Melvyn Yap, PhD candidate. "Electrophysiology of sleep in *Drosophila*" |
| 2011- | Leonie Kirszenblat, PhD candidate. " Sleep homeostasis and visual attention in *Drosophila*" |
| 2010 - | Oressia Zalucki, PhD candidate. "Presynaptic mechanisms of general anaesthesia in the *Drosophila* brain |
| 2009 - | Thomas Pollak, PhD Candidate. "Brain Dynamics and behavioural state in *Drosophila*." (With Barry Dickson, IMP, Vienna, Austria). |
| 2007- | Preeti Sareen, PhD Candidate. "Selective attention in *Drosophila*." (With Martin Heisenberg, Wuerzburg, Germany). |

Masters and Honours students

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|---|---|
| 2013 | Alice Petty (Honours), Avantika Solao (Honours), Jessica Ogden (Masters) |
| 2012 | Michael Troup (Masters) |
| 2011 | Jacqui Stacey (Honours) |
| 2010 | Benjamin Calcagno (Honours) |
| 2009 | Nivetha Gunasekaran (Masters) |

Post-doctoral Supervision

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|---|---|
| 2012- | Wendy Imlach (Neurophysiology) |
| 2012- | Yanqion Zhou (Visual attention) |
| 2011- | Aoife Larkin (Synaptic function) |
| 2010- | Benjamin Kottler (Aneasthetic mechanisms) |
| 2009- | Bart van Alphen (Models of attention) |
| 2008- | Angelique Paulk (Neurophysiology of attention) |

Publications in peer-reviewed journals

**van Swinderen, B.**, Kottler, B. (2013) Explaining general anesthesia: A two-step hypothesis linking sleep and the synaptic release machinery. *BioEssays* (in press).

Paulk, A.C., Zhou, Y-Q, Stratton, P., Liu, L., **van Swinderen, B.** (2013) Multichannel brain recordings in behaving *Drosophila* reveal oscillatory activity and local coherence in response to sensory stimulation and circuit activation. *Journal of Neurophysiology* 110: 1703-1721.

Kottler, B., Bao, H., Zalucki, O., Troupe, M., Imlach, W. Paulk, A., van Alphen, B., Zhang, B., **van Swinderen, B.** (2013) A sleep/wake circuit controls isoflurane sensitivity in *Drosophila*. *Current Biology* 23: 594-8.

van Alphen, B., Yap, M., Kirszenblat, L., Kottler, B., **van Swinderen, B.** (2013) A dynamic deep sleep stage in *Drosophila*. *Journal of Neuroscience* 33: 6917-27

Paulk, A., Millard, S.S., **van Swinderen, B.** (2013) Vision in *Drosophila*: seeing the world through a model's eyes. *Annual Reviews in Entomology*, 58: 313-32.

Calcagno, B., Eyles, D., van Alphen, B., **van Swinderen, B.** (2013) Transient activation of dopaminergic neurons during development modulates visual responsiveness, locomotion, and brain activity in a dopamine ontogeny model of schizophrenia. *Translational Psychiatry*, 2: e2026

van Alphen, B., **van Swinderen, B.** (2013) *Drosophila* strategies to study psychiatric disorders. *Brain Research Bulletin* 92:1-11.

**van Swinderen, B.** (2012) Competing visual flicker reveals attention-like rivalry in the fly brain. *Frontiers in Integrative Neuroscience*, 6:96.

Miller, S.M., Ngo, T.T., **van Swinderen, B.,** (2011) Attentional switching in humans and flies: rivalry in large and miniature brains. *Frontiers in Human Neuroscience*, 5:188.

Evans, O., Paulk, A.C., **van Swinderen, B.** (2011) An automated paradigm for *Drosophila* visual psychophysics. *PLoS One* 6(6):e21619

**van Swinderen, B.** (2011) Attention in Drosophila. *Int. Rev. Neurobiology*. 99: 51-85.

**van Swinderen, B.** and Andretic, R. (2011) Dopamine in *Drosophila*: setting arousal thresholds in a miniature brain. Proc. Biol. Sci. 278(1707):906-13

Burne T, Scott E, **van Swinderen B.**, Hilliard M, Reinhard J, Claudianos C, Eyles D, McGrath J. (2011) Big ideas for small brains: what can psychiatry learn from worms, flies, bees and fish? *Molecular Psychiatry*. 16(1):7-16.

**van Swinderen, B.** and Brembs, B. (2010) Attention-like deficit and hyperactivity in a *Drosophila* memory mutant. Journal of Neuroscience. Jan 20; 30(3):1003-14.

**van Swinderen, B.**, McCartney, A., Kauffman, S., Flores, K., Wagner, J., Paulk, A. (2009) Shared visual attention and memory systems in the *Drosophila* brain. PLoS One. June 19;4(6):e5989.

**van Swinderen, B.** (2007) The Attention-Span of a Fly. Fly 1:3, 187-189.

**van Swinderen, B.** (2007) Attention-like Processes in *Drosophila* Require Short-term Memory Genes. Science 315: 1590-1593.

**van Swinderen, B.** and Kristopher A. Flores (2006) Attention-like Processes Underlying Optomotor Performance in a *Drosophila* Choice Maze. Journal of Neurobiology 67: 129-145.

**van Swinderen, B.** (2006) A Succession of Anesthetic Endpoints in the *Drosophila* brain. Journal of Neurobiology 66: 1195-1211.

Andretic, R., **van Swinderen, B.**, Greenspan, R.J. (2005) Dopaminergic Modulation of Arousal in *Drosophila*. Current Biology Vol. 15, 1165-1175.

**van Swinderen, B.**, and Greenspan, R.J. (2005) Flexibility in a gene network affecting a simple behavior in *Drosophila melanogaster*. Genetics 169: 2151-2163.

**van Swinderen, B.** The remote roots of consciousness in fruit-fly selective attention? (2005) Bioessays 27: 321-330.

Greenspan, R.J., and **van Swinderen, B.** (2004) Cognitive consonance: complex brain functions in the fruit fly and its relatives. Trends in Neuroscience, Dec.; 27(12):707-711.

**van Swinderen, B.**, Nitz, D.A., Greenspan, R.J. (2004) Uncoupling of Brain Activity from Movement Defines Arousal States in *Drosophila*. Current Biology Vol. 14, 81-87.

**van Swinderen, B.**, and Andretic R. (2003) Arousal in *Drosophila*. Behavioural Processes: Vol. 64, 133-144.

**van Swinderen, B.**, and Greenspan, R.J. (2003) Salience Modulates 20-30 Hz brain activity in *Drosophila*. Nature Neuroscience Vol. 6, #6, p579-586.

Nitz, D.A., **van Swinderen, B.**, Tononi, G., Greenspan, R.J. (2002) Electrophysiological Correlates of Rest and Activity in *Drosophila melanogaster*. Current Biology Vol. 12, 1934-1940.

**van Swinderen, B.**, Metz, L.B., Shebester, and Crowder, C.M. (2002) A *C. elegans* Pheromone Antagonizes Volatile Anesthetic Action Through a Go-coupled Pathway. Genetics 161: 109-119.

**van Swinderen, B.**, Metz, L.B., Shebester, L.D., Mendel, J.E., Sternberg, P.W. and Crowder, C.M. (2001) Goalpha Regulates Volatile Anesthetic Action in Caenorhabditis elegans. Genetics 158: 643-655.

**van Swinderen, B.**, Lemmel, D.F., Hunt, S.F., Crowder, C.M. (2000) Genes regulating neurotransmitter release control volatile anesthetic sensitivity in C. elegans. Progress in Anesthetic Mechanisms 6 (special issue), 330-342.

**van Swinderen, B.**, Saifee, O., Shebester, L., Roberson, R., Nonet, M.L. and Crowder, C.M. (1999) A neomorphic syntaxin mutation blocks volatile-anesthetic action in Caenorhabditis elegans. Proc Natl Acad Sci USA 96: 2479-2484.

**van Swinderen, B.**, Galifianakis, A. and Crowder, C.M. (1998) Common genetic determinants of halothane and isoflurane potencies in *Caenorhabditis elegans*. Anesthesiology 89: 1509-1517.

**van Swinderen, B.**, Galifianakis, A. and Crowder, C.M. (1998) A quantitative genetic approach towards volatile anesthetic mechanisms in C. elegans. Toxicol Lett 100-101: 309-317.

**van Swinderen, B.**, Shook, D.R., Ebert, R.H., Cherkasova, V.A., Johnson, T.E., Shmookler Reis, R.J., Crowder, C.M.(1997) Quantitative Trait Loci Controlling Halothane Sensitivity in *Caenorhabditis elegans.* Proc Natl Acad Sci USA 94: 8232-8237.

Cheverud, J.M., Routman, E.J., Duarte, F.A.M., **van Swinderen, B.**, Cothran, K., Perel, C. (1996) Quantitative Trait Loci for Murine Growth. Genetics 142: 1305-1319.

Chandrashekar, R., **van Swinderen, B.**, Taylor, H.R. and Weil, G.J. (1995) Effect of Ivermectin Prophylaxis on Antibody Response to *Onchocerca volvulus* Recombinant Antigens in Experimentally Infected Chimpanzees. International Journal for Parasitology 25: 983-988.

**van Swinderen, B.** and Hall, J.C. (1995) Analysis of Conditioned Courtship in *dusky-Andante* Rhythm Mutants of *Drosophila*. Learning & Memory 2: 49-61.

Book chapters, Dispatches, Commentaries

**van Swinderen, B.** Sleep in Invertebrates, in "Evolution of Nervous Systems, Volume 1" (Ed. Jon H. Kaas, Academic press: Oxford 2006).

**van Swinderen, B.** (2009) Fly memory: a mushroom body story in parts. *Current Biology* Vol. 19, Issue 18, p. R855.

**van Swinderen, B.** (2010) Visual Learning and Perception in Drosophila. Neurobiology of Drosophila Manual. Cold Spring Harbor Press, New York. Chapter 25.

Karunanithi, S., **van Swinderen, B.** (2011) Slamdance: seizing a fly model for epilepsy. J Neurophysiol. 106(1):15-7

Submitted manuscripts

Paulk, A.C., Stacey, J.A., Pearson, T., Taylor, G., Moore, R., Srinivasan, M.V., **van Swinderen, B.** (2013) Visual attention in the honeybee optic lobes predicts behavioral choices.

Invited lectures

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| July, 2013 | "Sleep and general anaesthesia in the *Drosophila* brain"<br>Washington University School of Medicine, Department of Neurobiology and Neuroanatomy seminar series. |
| July, 2013 | "Circuit-specific functional roles for oscillations in the *Drosophila* brain"<br>Northwestern University, Dept. of Neurobiology seminar series |
| July, 2013 | "Sleep stages in *Drosophila*"<br>University of Wisconsin-Madison, Dept. of Genetics seminar series. |
| July, 2013 | "Attention in bees and flies"<br>University of Wisconsin-Madison, Dept. of Psychiatry seminar series. |

June, 2013 "Circuit-specific functional roles for oscillations in the *Drosophila* brain" Neuro-electronics research foundation seminar, K.U. Leuven, Belgium.

June, 2013 "Sleep stages in *Drosophila*" International Neural and Behavioral Genetics Society conference, Leuven

June, 2013 "Sleep and general anaesthesia in the *Drosophila* brain" Katholiek Universiteit Leuven, Belgium

May, 2013 "Sleep and general anaesthesia in the *Drosophila* brain" SCMB seminar series, The University of Queensland

Oct., 2012 "Using the genetic model *Drosophila melanogaster* to understand general anaesthesia and sleep" Faculty of pain Medicine Queensland Regional Committee

July, 2012 "Sleep and anaesthesia in *Drosophila*" Departmental Seminar, National University of Singapore.

July, 2012 "Neural correlates of unconsciousness in *Drosophila melanogaster*" Francis Crick Memorial Conference on Consciousness, University of Cambridge, U.K.

July, 2012 "Visual rivalry in the fly brain reveals a dissociation between salience and time" Association for the Scienctific Study of Consciousness (ASSC 17), Brighton, U.K.

June, 2012 "Sleep intensity in *Drosophila melanogaster*" Cold Spring Harbor Asia Conference on Invertebrate Neurobiology, Suzhou, China.

April, 2012 "Sleep and general anaesthesia in *Drosophila melanogaster*", Leaders in Science Series, Garvan Institute, Sydney.

Jan., 2012 "Manipulating oscillations and attention in the insect brain", Symposium on Neural Oscillation, ANS 2012, Gold Coast.

May, 2011 "Visual competition and brain dynamics in the fly and the bee", Symposium: Learning and Memory: A synthesis of flies and honeybees. Janelia Farm, Washington DC, USA

July, 2011 Rudolf-Virchow Center, Wuerzburg, Germany. "Dopamine ontogeny and schizophrenia endophenotypes in *Drosophila*"

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| July, 2011 | Freie Universitat Berlin, Germany. Biogenic amines seminar series. "Dopamine ontogeny and schizophrenia endophenotypes in *Drosophila*" |
| October, 2009 | Institute of Biophysics, Beijing. "New approaches for the study of visual perception in *Drosophila*". |
| October, 2009 | Institute of Neuroscience, Shanghai. "New approaches for the study of visual perception in *Drosophila*". |
| June, 2009 | BCN Symposium: Clocks in the brain and concepts of time. Oscillations, attention, and timing in the fly brain (Plenary lecture). Groningen, the Netherlands. |
| April, 2009 | John Curtin School of Medical Research. "Attention and timing in the Drosophila brain." Canberra, ACT. |
| July, 2008 | Australian Insect Molecular Biology conference. "Attention in the Drosophila Brain" (Plenary Lecture), Melbourne, Vic. |
| June, 2008 | Asia Pacific Conference on Vision. "Neural correlates of visual attention in Drosophila melanogaster." Brisbane, Qld. |
| May, 2008 | School of Psychology, University of Queensland. "Fly psychology." |
| May, 2008 | QBI, Advanced Neuroscience Seminar Series on Learning and Memory. "Learning from flies: a mushroom body story." |
| March, 2008 | SIB, University of Queensland. "Attention-like processes in fruit flies." |
| February, 2008 | IMB, University of Queensland. "Attention in the Drosophila brain." |
| November, 2007 | Northwestern University Neurobiology and Physiology Department Seminar. "Neurophysiology of attention in the fly brain." Evanston, Illinois. |
| October, 2007 | Insect Brain and control of behaviour. "Attention and alternations in the fly brain." Tutzing, Germany. |
| September, 2007 | Southern California *Drosophila* meeting. "Attention and alternations in the fly brain." Irvine, California. |
| July, 2007 | Society for Neuroethology, insect cognition section. "Attention-like processes in the fly brain." Vancouver, Canada. |
| July, 2007 | Neurobiology of Drosophila summer lab course and lecture, Visual Learning Section, Cold Spring Harbor Lab, New York. |

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| May, 2007 | International Behavior and Neural Genetics Society. "The Standard Matrix: A novel approach to exploring genetic effects on behavior in *Drosophila*." Doorweth, Netherlands. |
| March, 2007 | Insect behavior: Small brains, big functions. "Attention-like processes in the *Drosophila* brain." Janelia Farm Research Campus, Virginia. |
| July, 2006 | Neurobiology of Drosophila summer lab course and lecture, Visual Learning Section, Cold Spring Harbor Lab, New York. |
| March, 2006 | Computational and Systems Neuroscience workshop on oscillations. "Genes modulating selective attention and associated Local Field Potentials in *Drosophila*." Park City, Utah. |
| July, 2005 | Neurobiology of Drosophila summer lab course and lecture, Visual Learning Section, Cold Spring Harbor Lab, New York. |
| March, 2005 | Computational and Systems Neuroscience workshop on oscillations. "Studying fruit-fly selective attention with frequency-tagged visual stimuli." Snowbird, Utah. |
| January, 2005 | Animal Behavior Interest Group, California Institute of Technology. "Behavioral and electrophysiological measures of selective attention in *Drosophila*." |
| November, 2004 | School of Social Sciences, University of California, Irvine. "Selective attention in the fruit fly." |

Presentations / abstracts

Tsuchiya, N., Cohen, D., Paulk, A., Oizumi, M., Shaw, P., van Swinderen, B., Measuring the level of consciousness in flies with integrated information. (July 2013) Association for the Scientific Study of Consciousness, San Diego.

van Swinderen, B. Perceptual suppression mechanisms in the fly brain: insights into loss of consciousness (July 2013). Association for the Scientific Study of Consciousness, San Diego.

van Swinderen, B., Yap, M., Thomas, N., Shaw, P. Sleep deprivation increases visual responsiveness in *Drosophila* (January 2011). Australian Neuroscience Society, Auckland.

van Swinderen, B. , Pollak, T., Reid, C., Paulk, A.C. Multichannel recordings in the fly brain reveal frequency dynamics in response to visual stimuli (November 2010). Society for Neuroscience, San Diego.

Van Alphen, B., Burne, T.H.J., Eyles, D.W., Mattingley, J., McGrath, J.J., van Swinderen, B. (January 2010) A high-throughput assay to measure sensorimotor gating (PPI) in Drosophila. Australian Neuroscience Society, Sydney.

van Swinderen, B., Paulk, A.C. (January 2010) Steady-state visually evoked potentials (SSVEPs) reveal attention-like behaviour in the fruitfly Drosophila melanogaster. Australian Neuroscience Society, Sydney.

Evans, O., Paulk, A.C., van Swinderen, B. (January 2010) Learning and memory pathways in the Drosophila mushroom bodies affect motion response to visual stimuli. Australian Neuroscience Sociery, Sydney.

Evans, O., Paulk, A., van Swinderen, B. (May 2009) The optomotor maze paradigm: a high-throughput assay to study visual perception in *Drosophila* mutants. Janelia Farm conference on insect vision.

van Swinderen, B., Brembs, B. (January 2009) A short attention span in the memory consolidation mutant *radish.* Australian Neuroscience Society, 29th annual meeting, Canberra.

van Swinderen, B. How to study consciousness on the fly: insights from brain recordings during sleep, general anesthesia, and selective attention in *Drosophila.* 11th European *Drosophila* neurobiology conference (September, 2006), Leuven, Belgium.

van Swinderen, B. Dierick, H., Andretic, R., Wagner, J., Kyriacou, C., Greenspan, R.J. The Standard Matrix: A novel approach to exploring genetic effects on behavior in *Drosophila*. 11th European *Drosophila* neurobiology conference (September, 2006), Leuven, Belgium.

van Swinderen, B. Learning and Memory Genes Modulate Selective Attention in *Drosophila*. Gordon Research Conference on Genes and Behavior (January 2006), Ventura, California.

van Swinderen, B. Fruit fly approaches to studying consciousness-related variables. Association for the Scientific Study of Consciousness. 2004, Antwerp, Belgium.

van Swinderen, B. Uncoupling brain activity and arousal from movement in *Drosophila*. Neurobiology of *Drosophila* 2003, Cold Spring Harbor.

van Swinderen, B., Greenspan, R.J. Physiology and neuroanatomy of selective attention in the brain of *Drosophila*. Neurofly 2002, Dijon, France.

van Swinderen, B., Greenspan, R.J. Physiology and neuroanatomy of selective attention in the brain of *Drosophila*. Society for Neuroscience 2002, Orlando, Florida.

van Swinderen, B., Nitz, D.A., Greenspan, R.J. Local Field Potential recordings and visually evoked responses in *Drosophila.* Neurobiology of *Drosophila* 2001, Cold Spring Harbor.

Editorial Duties

2009- Academic Editor for PLoS ONE.

Extramural Grant Support / Fellowships

2005-2008 "Translating mechanisms of novelty recognition in *Drosophila* into a computational device." NSF Biocomp. Grant # 0523216 (with Jeffrey Krichmar and Ralph Greenspan), $500,000.

2010-2012 "Presynaptic mechanisms of general anaesthesia in the fly brain" ARC Discovery Project # 1093968, $415,000.

2010-2014 "Suppression mechanisms in the *Drosophila* brain" ARC Future Fellowship, FT # 100100725, $711,000.

2011-2013 "Molecular mechanisms of synaptic development" (with Charles Claudianos, & Judith Reinhard), NHMRC Project # APP1008125, $360,000.

2011-2016 "Functional analysis of sleep-promoting neurons in health and disease" (with Paul Shaw, Washington University, USA). NIH, RO1NS076980-01, $1,200,000

Memberships

2013- Association for the Scientific Study of Consciousness (Local Chair for 2014)

2013- International Behavior and neural Genetics Society

2009- Society for Neuroscience

2008- Australian Neuroscience Society