Robert C. Elson
Department of Biology
Point Loma Nazarene University
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EDUCATION

University of Cambridge, England 1985
Ph. D., Neurobiology
Dissertation title: *Wing sensory inputs to identified locust neurons*

University of Cambridge, England 1981
B.A. (Honors), Natural Sciences. *Major: Zoology*

WORK HISTORY

Point Loma Nazarene University, Department of Biology.
Associate Professor 2006-present
Adjunct Professor 2005-2006
Visiting Associate Professor 2003-2005

University of California San Diego, Division of Biological Sciences and Institute for Nonlinear Science
Lecturer 1998-2004
Associate Project Scientist 1997-2003
Assistant Project Scientist 1991-1997
Visiting Postgraduate Researcher 1988-1991

University of Bristol (England) Department of Physiology
Postdoctoral Fellow 1985-1988

COURSES TAUGHT

Point Loma Nazarene University

Bio 101 (Human Biology & Bioethics: GE)[1]
Bio 103 (Introduction to Biology: GE) [1]
Bio 130 (Human Anatomy & Physiology I)
Bio 140 (Human Anatomy & Physiology II)
Bio 211 (Ecological & Evolutionary Systems) [2]
Bio 212 (Organismal Biology)[2]
Bio 215 (Animal Biology)
Bio 325 (Insect Biology) [2]
Bio 340 (Field Biology: Freshwater Ecology) [2]

University of California San Diego

BILD 2 (Multicellular Life)
BILD 12 (Neurobiology and Behavior: GE) [1]
BIPN 145 (Neurobiology Laboratory)

Notes. *1*: I substantially redesigned this course. *2*: I designed this new course

SELECTED PUBLICATIONS IN PEER-REVIEWED JOURNALS

Marin B, Pinto RD, **Elson RC**, Colli E Noise, transient dynamics, and the generation of realistic interspike interval variation in square-wave burster neurons. *Physical Review E* 90: 042718 (2014)

P.F. Rowat and **R.C. Elson.** State-dependent effects of Na channel noise on neuronal burst generation. *Journal of Computational Neuroscience* 16: 87-112. (2004)

R.C. Elson, A.I. Selverston, H.D.I. Abarbanel, and M.I. Rabinovich. Inhibitory synchronization of bursting in biological neurons: dependence on synaptic time constant. *Journal of Neurophysiology* 88: 1166-76. (2002)

R.D. Pinto, **R.C. Elson**, A. Szucs, M.I. Rabinovich, A.I. Selverston, and H.D.I. Abarbanel. Extended dynamic clamp: controlling up to four neurons using a single desktop computer and interface. *Journal of Neuroscience Methods* 108: 39-48. (2001)

A.I. Selverston, M.I. Rabinovich, H.D.I. Abarbanel, **R.C. Elson**, A. Szucs, R.D. Pinto, R. Huerta and P. Varona. Reliable circuits from irregular neurons: A dynamical approach to understanding central pattern generators. *Journal of Physiology (Paris)* 94: 357-374. (2000)

R.C. Elson, R. Huerta, H.D.I. Abarbanel, M.I. Rabinovich, and A.I. Selverston. Dynamical control of irregular bursting in an identified neuron of an oscillatory circuit. *Journal of Neurophysiology* 82: 115-122. (1999)

R.C. Elson, A.I. Selverston, R. Huerta, N.F. Rulkov, M.I. Rabinovich, and H.D.I. Abarbanel. Synchronous behavior of two coupled biological neurons. *Physical Review Letters* 81: 5691-5. (1998).

R.C. Elson. Neuroanatomy of a crayfish thoracic ganglion: sensory and motor roots of the walking-leg nerves and possible homologies with insects. *Journal of Comparative Neurology* 365: 1-17. (1996)

R.C. Elson and A.I. Selverston. Slow and fast synaptic inhibition evoked by pattern-generating neurons of the gastric mill network in spiny lobsters. *Journal of Neurophysiology* 74: 1996-2011. (1995)

R.C. Elson, Y.V. Panchin, Y.I. Arshavsky, and A.I. Selverston. Multiple effects of an identified proprioceptor upon gastric pattern generation in spiny lobsters. *Journal of Comparative Physiology* 174: 317-329. (1994)

R.C. Elson and A.I. Selverston. Mechanisms of gastric rhythm generation in the isolated stomatogastric ganglion of spiny lobsters: Bursting pacemaker potentials, synaptic interactions and muscarinic modulation. *Journal of Neurophysiology* 68:890-907. (1992)

R.C. Elson, K.T. Sillar, and B.M.H. Bush. Identified proprioceptive afferents and motor rhythm entrainment in the crayfish walking system. *Journal of Neurophysiology* 67:530-546. (1992)

R.C. Elson. Integration of wing proprioceptive and descending exteroceptive sensory input by thoracic interneurones of the locust. *Journal of Experimental Biology* 128:193-217. (1987)

K.T. Sillar, P. Skorupski, **R.C. Elson,** and B.M.H. Bush. Two identified afferent neurones entrain a central locomotor rhythm generator. *Nature* 323:440-443. (1986)

R.C. Elson and H.-J. Pfluger. The activity of a steering muscle in flying locusts. *Journal of Experimental Biology* 120:421-442. (1986)

PAPER SUBMITTED (with student co-authors)

Robert C. Elson, Melody R. Bellora, Adam D. Donason, Joanna-Lynn C. Fregoso, Ravi J. Smith, and Ryan R. Weiss (2016)
Dynamics of postembryonic changes in pattern of serotonin-containing neurons in the terminal abdominal ganglion of a tenebrionid beetle

OTHER PUBLICATIONS

- 7 other research articles in refereed journals
- 1 review
- 1 book chapter
- More than 20 abstracts.
- Most recent abstracts:

Bellora M*, Donason A*, Smith R*, Soch, J*, and Elson RC (2015) Dynamic expression of serotonin in identified neurons during metamorphic development of a mealworm beetle. Poster at West Coast Biological Sciences Undergraduate Research Conference (WCBSURC).

Barr A*, Bennett W*, Fregoso J*, Wolf D*, and Elson, RC (2013) Metamorphic changes in number and type of serotonergic neurons in the terminal abdominal CNS of a mealworm beetle. Poster at WCBSURC.

Elson RC, Fregoso J*, Smith R*, and Soch J* (2013) Post-embryonic development of serotonergic neurons in a tenebrionid beetle: time-course and hormonal dependence. Poster at Society for Neuroscience annual meeting.

(* = student co-authors)

RESEARCH INTERESTS

- Neuroanatomy and neurophysiology of simple nervous systems
- Sensory integration and motor control; neuromodulation; neurobiology of behavior
- Development of expression of neurotransmitters
- The role of cellular and synaptic properties in the operation of neural circuits
- Nonlinear analysis of neural activity

CURRENT RESEARCH

Associate Professor, Point Loma Nazarene University Summers and sabbatical 2007-present

- Neurobiology of pest insect species during postembryonic development and dormancy.
- Since summer 2007, have directed/mentored 14 undergraduates in research projects

PREVIOUS RESEARCH EXPERIENCE

Associate Project Scientist. Division of Biological Sciences and Institute for Nonlinear Science, UCSD. 1997-2003

- Neurobiology and nonlinear analysis. Chaotic dynamics, synchronization, and mutual regularization in circuits of biological neurons.

Assistant Project Scientist. Department of Biology, UCSD. 1991-1997

Neurobiology of fast and slow synapses, sensory feedback, and muscarinic modulation in the gastric rhythm-generating circuit of the lobster stomatogastric ganglion.

Visiting Postgraduate Researcher. Department of Biology, UCSD. 1988-1991
- Mechanisms of rhythm generation in the gastric circuit of the lobster stomatogastric ganglion.

Postdoctoral Fellow. Physiology, University of Bristol, U.K. 1985-1988
- Sensory feedback and entrainment in the central pattern generator for walking in crayfish.

GRANTS AWARDED

Alumni Association (PLNU) faculty grants 2009, 2014

RASP (Research and Special Projects grant, PLNU) 2006, 2008, 2012

National Science Foundation 1999
The role of chaotic dynamics in motor pattern generation. (IBN-9975490) $360k. Co-P.I. with Dr. P.F. Rowat, UCSD

National Institutes of Health 1997, 2001
Wrote successful new and renewal grant applications for lab P.I., Prof A.I. Selverston, UCSD.

FELLOWSHIPS & STUDENTSHIPS
- **Postdoctoral Fellowship**. Science and Engineering Research Council, U.K. 1985
- **Graduate Studentship**. Medical Research Council, U.K. 1981
- **Entrance Exhibition and Scholarship**. Clare College, University of Cambridge, U.K. 1978

EXTERNAL PROFESSIONAL ACTIVITIES
Peer reviewer of grant applications and journal articles for:
- National Science Foundation
- *Journal of Experimental Biology*
- *Journal of Neurophysiology*
- *Journal of Comparative Physiology*
- *Microscopy Research and Technique*

PROFESSIONAL MEMBERSHIPS – past and present
- Entomological Society of America
- Xerces (Society for Invertebrate Conservation)
- Society for Neuroscience
- American Association for the Advancement of Science
- American Scientific Affiliation
- Society for Technical Communication

PROFESSIONAL DEVELOPMENT

Collaboration with Dr. Jennifer Lineback to improve pedagogical methods in Anatomy and Physiology II (Bio140). Funded by Center for Teaching and Learning, PLNU.	2014
Collaboration with Dr. Jennifer Lineback to reform course structure and pedagogy in Anatomy and Physiology I (Bio130). Funded by an Alumni Association Faculty grant, PLNU	2014
TILE (Technology Integrated Learning Environments). PLNU	2011
Other workshops at Center for Teaching & Learning, PLNU	2005, 2011
Technical writing and proofreading courses. UCSD Extension	2003-2004

SERVICE ON COMMITTEES (PLNU)

Instructional Technology Committee	2014-
Faculty Committee on Diversity	2011-2013
Disaster Preparedness Committee	2007-2009
LEAP (Learning Experience for Academic Progress)	2006