

CURRICULUM VITAE

BARBARA SYMONDS BELTZ

Allene Lummis Russell Professor in Neuroscience
Neuroscience Program
Wellesley College
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Education:

1974 B.A. Mount Holyoke College (Biology and English)
1976 M.A. Princeton University (Biology)
1979 Ph.D. Princeton University (Biology: Focus in Neurobiology and Development)

Postdoctoral Training:

1979-1980 Fellowship, National Science Foundation, Harvard Medical School, Boston, MA
1980-1983 Fellowship, National Institutes of Health, Harvard Medical School, Boston, MA

Academic Appointments:

1976-1978 Teaching Assistant, Anatomy & Neurophysiology, Princeton University, Princeton, NJ
1979-1983 Research Fellow, Department of Neurobiology, Harvard Medical School, Boston, MA
1983-1985 Instructor, Department of Neurobiology, Harvard Medical School
1983-1988 Co-Director, Marine Biology Lab Short Course "*Basic Immunocytochemical Techniques in Tissue Sections and Whole Mounts*"
1985-1987 Lecturer, Department of Neurobiology, Harvard Medical School
1987-1993 Assistant Professor, Department of Biological Sciences, Wellesley College
1987-1997 Visiting Assistant Professor, Department of Neurobiology, Harvard Medical School
1993 Visiting Fellow, School of Biological Sciences, University of New South Wales, Sydney, Australia
1993-1999 Associate Professor, Department of Biological Sciences, Wellesley College
1997-1998 Visiting Faculty, Volen Center, Brandeis University, Waltham, MA
1999-2007 Professor, Department of Biological Sciences, Wellesley College
1999-2004 Director, Neuroscience Program, Wellesley College
2001-2004 Chair, Department of Biological Sciences, Wellesley College
2006- Director, Neuroscience Program, Wellesley College
2007- Professor of Neuroscience, Wellesley College

Honors and Awards:

1974 Magna cum laude graduate, Mount Holyoke College
1977, 1978 Presidential Scholar, Electron Microscopy Society of America
1989 Mary Lyon Alumnae Achievement Award, Mount Holyoke College
1989-1995 NSF Presidential Young Investigator Award
1993 Fogarty Senior International Fellow, University of New South Wales, Australia
2002-2004 Allene Lummis Russell Chair in Neuroscience, Wellesley College
2004-2011 Susan M. Hallowell and Ruby Frances Howe Farwell Chair, Wellesley College
2004-2006 Maren Fellow, Mt. Desert Island Biological Laboratory
2011- Allene Lummis Russell Chair in Neuroscience, Wellesley College
2015 Pinanski Teaching Prize, Wellesley College

Intramural Professional Activities, Wellesley College:

1987-	Academic Council
1993-2007	Reappointments and Promotions Committee, Biological Sciences
1993-1996	Committee on Curriculum and Instruction
1994-1995	Co-chair, Pedagogy Task Force
1998-2001	Admissions Committee
1998-1999	Brachman Hoffman Fellowship Committee
1998-2004	Director, Neuroscience Program
2001-2004	Chair, Department of Biological Sciences
2003-2005	Committee on Curriculum and Instruction
2005-2006	2015 Wellesley Commission
2006-	Director, Neuroscience Program
2007-	Reappointments and Promotions Committee, Neuroscience Program
2008-2011	Admissions Committee

Extramural Professional Activities (most recent 10 years):

1999-	Section Editor, <i>Arthropod Structure and Development</i>
2001-2004	NSF Developmental Neuroscience Review Panel
2003-2006	Committee on the Development of Women's Careers in Neuroscience, Society for Neuroscience
2003	External evaluator for tenure and promotion, Bryn Mawr College, PA 2004 External evaluator for tenure and promotion, Chapman College, CA
2004-2007	NSF Review Panel, Director's Award for Distinguished Teaching Scholars Program INBRE External Advisory Committee, State of Arkansas and University of Arkansas for Medical Sciences RIMI External Advisory Committee, Meharry Medical College and Tennessee State University, Nashville, Tennessee
2004-	INBRE External Advisory Committee, State of Maine and Mt. Desert Island Biological Laboratory Committee Chair 2005-
2004-	Woods Hole Oceanographic Institution (WHOI), Member of the Corporation; Education Committee 2004- Promotions/Tenure Committee 2011-
2004-2007	Chair, Program Committee, International Congress of Neuroethology, Vancouver Congress (held in July, 2007)
2005	Trustee member, External Review, Biology Department, WHOI External evaluator for promotion, Gustavus Adolphus College, MN External review, Neuroscience Program, Trinity College, Hartford, CT
2006	External review, Neuroscience Program, Bowdoin College
2006-	Consultant, Sherman Fairchild Foundation
2008	External evaluator for tenure and promotion, Wesleyan University
2008-2009	Scientific Advisory Board, Institute of Neurobiology, University of Puerto Rico
2007-	Mount Desert Island Biological Laboratory, Nominating Committee
2009-	Associate Editor, <i>Frontiers in Aquatic Physiology</i>
2010-	Mount Desert Island Biological Laboratory, Board of Scientific Counselors
2010-2011	Mount Desert Island Biological Laboratory, Director's Advisory Counsel
2011	External review, Neuroscience Program, Union College External review, Neuroscience Program, Mount Holyoke College
2014	External evaluator for tenure and promotion, Wesleyan University External review, Neuroscience Program, Skidmore College

Reviewer for the following journals and agencies:

Arthropod Structure and Development	Journal of Crustacean Biology
Biological Bulletin	Journal of Experimental Biology
Brain Research	Journal of Experimental Zoology
Canadian Journal of Zoology	Journal of Neurobiology
Cell and Tissue Research	Journal of Neuroscience
Developmental Neurobiology	Journal of Neuroscience Methods
Human Frontiers in Science Program	National Institutes of Health
Invertebrate Reproduction	National Science Foundation
Journal of Comparative Neurology	PLoS Genetics
	PLoS One

Membership in Professional Societies:

1974-	Sigma Xi
1976-	Society for Neuroscience
	1995-1998 Member, Committee on Neuroscience Literacy
	1997, 1998 Co-Chair, Short Course for High School Students
	2003-2006 Committee on the Development of Women's Careers in Neuroscience
1976-2000	East Coast Nerve Net
	1995-2000 Co-chair, organizing committee
1978-	American Association for the Advancement of Science
	1999-2001 Elected member, Nominating Committee
1994-2008	International Congress of Neuroethology
	2003-2004 Organizing Committee for 2004 congress, Denmark
	2004-2007 Chair, International Congress 2007, Canada
1998-2003	N.E.U.R.O.N (North east under/graduate research organization for neuroscience), Founding member
	1999-2002 Chair, Organizing Committee

*Research-related public lectures & outreach activities**(within and outside the College community)*

2002	Wellesley College, The Wellesley Campaign: New England Celebration
2003	Wellesley College, Alumnae Convocation
2004	Staley Symposium, Wellesley College
2005	Wellesley College Reunion Convocation Hopedale, MA Library, Public Lecture
2006	Wellesley Alumnae Club of Boston, MA
2007	Wellesley Alumnae Club of Santa Barbara, CA Brachman Hoffman Symposium, Wellesley College Distinguished Faculty Lecture, Wellesley College
2010	Dallas, Texas: Wellesley Alumnae Club Event
2011	Houston, Texas: Wellesley Club, Prospective Student Event Naples, Florida: Wellesley Club Event Merrimac Valley Wellesley Club, MA
2014	Wellesley Alumnae Club of Sarasota, FL Brachman Hoffman Symposium, Wellesley College
2015	Older Wiser Lifelong Learners (O.W.L.L.), Lexington, MA Older Wiser Lifelong Learners (O.W.L.L.), Lexington, MA Wellesley Alumnae Club of Columbus, OH

RESEARCH ACTIVITIES**Invited Lectures (2001-15)**

- 2001 University of Connecticut at Storrs, Department of Physiology and Neurobiology
Worcester Polytechnic Institute, Biology Department, Worcester, MA
New England Society for Microscopy
University of Virginia, Biology Department
- 2002 Colby College, Parents' Weekend speaker
Conference: *Post-Genomic Neuroscience: From Molecules to Behavior*, Marine
Biology Laboratories, Woods Hole, MA
- 2003 Helen F. Cserr Memorial Lecture, Mount Desert Island Biological Laboratory
Plenary Speaker, International Stem Cell Symposium, Mount Desert Island
Biological Laboratory
- 2004 Frenchman's Bay Crustacean Society, Maine
Universität Ulm, Neurobiologie, Ulm, Germany
- 2005 Mount Desert Island Biological Laboratory, NIEHS Center for Membrane Toxicity
Studies
Institute of Marine Research, Austevoll, Norway
- 2006 Institute of Biomedical Sciences, Universidade Federal do Rio de Janeiro, Brazil
Plenary speaker, SBBC/SIMEC Conference (combined meetings of: XIII Brazilian
Congress of the Brazilian Society of Cell Biology; IX Brazilian Symposium on
Extracellular matrix; IV International Symposium on Extracellular Matrix)
Buzios, Brazil
Plenary Speaker, International Stem Cell Symposium, Mount Desert Island
Biological Laboratory
Columbia University, Judith P. Sulzberger MD Genome Center
- 2008 Max Planck Institute for Chemical Ecology, Jena, Germany
Humboldt University, Institute for Biology, Berlin, Germany
Mount Desert Island Biological Lab, Maine
- 2009 The Whitney Lab, University of Florida
Max Planck Institute for Chemical Ecology, Jena, Germany
University of Chicago, Neuroscience and Cell Physiology Programs
- 2010 Evolf (Evolution of Olfaction) Expedition and Conference Speaker, Christmas Island,
Australia
- 2012 Christianna Smith Lecture, Mount Holyoke College
- 2013 Ernst Moritz Arndt Universität, Greifswald, Germany
Uppsala University, Uppsala, Sweden
- 2014 Trinity College, Hartford CT
Massachusetts Institute of Technology, McGovern Institute for Brain Research &
Dept. of Brain and Cognitive Sciences: Careers Panel
National Institutes of Health: NIDCR, CSDB

Publications (*indicates undergraduate student author)**Books**

Beltz BS, Burd GD (1989) *Immunocytochemical Techniques: Principles and Practice*, Blackwell Scientific Publications, Cambridge, MA. 182 pp.

Paul CA, Beltz BS, Berger-Sweeney J, editors (1997) *Discovering Neurons: The Experimental Basis of Neuroscience*, Cold Spring Harbor Press, NY. 420 pp.

Book Chapters

Sandeman DC, Benton JL, Beltz BS (2015) Adult neurogenesis in the decapod crustacean brain: The immune system supplies neural progenitors. *Structure and Evolution of Invertebrate Nervous Systems*, A Schmidt-Rhaesa, S Harzsch, G Purschke, eds., Oxford University Press, in press.

Beltz BS, Zhang Y, Benton JL (2015) Serotonin modulates adult neurogenesis in an invertebrate model: Approaches to receptor localization and function. Chapter in *Serotonin Receptor Technologies*, in the Neuromethods Series, W Blenau, A Baumann, eds., Springer Science + Business Media, in press.

Reviews

Beltz BS, Kravitz EA (1986) Aminergic and peptidergic neuromodulation in Crustacea. *Journal of Experimental Biology* 124:115-141.

Beltz BS (1988) Crustacean Neurohormones. In: *Invertebrate Endocrinology*, vol 2, Laufer H and Downer R, ed., Alan R. Liss, Inc. NY pp. 235-258.

Beltz BS (1990) New Dimensions in Neuroanatomy: Visualizing the Morphology, Physiology and Chemistry of Neurons, *American Zoologist* (SAAWOK Symposium) 30:353-370.

Beltz BS and Helluy S (1992) "Larval" life in the egg: an embryonic molt cycle in the American Lobster, *Lobster Newsletter* 5(1):1-7.

Beltz BS (1995) Neurobiology and Neuroendocrinology. Chapter 11 in: *Biology of the Lobster, Homarus americanus*, Factor JR, ed., Academic Press, pp. 267-290.

Beltz BS (1999) The Distribution and Functional Anatomy of Amine Neurons in Lobsters, *Microscopy Research and Technique* 44:105-120.

Beltz BS, Kravitz EA (2002) Serotonin in Crustacean Systems: More than a Half Century of Fundamental Discoveries. In *Crustacean Experimental Systems in Neurobiology*, Springer Verlag, Berlin, pp 141-163.

Beltz BS, Sandeman DC (2003) Regulation of life-long neurogenesis in the decapod crustacean brain. *Arthropod Structure and Development* 32:39-60.

Original Reports (peer reviewed)

Beltz BS, Gelperin A (1979) An ultrastructural analysis of the salivary system of the terrestrial mollusc *Limax maximus*. *Tissue and Cell* 11:31-50.

Beltz BS, Gelperin A (1980) Mechanosensory input modulates the activity of an autoactive, bursting neuron in *Limax maximus*. *Journal of Neurophysiology* 44:665-674.

Beltz BS, Gelperin A (1980) Mechanisms of peripheral modulation of salivary burster in *Limax maximus*: a presumptive sensorimotor neuron. *Journal of Neurophysiology* 44:675-686.

Beltz BS, Kravitz EA (1983) Mapping of serotonin-like immunoreactivity in the lobster nervous system. *Journal of Neuroscience* 3:585-602.

- Kravitz EA, Beltz BS, Glusman S, Goy M, Harris-Warrick RM, Johnston MF, Livingstone MS, Schwarz TL, Siwicki KK (1983) Neurohormones and Lobsters: Biochemistry to behavior. *Trends in Neuroscience* 6(8):346-349.
- Beltz B, Eisen JS, Flamm R, Harris-Warrick RM, Hooper SL, Marder E (1984) Serotonergic innervation and modulation of the stomatogastric ganglion of three decapod crustaceans. *Journal of Experimental Biology* 109:35-54.
- Kravitz EA, Beltz BS, Glusman S, Goy MF, Harris-Warrick RM, Johnston MF, Livingstone MS, Schwarz TL (1984) The well-modulated lobster: The roles of serotonin, octopamine, and proctolin in the lobster nervous system. *Pesticide Biochemistry and Physiology* 22:133-147.
- Kravitz EA, Beltz BS, Glusman S, Goy M, Harris-Warrick R, Johnston M, Livingstone M, Schwarz T, Siwicki KK (1985) The well-modulated lobster: The roles of serotonin, octopamine, and proctolin in the lobster nervous system. In: *Model Neural Networks and Behavior*, Selverston A, ed., Plenum Press.
- Siwicki KK, Beltz BS, Schwarz TL, Kravitz EA (1985) Proctolin in the lobster nervous system. *Peptides* 6:393-402.
- Siwicki KK, Beltz BS, Kravitz EA (1987) Proctolin in serotonergic, dopaminergic, and cholinergic neurons in the lobster, *Homarus americanus*. *Journal of Neuroscience* 7:522-532.
- Beltz BS, Kravitz EA (1987) Physiological identification, morphological analysis and development of identified serotonin-proctolin containing neurons in the lobster ventral nerve cord. *Journal of Neuroscience* 7:533-546.
- Kobierski L, Beltz BS, Trimmer BA, Kravitz EA (1987) The FMRFamide-like peptides of *Homarus americanus*: Distribution, immunocytochemical mapping, and ultrastructural localization in terminal varicosities. *Journal of Comparative Neurology* 266:1-15.
- Helluy SM, Beltz BS (1990) Stages in the embryonic development of the American lobster with an emphasis on the nervous system. In *Frontiers in Crustacean Neurobiology*, Birkhauser, pp 530-536.
- Beltz BS, Pontes M, Helluy SM, Kravitz EA (1990) Patterns of appearance of serotonin and proctolin immunoreactivities in the developing nervous system of the American lobster. *Journal of Neurobiology* 21:521-542.
- *Arbiser ZK, Beltz BS (1991) SCP_B - and FMRFamide-like immunoreactivities in the lobster: Colocalization of two peptides or colabeling of the same peptide(s)? *Journal of Comparative Neurology* 306:417-424.
- Helluy SM, Beltz BS (1991) Embryonic development of the American lobster (*Homarus americanus*): Quantitative staging and characterization of an embryonic molt cycle. *Biological Bulletin* 180:355-371.
- Beltz BS, Helluy SM, Ruchhoeft ML,*Gammill LS (1992) Aspects of the embryology and neural development of the American lobster. *Journal of Experimental Zoology* 261:288-297.
- Ma PM, Beltz BS, Kravitz EA (1992) Serotonin-containing neurons in lobsters: I. Their role as "gain-setters" in postural control mechanisms. *Journal of Neurophysiology* 65:36-54.
- Helluy SM, Sandeman RE, Beltz BS, Sandeman DC (1993) Comparative brain ontogeny of the crayfish and clawed lobster: Implications of direct and larval development. *Journal of Comparative Neurology* 335:343-354.
- Cournil I, Helluy SM, Beltz BS (1994) Dopamine in the lobster *Homarus gammarus*: I. Comparative analysis of dopamine and tyrosine hydroxylase immuno-reactivities in the nervous system of the juvenile. *Journal of Comparative Neurology* 344:455-469.
- Sandeman D, Beltz B, Sandeman R (1995) Crayfish brain interneurons that converge with serotonin giant cells in accessory lobe glomeruli. *Journal of Comparative Neurology* 352:263-279.
- Helluy S, Ruchhoeft M, Beltz B (1995) Development of the olfactory and accessory lobes in the American lobster: An allometric analysis and its implications for the deutocerebral structure of decapods. *Journal of Comparative Neurology* 357:433-445.

- Cournil I, Casanovas B, Helluy S, Beltz B (1995) Dopamine in the lobster *Homarus americanus*. II. Dopamine immunoreactive neurons and development of the nervous system. *Journal of Comparative Neurology* 362:1-16.
- Helluy S, Benton J, Ruchhoeft M, *Langworthy K, Beltz B (1996). Glomerular formation in the developing olfactory and accessory lobes of the American lobster: Stabilization of numbers and increase in size after metamorphosis. *Journal of Neurobiology* 29:459-472.
- Schneider H, Budhiraja P, Walter I, Beltz B, *Peckol E, Kravitz E (1996). Developmental expression of the octopamine phenotype in lobsters *Journal of Comparative Neurology* 371:3-14.
- *Langworthy K, Helluy S, Benton J, Beltz B (1997) Amines and peptides in the brain of *Homarus americanus*: Immunocytochemical localization patterns and implications for brain function. *Cell and Tissue Research* 288:191-206.
- Benton J, Helluy S, Huber R, Beltz B (1997) Serotonin depletion by 5,7-dihydroxytryptamine alters deutocerebral development in the lobster. *Journal of Neurobiology* 33:357-373.
- Harzsch S, *Miller J, Benton J, Dawirs RR, Beltz B (1998) Neurogenesis in the thoracic neuromeres of two crustaceans with different styles of metamorphic development. *Journal of Experimental Biology* 201:2465-2479.
- Harzsch S, Benton, J, Dawirs, RR, Beltz, B (1999) A new look at embryonic development of the visual system in decapod crustaceans: neuropil formation, neurogenesis and apoptotic cell death. *Journal of Neurobiology* 39:294-306.
- Harzsch S, *Miller J, Benton J, Beltz B (1999) From embryo to adult: Persistent neurogenesis and apoptotic cell death shape the crustacean deutocerebrum. *Journal of Neuroscience* 19:3472-3485.
- Chang ES, Chang SA, Beltz BS, Kravitz EA (1999) Crustacean hyperglycemic hormone in the lobster nervous system: Localization and release from cells in the subesophageal ganglion and thoracic second roots. *Journal of Comparative Neurology* 414:50-56.
- Harzsch S, Benton J, Beltz BS (2000) An unusual case of a mutant lobster embryo with double brain and double ventral nerve cord. *Arthropod Structure and Development* 29:95-99.
- Sullivan JM, Benton JL, Beltz BS (2000) Serotonin depletion *in vivo* inhibits the branching of olfactory projection neurons in the lobster deutocerebrum. *Journal of Neuroscience* 20:7716-7721.
- Benton J, Beltz BS (2001) Effects of embryonic serotonin depletion on olfactory interneurons in lobsters. *Journal of Neurobiology* 46: 193-205.
- *Doernberg S, Cromarty SI, Beltz BS, Kravitz EA (2001) Agonistic behavior in naïve juvenile lobsters depleted of serotonin by 5,7-dihydroxytryptamine. *Journal of Comparative Physiology A* 187(2): 91-103.
- Beltz BS, Benton JL, Sullivan JM (2001) Transient uptake of serotonin by newborn olfactory projection neurons may mediate their survival. *Proceedings of the National Academy of Science* 98:12730-12735.
- Sullivan JM, Beltz BS (2001) Neural pathways connecting the deutocerebrum and lateral protocerebrum in the brains of decapod crustaceans. *Journal of Comparative Neurology* 441:9-22.
- Sullivan JM, Beltz BS (2001) Development and connectivity of olfactory pathways in the brain of the lobster *Homarus americanus*. *Journal of Comparative Neurology* 441:23-43.
- Benton JL, Beltz BS (2002) Patterns of neurogenesis in the midbrain of embryonic lobsters are different from proliferation in the insect and crustacean ventral nerve cord. *Journal of Neurobiology* 53: 57-67.
- Goergen, E, *Bagay LA, Rehm K, Benton JL, Beltz BS (2002) Circadian control of neurogenesis. *Journal of Neurobiology* 53: 90-95.
- Paul CA, Goergen EM, Beltz BS (2002) Exploring neurogenesis in crustaceans. *Journal of Undergraduate Neuroscience Education* 1:A18-A22.

- Richards KS, Simon DJ, Pulver SR, Beltz BS, Marder E (2003) Serotonin in the developing stomatogastric system of the lobster, *Homarus americanus*. *Journal of Neurobiology* 54:380-92.
- Beltz BS, *Kordas K, *Lee MM, *Long JB, Benton JL, Sandeman DC (2003) Ecological, evolutionary and functional correlates of sensilla number and glomerular density in the olfactory system of decapod crustaceans. *Journal of Comparative Neurology* 455: 260-269.
- *McKinzie ME, Benton JL, Beltz BS, Mellon DF (2003) Parasol cells of the hemiellipsoid body in the crayfish *Procambarus clarkii*: dendritic branching patterns and functional implications. *Journal of Comparative Neurology* 462:168-179.
- Sullivan JM, Beltz BS (2004) Evolutionary changes in the olfactory projection neuron pathways of eumalacostracan crustaceans. *Journal of Comparative Neurology* 470:25-38.
- Wildt M, Goergen EM, Benton JL, Sandeman DC, Beltz BS (2004) Regulation of serotonin levels by multiple light-entrainable endogenous rhythms. *Journal of Experimental Biology* 207:3765-74.
- Sullivan JM, Beltz BS (2005) Integration and segregation of inputs to higher-order neuropils in the crayfish brain. *Journal of Comparative Neurology* 481:118-126.
- *Brinkley CK, Kolodny NH, Kohler SJ, Sandeman DC, Beltz BS (2005) Magnetic resonance imaging at 9.4 T as a tool for studying functional and neural anatomy in non-vertebrates. *Journal of Neuroscience Methods* 146: 124-132.
- Sullivan JM, Beltz BS (2005) Newborn cells in the adult crayfish brain differentiate into distinct neuronal types. *Journal of Neurobiology* 65: 157-170.
- Sullivan JM, Beltz BS (2005) Adult neurogenesis in the central olfactory pathway in the absence of receptor neuron turnover. *European Journal of Neuroscience* 22:2397-2402.
- Sullivan JM, Benton JL, Sandeman DC, Beltz BS (2007) Adult Neurogenesis: A Common Strategy Across Diverse Species. *Journal of Comparative Neurology* 500:574-584.
- Beltz BS, Tlusty MF, Benton JL, Sandeman DC (2007) Omega-3 fatty acids upregulate adult neurogenesis. *Neuroscience Letters* 415:154-8.
- Benton JL, Sandeman DC, Beltz BS (2007) Nitric oxide in crustacean brain: Regulation of neurogenesis and morphogenesis in the developing olfactory pathway. *Developmental Dynamics* 236:3047-3060.
- Sullivan JM, Sandeman DC, Benton JL, Beltz BS (2007) Adult neurogenesis and cell cycle regulation in the crustacean olfactory pathway: from glial precursors to differentiated neurons. *Journal of Molecular Histology* 38:527-542.
- Benton JL, Goergen EM, *Rogan SC, Beltz BS (2008) Hormonal and synaptic influences of serotonin on adult neurogenesis. *General and Comparative Endocrinology* 158:183-190.
- Harzsch S, Dirksen H, Beltz BS (2009) Development of pigment-dispersing hormone-immunoreactive neurons in the American lobsters: homology to the insect circadian pacemaker system? *Cell and Tissue Research* 335:417-429.
- Zhang Y, Allodi S, Sandeman DC, Beltz BS (2009) Adult neurogenesis in the crayfish brain: proliferation, migration and possible origin of precursor cells. *Developmental Neurobiology* 69:415-436.
- Sandeman DC, Benton JL, Beltz BS (2009) An identified serotonergic neuron regulates neurogenesis in the crayfish brain. *Developmental Neurobiology* 69:530-545.
- Sullivan JM, *Genco MC, *Marlow ED, Benton JL, Beltz BS, Sandeman DC (2009) Brain photoreceptor pathways contributing to circadian rhythmicity in crayfish. *Chronobiology International* 26:1136-1168.
- *Ayub N, Benton JL, Zhang Y, Beltz BS (2011) Environmental enrichment influences neuronal stem cells in the adult crayfish brain. *Developmental Neurobiology* 71:351-361.
- Zhang Y, Benton JL, Beltz BS (2011) 5-HT receptors mediate lineage-dependent effects of serotonin on adult neurogenesis in *Procambarus clarkii*. *Neural Development* 6:2.

- Sandeman DC, Bazin F, Beltz BS (2011) Adult neurogenesis: Examples from the decapod crustaceans and comparisons with mammals. *Arthropod Structure and Development* 40:258-275.
- Benton JL, Zhang Y, *Kirkhart CR, Sandeman DC, Beltz BS (2011) Primary neuronal precursors in adult crayfish brain: replenishment from a non-neuronal source. *BMC Neuroscience* 12 (1):53.
- Beltz BS, Zhang Y, Benton JL, Sandeman DC (2011) Adult neurogenesis in the decapod crustacean brain: A hematopoietic connection? *European Journal of Neuroscience* 34:870-883.
- Sintoni S, Benton JL, Beltz BS, Hansson BS, Harzsch S (2012) Neurogenesis in the central olfactory pathway of adult decapod crustaceans: development of the neurogenic niche in the brains of Procambriid crayfish. *Neural Development* 7:1.
- *Otopalik AG, *Shin J, Beltz BS, Sandeman DC, Kolodny NH (2012) Differential Uptake of MRI Contrast Agents Indicates Charge-Selective Blood-Brain Interface in the Crayfish. *Cell and Tissue Research* 349: 493-503.
- Chaves da Silva PG, Benton JL, Beltz BS, Allodi S (2012) Adult neurogenesis: ultrastructure of a neurogenic niche and neurovascular relationships. *PLoS One* 7(6), e39267.
- Chaves da Silva PG, Benton JL, Sandeman DC, Beltz BS (2013) Adult neurogenesis in the crayfish brain: the hematopoietic anterior proliferation center has direct access to the brain and stem cell niche. *Stem Cells and Development* 22:1027-41.
- Benton JL, Chaves da Silva PG, Sandeman DC, Beltz BS (2013) First-generation neuronal precursors in the crayfish brain are not self-renewing. *International Journal of Developmental Neuroscience* 31:657-666.
- *Kim YF, Sandeman DC, Benton JL, Beltz BS (2014) Birth, survival and differentiation of neurons in an adult crustacean brain. *Developmental Neurobiology* 74: 602-615.
- Benton JL, *Kery R, *Li J, Noonin C, Söderhäll I, Beltz BS (2014) Cells from the innate immune system generate adult-born neurons in crayfish. *Developmental Cell* 30: 322-333.
- Bless EP, *Reddy T, Acharya KD, Beltz BS, Tetel MJ (2014) Oestradiol and diet modulate energy homeostasis and hypothalamic neurogenesis in the adult female mouse. *Journal of Neuroendocrinology*, 11: 805-816.
- Beltz BS, *Cockey EL, *Li J, *Platto JF, *Ramos KA, Benton JL (2015) Adult neural stem cells: Long-term self-renewal, replenishment by the immune system, or both? *Bioessays* 37:495-501.

Recent abstracts describing unpublished work

- Zhang Y, Beltz BS (2010) Glutamine synthetase, a functionally active enzyme in crayfish brain. *Soc Neurosci Abstr* 36: 737.14.
- *Li E, *Cockey E, *Platto J, Benton JL, Beltz BS (2014) Neuronal precursors in the crayfish *Procambarus clarkii* are replenished from a non-neuronal source. *Soc. Neurosci Abstr* 40: 495.16.
- *Ramos KA, Benton JL, *Li J, Söderhäll I, Bauer D, Beltz BS (2014) The crustacean cytokine astakine 1: A link between the innate immune system and nervous system in crayfish. *Soc Neurosci Abstr* 40: 495.04.
- *Platto J, Benton JL, Quinan V, Beltz BS (2014) Characterization of cells derived from adoptive transfer of hemocytes in crayfish brain. *Soc Neurosci Abstr* 40: 495.03.

Grants Awarded: Extramural

- 1985 - 1988 NIMH Grant #2-ROI-MH40321, *Development of amine neurons and associated behaviors* (\$224,793/3 years)
- 1987 - 1990 NIH Program Project Grant #NS25915 *Development of amine and peptide neurons* (3 years - B.Beltz portion, - \$89,864 direct costs)
- 1988 - 1991 NSF Grant #BNS-8718938 *Development of amine neurons and associated behaviors* (\$212,980/3 years)
- 1988 - 1989 NSF REU Supplemental Undergraduate Funding (\$3,500)
- 1988 - 1990 NSF Instrumentation and Laboratory Improvement (ILI) Grant #USE-8851888. *Immunological Techniques in the Undergraduate Laboratory* (Co-P.I. with Beverly Blazar / \$81,484 - direct costs)
- 1988 - 1989 NIH BRSG #1-S15-NS26700 Small Instrument Program. P.I. with Beverly Blazar and Howard Eichenbaum) (\$6,350 direct costs for -80°C freezer)
- 1989 - 1994 NSF Presidential Young Investigator Award BNS-958169. *Development of Asymmetry in the Nervous System* (\$25,000 base award per year plus matching funds)
- 1991 - 1993 NSF Instrumentation and Laboratory Improvement (ILI) Grant #USE-9152022, *An Integrated Approach to Teaching Developmental Biology* (Co-P.I. with Mary Coyne and Carol Ann Paul) (\$48,700 direct costs total)
- 1991 - 1994 NSF Competing renewal for BNS-8718938, *Developmental Plasticity in Identifiable Neurons*. Funded but declined the award in order to accept NIH-NS-25915 (see below)
- 1991 - 1997 NIH #NS-25915, *Development of Amine Neurons and their Targets* (\$90,000 direct cost average per annum)
- 1993 NSF International Programs: U.S.-Australia Cooperative Science program, *Neural Connectivity and Processing in the Crustacean Brain*. Funded but declined in order to accept the Fogarty Fellowship (below)
- Fogarty International Fellowship, NIH, for sabbatical study at the University of New South Wales, Sydney, Australia *Neural Connectivity and Processing in the Crustacean Brain* (\$18,000)
- 1995 - 1997 NSF Instrumentation and Laboratory Improvement (ILI) Program, *The Compound Microscope: A Tool for Visualizing Dynamic Phenomena in Cells* (\$81,000)
- 1996 - 1999 NSF Grant, *Amines and Agonistic Behavior in Crustaceans* (\$135,000/3 years)
- 1997 - 2000 NSF Grant, *Development and Maturation of Olfactory Centers in The Lobster: Influences of Serotonin and Adult Neurogenesis* (\$217,000/3 years)
- 1999 - 2000 NSF Grant, *Amines and Agonistic Behavior in Crustaceans*. A collaborative project with D.H. Edwards (Georgia State University), E.A. Kravitz (Harvard Medical School) and R.H. Huber (Bowling Green State University) (\$40,000/1 year)
- 1999-2000 NSF-DBI MRI (Major Research Instrumentation) #9977366, *The Confocal Microscope: Teaching and Research Explorations in an Undergraduate College Setting* (\$324,857, for acquisition of a confocal laser scanning microscope)
- 2001-2004 NSF-IOS #0091092, *Development and Maturation of Olfactory Centers in the Lobster: Influences of Serotonin and Adult Neurogenesis* (\$426,000/3 years)
- 2001-2003 NSF-DBI MRI (Major Research Instrumentation) #0116263, *Acquisition of a Magnetic Resonance Imaging Accessory for a Bruker 400 MHz NMR Spectrometer* (P.I. with Nancy Kolodny, Joanne Berger-Sweeney and Susan Kohler)(\$184,623/2 years)

- 2001-2005 NSF-DBI #0097499, *REU Site for Research in Biological Sciences*, Co-P.I. with Dennis Smith (\$170,000/4 years)
- 2004-2008 NSF-IOS #0344448, *Development and Maturation of Olfactory Centers in the Lobster: Influences of Serotonin and Adult Neurogenesis* (\$500,000/4 years)
- 2004 Maren Fellowship, Mt. Desert Island Biological Laboratory: *Regulation of Neurogenesis in the Crustacean Brain* (\$17,000; summer support)
- 2005 NSF-IOS Research Experiences for Teachers (RET) Supplement #0530407: *Summer support for a high school teacher to work on neurogenesis research projects* (\$8,335/direct and indirect costs; one year award)
- Maren Fellowship, Mt. Desert Island Biological Laboratory (\$15,000; summer lab support)
- 2005-2011 NIH R01MH67157, National Institutes of Mental Health, *Environmental Control of Neurogenesis* (\$1,388,000/5 years; direct and indirect costs)
- 2005 Maren Fellowship, Mt. Desert Island Biological Laboratory (\$8,500; summer lab support)
- NSF-IOS Research Experiences for Teachers (RET) Supplement #0623727: *Summer support for a high school teacher to work on neurogenesis research projects* (\$9,882/direct and indirect costs; one year award)
- 2006 Maren Fellowship, Mt. Desert Island Biological Laboratory (\$5,000; summer lab support)
- 2007 NSF-IOS #0738689: *8th International Congress for Neuroethology* (\$22,000 in support of this international meeting held in Vancouver, B.C., Canada in July, 2007)
- 2008-2012 Howard Hughes Medical Institute, HHMI #52006325: *Undergraduate Science Education Program Proposal*. Co-P.I. with John Cameron. Proposal written by Lori Friedman, Resources Office, Wellesley College (\$1,200,000/5 years)
- 2008-2011 NSF-IOS #0818259, *Neurogenesis in adult brains: the vascular niche, glial progenitors, migratory streams and neuronal differentiation in the olfactory pathway of crustaceans*. (\$400,000/3 years)
- 2009-2011 NSF-DBI- Major Research Instrumentation: *Acquisition of a spectral confocal microscope for multidisciplinary research and training at an undergraduate college for women* (\$537,139/2 years)
- 2011-2015 NSF-IOS #1121345, *Adult neurogenesis: Precursor cell regulation and replenishment* (\$660,000/4 years)
- 2015-2017 NSF-IOS #1456918, *Cells from the immune system generate adult-born neurons in crayfish* (\$195,000/2 years)

Grants Awarded: Intramural

- 1988-1989 BRSB Wellesley College Award (\$1,800)
- 2000-2002 Brachman Hoffman Fellowship, Wellesley College, *Have ecological factors influenced the evolution of the neural pathway for olfaction?* (\$38,038 direct costs, over two years)
- 2003-2005 Staley Fellowship, Wellesley College, *Circadian Control of Neurogenesis: The Day-Night Cycle, Cell Proliferation and Regulation by Serotonin* (\$39,660/2 years)
- 2004 Fiske Award, Wellesley College, *Mt. Desert Island Biological Lab: Summer 2004* (\$2,000/summer laboratory expenses)
- 2005 Brachman Hoffman Small Grant, Wellesley College, *Mini-Mitter Devices for Monitoring Circadian Activity Patterns* (\$2,800/one-time equipment purchase)
- 2007 Brachman Hoffman Small Grant: *Support for a summer undergraduate student project for Youngmi Kim* (\$4,450/1 year)
- 2009-2011 Brachman Hoffman Fellowship, Wellesley College, *Adult Neurogenesis: precursor cell origins* (\$39,913/2 years)

TEACHING AND MENTORING ACTIVITIES*Courses taught, Wellesley College*

1987-2008	BISC 110: Introductory Cell Biology
1992	BISC 111: Introductory Organismal Biology
1995, 2005-2007	BISC 213: Brain and Behavior
1987-2002	BISC 216: Mechanisms of Animal Development
1991	BISC 220: Cell Physiology
1987-89	BISC 330: Neural Basis of Behavior
1990-2003, 2007-14	BISC 306: Principles of Neural Development
2009-2014	NEUR300: Capstone Seminar in Neuroscience
2011-15	NEUR200: Neurons, Networks and Behavior

Secondary school teachers mentored in my lab:

1994-95	Margaret Schwartz, Lexington High School, Massachusetts Howard Hughes Institute Research Fellow
2000	Kris Rehm, Concord Academy, Concord, Massachusetts Howard Hughes Institute Research Fellow
2005-07	Jennifer Shanholtzer, Mount Desert Island High School, Maine NSF-supported, <i>Research Experiences for Teachers</i> program

Research Fellows (postdoctoral) in my laboratory group:

1988-1993	Simone Helluy
1996-1998	Steffen Harzsch
1999-2001	Jeremy Sullivan
2003-2006	Jeremy Sullivan
2008-2011	Yi Zhang
2015-	Georg Brenneis (anticipated arrival in March)

Visiting Scientists hosted by my laboratory:

2000	Steffen Harzsch (University of Ulm, Germany)
2000	David Sandeman (University of New South Wales, Sydney, Australia) Renate Sandeman (University of New South Wales, Sydney, Australia)
2001-2004	Miriam Wildt (PhD student, University of Ulm, Germany)
2004, 2005	DeForest Mellon (University of Virginia, Charlottesville; 1 month/yr)
2006-2007	Gro van der Meeren (Institute of Marine Research, Norway) Terje van der Meeren (Institute of Marine Research, Norway) Silvia Sintoni (PhD candidate, Max-Planck Institute, Jena, Germany; May-July)
2007-2008	Silvana Allodi (Federal University of Rio de Janeiro, Brazil; November)
2008-2009	Silvana Allodi (September-November)
2010	Paula Chavez (PhD candidate, Federal University of Rio de Janeiro, Brazil; November-December)
2011-12	Paula Chavez (PhD candidate, Federal University of Rio de Janeiro, Brazil)
2014	Irene Söderhäll (Uppsala University; April)