CURRICULUM VITAE

BARBARA SYMONDS BELTZ

Allene Lummis Russell Professor in Neuroscience
Neuroscience Department
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
1998-2004	Director, Neuroscience Program, Wellesley College
2001-2004	Chair, Department of Biological Sciences, Wellesley College
2006-2016	Director, Neuroscience Program, Wellesley College
2007-	Professor of Neuroscience, Wellesley College

Honors and Awards:

1969	National Science Foundation Scholar, Foundation for Research on the Nervous System, Boston, MA
1972	Undergraduate Research Fellow, National Science Foundation, Clark University, Worcester, MA
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, Mount Desert Island Biological Laboratory, Salisbury Cove, ME
2004	Elected as a Member of the Corporation, Woods Hole Oceanographic Institution
2007	Distinguished Faculty Lecturer, Wellesley College
2011-	Allene Lummis Russell Chair in Neuroscience, Wellesley College
2012	Christiana Smith Lecturer, Mount Holyoke College
2015	Pinanski Teaching Prize, Wellesley College
2015-	Elected to Faculty of 1000

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
2006-2016	Director, Neuroscience Program
2007-	Reappointments and Promotions Committee, Neuroscience Program
2008-2011	Admissions Committee
2013-2014	Admissions and Financial Aid Advisory Committee
2013-2016	Chair of Chairs, Science Center
2013-2016	Provost's Council
2014-2016	Honor Code Council
2015-16	Advisory Committee on Merit
2017-19	Advisory Committee on Merit
2015	Family and Friends Speaker, Wellesley College
2016	Invited speaker, *Between the Pages*, Wellesley College
2018	Search Committee, Grants Accountant
	Presentation, Wellesley College Campaign Celebration

Extramural Professional Activities:

1990	NSF Discussion Panel *U.S. Engineering, Mathematics, and Science Education for the Year 2010 and Beyond*.
1992	Chairperson, NSF Workshop *Role of Faculty from Science Disciplines in the Undergraduate Education of Science and Mathematics Teachers*
1994	NSF Presidential Young Investigator Steering Committee, *The Status of Undergraduate Science Education in the U.S.*
1995	NSF Review Panel, Division of Undergraduate Education: *Mathematical Sciences and their Applications Throughout the Undergraduate Curriculum*
	Member of the Visiting Committee for Assessment of the Biology Program, Bryn Mawr College
	Invited participant, National Research Council Convocation *Undergraduate Education in Science, Mathematics, Engineering, and Technology*
	Invited participant, NSF Conference *Women in Science: Celebrating Achievements, Charting Challenges*
1995-2000	Co-chair, East Coast Nerve Net Organizing Committee
1995-1998	Committee on Neuroscience Literacy, Society for Neuroscience 1996-98 Co-Chair, Short Course for High School Students
1997	*Teaching Neuroscience*, Presentation for High School Teachers
1996-2004	Graduate Record Examinations Board, Educational Testing Service, Committee of Examiners (GRE Biology) 2002-2004, Chair
1996, 1998	Science Careers Forum, Panelist, Harvard Medical School, Ph.D. Program in Biological and Biomedical Sciences
1999-	Section Editor, *Arthropod Structure and Development*
2000-2001	Advisory Panel for the Major Research Instrumentation Program, National Science Foundation
2000	NIH Review Panel: Summer Research Experiences for Undergraduates
2002	Organizer for the conference *Post-genomic neuroscience: from molecules to behavior*, Marine Biological Laboratory, Woods Hole, MA
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
	NSF Review Panel, Director's Award for Distinguished Teaching Scholars Program
2004-2007	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
2004-2016	INBRE External Advisory Committee, State of Maine and Mt. Desert Island Biological Laboratory

2004-	Woods Hole Oceanographic Institution (WHOI), Member of the Corporation; 2004-2015 Education Committee; 2011-16 Promotions/Tenure Committee
2004-2007	Chair, Program Committee, International Congress of Neuroethology, Vancouver Congress (held in July, 2007)
2005	Trustee member, External Review, Biology Department, Woods Hole Oceanographic Institution (WHOI)
	External evaluator for promotion, Gustavus Adolphus College,= (MN)
	External review, Neuroscience Program, Trinity College (CT)
2006	External review, Neuroscience Program, Bowdoin College (ME)
2006-2017	Consultant, Sherman Fairchild Foundation
2007-	Mount Desert Island Biological Laboratory, Member of the Corporation 2007- Nominating Committee 2010- Scientific Advisory Board 2010-2011 Director's Advisory Council
2008	External evaluator for tenure and promotion, Wesleyan University
2008-2009	Scientific Advisory Board, Institute of Neurobiology, University of Puerto Rico
2009-	Associate Editor, *Frontiers in Aquatic Physiology*
2011	External review, Neuroscience Program, Union College (NY)
	External review, Neuroscience Program, Mount Holyoke College (MA)
	External evaluator for tenure and promotion, Wesleyan University
2013	Guest editor, PLoS Genetics: 9(3), March 21 (e1003361)
2014	External review, Neuroscience Program, Skidmore College
2016	Mount Holyoke College, Young Alumnae Speed Networking
2016	Plenary Speaker, National Student Leadership Conference, Harvard Medical
	Workshop Speaker, Society for Neuroscience, *Creating, Sustaining and Enhancing Undergraduate Neuroscience Programs*
	External review, Neuroscience Program, The University of Arizona at Tucson
2017-	Lead Consultant, Undergraduate Science Programs, Sherman Fairchild Foundation *Responsible for all funding programs that are involved in supporting undergraduate science education and research, from planning to implementation to oversight*
2018	External review, Neuroscience Program, Lake Forest College (IL)
	External review, Neuroscience Program, Barnard College (NY)
	Member National Science Foundation BIO Advisory Committee Chair, BIO AC subcommittee on proposal submission limits
2019-	Editor-in-Chief for the journal *Arthropod Structure and Development*, Elsevier Publishing Company
2019	Plenary Speaker, The 10th International Congress of Comparative Physiology and Biochemistry, Ottawa, Canada

Reviewer for the Following Journals and Agencies:

Arthropod Structure and Development
Biological Bulletin
Brain Research
Canadian Journal of Zoology
Cell and Tissue Research
Chemical Senses
Comparative Biochemistry and Physiology
Developmental Neurobiology
Frontiers in Aquatic Physiology
General and Comparative Endocrinology
Human Frontiers in Science Program
Intl Journal of Developmental Biology
Invertebrate Neuroscience
Invertebrate Reproduction
Journal of Comparative Neurology
Journal of Crustacean Biology
Journal of Experimental Biology
Journal of Experimental Zoology
Journal of Neurobiology
Journal of Neuroscience
Journal of Neuroscience Methods
National Institutes of Health
National Science Foundation
PLOS Genetics
PLOS One
PNAS
Progress in Neurobiology
Stem Cells and Development
Tissue and Cell

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- 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 (Vancouver, 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 (2002-present)
(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
	Older Wiser Lifelong Learners (O.W.L.L.), Lexington, MA
	Science Center Faculty Speaker Series
2015	Older Wiser Lifelong Learners (O.W.L.L.), Lexington, MA
	Wellesley Alumnae Club of Columbus, OH
	Biochemistry Program Research Retreat, faculty speaker
2018	Boston Preparatory Charter Public School, Wellesley College visit, faculty lab talk

RESEARCH ACTIVITIES

Invited Lectures

1986 Discussion Meeting *"Receptors and Ion Channels*", Sponsored by The Company of Biologists, Ltd., Titisee, West Germany

1987 Biology Department, Mount Holyoke College, South Hadley, MA
Biology Department, Wake Forest University, Winston-Salem, NC

1988 Neurobiology Department, Harvard Medical School, Boston, MA

1989 Whitney Laboratory for Experimental Marine Biology and Medicine, University of Florida, St. Augustine, FL
Biology Department, George State University, Atlanta, GA
Symposium: *Frontiers in Crustacean Neurobiology,* Hamburg, Germany
Introductory Lecture, Neurobiology and Behavior Conference, *Science as a Way of Knowing* Symposium. American Society of Zoologists

1990 Biology Department, Brandeis University, Waltham, MA
Symposium *"Molecular and Cellular Events in Neural Development and Regeneration"*, Society for Neuroscience Meeting, St. Louis, MO

1991 Biology Department, Neuroscience Symposium, University of New South Wales, Sydney, Australia

1992 Department of Zoology, University of Rhode Island
Cell Biology Program, Rutgers University, New Brunswick, NJ

1993 Zoology Department, University of New South Wales, Sydney, Australia
Anatomy Department, Medical School of the University of New South Wales, Sydney, Australia
East Coast Neuroscience Meeting, Jarvis Bay, Australia

1995 Wellesley College, Faculty Seminar Series

1996 Advanced Placement Biology Colloquium for high school teachers, Westford, MA

1997 Boston University Marine Program, Woods Hole, MA

1999 Frontiers in Crustacean Neurobiology, Hamburg, Germany

2000 Georgia State University, Department of Biology
Beckman Foundation, Beckman Scholars Symposium
Arizona Research Labs, Division of Neurobiology, University of Arizona, Tucson

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
Tufts University Medical School

2002 Colby College, Parents' Weekend speaker

Conference: *Post-Genomic Neuroscience: From Molecules to Behavior*, Marine Biological Laboratory, Woods Hole, MA
(continued)

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
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 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

2015 University of Calgary Medical School & Alberta Children's Hospital Research Institute
Karger Workshop, invited speaker (Chicago, IL)

2016 Colorado College for a Day (Denver, CO)

2017 Conference: *Crustacean Models in Cross-Disciplinary Biological Research*, Janelia Farms/HHMI, Invited speaker/participant
Biology Department, University of New England, Biddeford, ME

Plenary Speaker, Research Day Symposium, Ross University Medical School, Portsmouth, Dominica

2019 Plenary Speaker, The 10th International Congress of Comparative Physiology and Biochemistry, Ottawa, Canada

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

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.

Sandeman DC, Benton JL, Beltz BS (2016) Adult neurogenesis in the decapod crustacean brain: The immune system supplies neural progenitors. Chapter 41 in *Structure and Evolution of Invertebrate Nervous Systems*, A Schmidt-Rhaesa, S Harzsch, G Purschke, eds., Oxford University 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.

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 *The Crustacean Nervous System*, volume II, 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* ll:31-50.

Beltz BS, Gelperin A (l980) 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, Dircksen 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.

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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.

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)

1993 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)

2017-2023 NSF-IOS #1656103, *Adult neurogenesis: Contributions from the innate immune system* ($743,579/6 years)

Grants Awarded: Intramural

1988-1989 BRSG 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)

2015-2017 Staley Fellowship, Wellesley College, *Cells from the immune system generate adult-born neurons: technological development and translational studies* ($49,970 direct costs/2 years)

TEACHING AND MENTORING ACTIVITIES

Courses taught (4 per year), 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, 2007-18	BISC 306: Principles of Neural Development
2009-2017	NEUR300: Capstone Seminar in Neuroscience
2011-18	NEUR200: Neurons, Networks and Behavior

Postdoctoral Fellows Mentored in my Lab

1988-1993	Simone Helluy (PhD, University of Alberta, Canada; recently retired as Senior Instructor, Department of Biological Sciences, Wellesley College)
1996-1998	Steffen Harzsch (PhD, University of Bielefeld, Germany; currently Professor/Dr Zoological Institute and Museum & Department of Cytology and Evolutionary Biology, University of Greifswald, Germany)
1999-2001 2003-2006	Jeremy Sullivan (PhD, University of Melbourne, Australia; currently Research Associate, Johns Hopkins University School of Medicine)
2008-2011	Yi Zhang (PhD, University of Hong Kong; General Manager, HLJ Tian Qing Stem Cell Co., Ltd. & Director, National Stem Cell Research and Engineering Center for Aging Diseases, Harbin, China)
2015-2018	Georg Brenneis (PhD, Humboldt University, Berlin)
2019-2021	Paula Chaves da Silva (PhD, Federal University of Rio de Janiero, Brazil)

PhD Students Mentored in my Lab

2001-2004	Miriam Wildt (PhD student from the Harzsch lab, University of Ulm, Germany; did all thesis work in my lab)
2006-2007	Silvia Sintoni (PhD student from the Harzsch lab, Max-Planck Institute, Jena, Germany; May-July)
2010	Paula Chavez (PhD student from the Allodi lab, Federal University of Rio de Janiero, Brazil; November-December)
2011-12	Paula Chavez (PhD candidate from the Allodi lab, Federal University of Rio de Janiero, Brazil; May-December)

Secondary School Teachers Mentored in my Lab

1994-95	Margaret Schwartz, Lexington High School, Massachusetts; Howard Hughes Institute Research Fellow (academic year and summer)
2000	Kris Rehm, Concord Academy, Concord, Massachusetts; Howard Hughes Institute Research Fellow (summer)
2005-07	Jennifer Shanholtzer, Mount Desert Island High School, Maine; NSF-supported *Research Experiences for Teachers* program (3 summers)

Visiting Scientists hosted by my laboratory

2000	Steffen Harzsch (University of Ulm, Germany; 1 month)
2000	David & Renate Sandeman (University of New South Wales, Sydney, Australia; September-December)
2004, 2005	DeForest Mellon (University of Virginia, Charlottesville; 1 month/yr)
2006-2007	Gro & Terje van der Meeren (Institute of Marine Research, Norway; full year)
2007-2008	Silvana Allodi (Federal University of Rio de Janiero, Brazil; November)
2008-2009	Silvana Allodi (September-November)
2014	Irene Söderhäll (Uppsala University; April)
2018	Chadanat Noonin (Uppsala University; January)