

Steven J. Zottoli

Adjunct Senior Scientist, Eugene Bell Center and Whitman Scientist
Marine Biological Laboratory
Woods Hole, MA

and

Schow Professor of Biology, *Emeritus*
Department of Biology
Williams College
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Contact: Steven.J.Zottoli@williams.edu

Education and Postdoctoral Training

B.A., Bowdoin College, Biology

M.S., University of Massachusetts, Zoology

Ph.D., University of Massachusetts, Physiology, Dr. John Roberts advisor, Comparative studies of the Mauthner cell in teleosts and chronic physiological recording from Mauthner cells in free-moving goldfish.

NIH Postdoctoral Fellow, Dr. Donald Faber advisor, Physiological studies on the Mauthner cell in teleost fishes and physiological response of the Mauthner cell to spinal cord injury.

Professional Positions

2013-	Adjunct Senior Scientist, Eugene Bell Center for Regenerative Biology, Marine Biological Laboratory, Woods Hole, MA
2015-2016	Co-Director of Education, Marine Biological Laboratory
2014-	Howard B. and Nan W. Schow '50 Professor of Biology, <i>Emeritus</i> , Williams College
2013-	Visiting Scientist, Institute of Neurobiology and UPR, Río Piedras
2010-2013	Adjunct Senior Scientist, Cellular Dynamics Program, Marine Biological Laboratory, Woods Hole, MA
2007-2010	Chair, Biology Department
Fall, 2001, Spring, 2005 2005-2006	Chair, Neuroscience Program
1994-2014	Howard B. and Nan W. Schow '50 Professor of Biology, Williams College
1993-2014	Professor of Biology, Williams College
1993-1994	Acting Chair of the Biology Department, Williams College
1991-1994	Director, Grass Laboratory, Marine Biological Laboratory, Woods Hole, MA.
1991-2004	Director, Howard Hughes Medical Institute grants to Williams College
1987-1993	Associate Professor of Biology, Williams College
1980-1987	Assistant Professor of Biology, Williams College
1978-1980	Assistant Professor of Physiology State University of New York at Buffalo

1977-1978

Research Scientist II Research Institute on Alcoholism, Buffalo, NY

Honors and Awards

Surdna Fellow, Bowdoin College, 1969

Grass Fellowship, Summer 1978

Steps Toward Independence Fellow, Marine Biological Laboratory, Summer, 1984

Sigma Xi, The Scientific Research Society

Lifetime Achievement Award from the Faculty for Undergraduate Neuroscience, 2015

Service on National Committees and Institutional Boards

Trustee of The Grass Foundation, 1988-1990, 1994-1997, elected as a Life Trustee 1997-

Vice President of The Grass Foundation, 1994-2000

President of The Grass Foundation, 2000-2005

External Advisory Board for Biomedical Research Infrastructure Network (BRIN) program for the state of New Mexico, 2001-2004

Participant in the HHMI Gilliam Fellows meeting, Summer, 2014

Participant in an HHMI Undergraduate Science Education Program, Historically Black Colleges and Universities and Tribal College Planning Workshop, April 9-10, 2007

Service on Marine Biological Laboratory committees

Member Marine Biological Laboratory Education Committee, 1994-1999

Member MBL Science Council Nominating Committee, 2001

Member of MBL taskforce to ensure continued excellence in Education, 2001

Member of MBL taskforce on governance/administrative structure, 2002

Member of the search committee for Chief Academic and Science Officer at the MBL, 2003 and 2007

Member of Search Committee for Director of the MBL, 2004

Member of the MBL Corporation Membership Committee, 2010-2013

Member of the MBL Whitman Center Steering Committee, 2013-2015

Member of the MBL Research Fellowship Committee, 2013-2019

Member of the joint MBL-University of Chicago retreat planning committee, 2014

Member of the MBL-UChicago Affiliation Scientific Advisory Committee, 2014-2015

Member-at-Large, MBL Boating Committee, 2015-

Reviewer

Journals

Biological Bulletin

Brain Research

Current Biology

Integrative and Comparative Biology

Journal of Comparative. Neurology

Journal of Comparative Physiology A

Journal of Morphology

Journal of Neuroscience
Journal of Neuroscience Research
Journal of Neurophysiology
Journal of Neurobiology
Neuroscience
Science
Zoology

Agencies

NSF
Health Research Board, Ireland
NSERC

Teaching

Courses taught at Williams College:

Animal Physiology
Histology
Human Biology and Social Issues (non-majors course)
Introduction to Neuroscience
Introductory Biology (The Organism)
Neurobiology
Neurobiology tutorial
Plasticity in the Nervous System (Senior seminar)
Topics in Neuroscience (Senior seminar)

Courses/Workshops taught at other institutions:

Director of HHMI-supported MBL summer program for Williams College undergraduates, 1997-2004
Director of MBL summer program for Williams College undergraduates, 2014-
Laboratory Instructor/faculty in Summer Program in Neuroscience, Ethics and Survival faculty member, MBL, 2000-2010
Co-Director with Rhonda Dzakpasu Neurons in Action Workshop, Universidad Central del Caribe, Puerto Rico, August, 2014
Co-Director with Rhonda Dzakpasu Neurons in Action Workshop with laboratory, Universidad Central del Caribe, Puerto Rico, August, 2015
The Grass Foundation Workshop on Neuroscience Outreach to Colleges with Limited Resources; January 30, 2016 (Organized and facilitated)
The Grass Foundation Workshop entitled, "Neuroscience Hands-On Teaching Workshop" held on November 8, 9, and 10th, 2019 at the University of Arizona (helped organize and facilitated with co-hosts Ulises Ricoy and Veronica Acosta)

Lectures given in courses at other institutions:

Introduction to Neuroscience, Anatomy Section, Cornell University, 1991
Neurobiology and Animal Behavior, Shoals Marine Laboratory, Gulf of Maine, 1999
Summer Program in Neuroscience, Ethics and Survival faculty member, MBL, 2000-2013
Participant in MBL SUCCESS; Shaping and Understanding Career Choices in Education, Science and Self, 2013-2015

Outreach

Developed a website (**stripedbassmagic.org**) for middle school/high school students and teachers based on ecosystem-based approach with the striped bass, and their predators and prey as a focus.

External reviewer

Mt. Holyoke Biology Department, Spring 2011
Emmanuel College Biology Department, Spring 2013

Students Mentored

Williams College Undergraduate students

Over 100 students mentored in research at Williams College
Over 80 students mentored during the summer at the MBL

Ph.D. thesis committees, external member:

Steve Leiber, Ph.D.	Albert Einstein	Advisor: Pat Model
Gary Swain, Ph.D.	Northeastern	Advisor: Joe Ayers
Dimple Bhatt, Ph.D.	SUNY Stony Brook	Advisor: Joe Fetcho
Xochitl Perez, Ph.D.	UPR, Río Piedras	Advisor: Loretta Roberson
Mayra Sanchez, M.S.	UPR, Río Piedras	Advisor: Loretta Roberson

SPINES students mentored in the post-course research at the MBL:

Juan G. Cueva, Postdoctoral student, Stanford (2005)
Stan King, Graduate student, University of Virginia (2006)
Kera Lawson, Graduate student, Meharry Medical College (2006)
Shirley Eva Sanchez, Graduate student, Boston University (2007)
Deborah Zoomora, Graduate student, University Texas, San Antonio (2007)
Heather Snell, Graduate student, University of North Texas Health Science Center (2012)
Xochitl Perez, Graduate student, University of Puerto Rico, Río Piedras (2013)

Other high school, undergraduate and graduate students mentored:

Katherine Qian, Graduate student with Ben Peng in the Department
of Biology at The Hong Kong University of Science and Technology (2007)
Mayra Sanchez, M.S., UPR, Río Piedras, Advisor: Loretta Roberson
Thomas Blum, Newton South High School (2017)
Joselyne Alvarez, Assumption College (2017)
Laurel Barnett, Westwood High School (2018)
Darya Khodakhah, Harrison High School (now at Middlebury College) (2018)
Andrea Fusco, MBL, Master's candidate, Northeastern University (2018)

Many middle and high school students as part of MBL outreach (stripedbassmagic.org) 2015-

Publications:

Peer Reviewed

1. **Zottoli, S.J.** A comparison of Mauthner cell size in teleosts and cell functions in escape tail-flips of unrestrained goldfish in response to sound. Ph.D. Dissertation, University of Massachusetts, 1976.
2. **Zottoli, S.J.** Fishing behavior of the common grackle. *Auk*, 93: 640-642, July 1976.
3. **Zottoli, S.J.** Correlation of the startle reflex and Mauthner cell auditory responses in unrestrained goldfish. *J. Exp. Biol.*, 66: 243-254, 1977.
4. **Zottoli, S.J.** Comparison of Mauthner cell size in teleosts. *J. Comp. Neurol.*, 178: 741-758, 1978.
5. **Zottoli, S.J.** and Faber, D.S. Properties and distribution of anterior VIIIth nerve excitatory inputs to the goldfish Mauthner cell. *Brain Res.*, 174: 319-323, 1979.
6. Faber, D.S., Kaars, C. and **Zottoli, S.J.** Dual transmission at morphologically mixed synapses: evidence from postsynaptic cobalt injections. *Neuroscience*, 5: 433-440, 1980.
7. **Zottoli, S.J.** and Faber, D.S. An identifiable class of statoacoustic interneurons with bilateral projections in the goldfish medulla. *Neuroscience* 5: 1987-1302, 1980.
8. **Zottoli, S.J.** Electrophysiological and morphological characterization of the winter flounder Mauthner cell. *J. Comp. Physiol.*, 143: 541-553, 1981.
9. Faber, D.S. and **Zottoli, S.J.** Axotomy-induced changes in cell structure and membrane excitability are sustained in a vertebrate central neuron. *Brain Res.*, 223: 436-443, 1981.
10. Funch, P.G., Kinsmon, S.L., Faber, D.S., Koenig, E. and **Zottoli, S.J.** Mauthner axon diameter and impulse conduction velocity decrease with growth of goldfish. *Neurosci. Letters*, 27: 159-164, 1981.

11. **Zottoli, S.J.** and *van Horne, C. Posterior lateral line afferent and efferent pathways within the central nervous system of the goldfish with special reference to the Mauthner cell. *J. Comp. Neurol.* 219: 100-111, 1983.
12. **Zottoli, S.J.**, *Hangen, D.H. and Faber, D.S. The axon reaction of the goldfish Mauthner cell and factors that influence its morphological variability. *J. Comp. Neurol.*, 230: 497-516, 1984.
13. *Rhodes, K.J., **Zottoli, S.J.** and Mufson, E.J. Choline acetyltransferase immunohistochemical staining in the goldfish (*Carassius auratus*) brain: evidence that the Mauthner cell does not contain choline acetyltransferase. *Brain Res.* 381: 251-224, 1986.
14. Titmus, M., Faber, D.S. and **Zottoli, S.J.** Altered excitability of the goldfish Mauthner cell following axotomy. I. Characterization and correlations with somatic and axonal morphological reactions. *J. Neurophysiol.* 55: 1424-1439, 1986.
15. **Zottoli, S.J.**, Hordes, A. and Faber, D.S. Localization of optic tectal input to the ventral dendrite of the goldfish Mauthner cell. *Brain Res.* 401: 113-121, 1987.
16. **Zottoli, S.J.**, Marek, L.E., Agostini, M.A. and *Strittmatter, S.L. Morphological and physiological survival of goldfish Mauthner axons separated from their somata by spinal cord crush. *J. Comp. Neurol.* 255: 272-282, 1987.
17. **Zottoli, S.J.**, *Rhodes, K.J. and Mufson, E.J. Comparison of acetylcholinesterase and choline acetyltransferase staining patterns in the optic tectum of the goldfish *Carassius auratus*: a histochemical and immunocytochemical analysis. *Brain, Behavior and Evolution* 30: 143-159, 1987.
18. *Danielson, P.D., **Zottoli, S.J.**, *Corrodi, J.G., *Rhodes, K.J. and Mufson, E.J. Localization of choline acetyltransferase to posterior lateral line efferent somata of the goldfish. *Brain Res.* 448: 158-161, 1988.
19. **Zottoli, S.J.**, *Rhodes, K.J., *Corrodi, J.G. and Mufson, E.J. Putative cholinergic projections from the nucleus isthmi and the nucleus reticularis mesencephali to the optic tectum in the goldfish (*Carassius auratus*). *J. Comp. Neurol.* 273: 385-398, 1988.
20. Lee, R.K.K., Eaton, R.C. and **Zottoli, S.J.** Segmental arrangement of reticulospinal neurons in the goldfish hindbrain. *J. Comp. Neurol.*, 329: 539-556, 1993.
21. Scott, J.W., **Zottoli, S.J.**, *Beatty, N.P., and Korn, H. Origin and function of spiral fibers projecting to the goldfish Mauthner cell. *J. Comp. Neurol.*, 339: 76-90, 1994.
22. *Bentley, A.P. and **Zottoli, S.J.** Central nervous system lesion triggers inappropriate pathway choice in adult vertebrate system. *Brain Res.*, 630: 333-336, 1993.
23. *Meyers, J.R., *Copanas, E.H. and **Zottoli, S.J.** Comparison of fast startle responses between two elongate, bony fish with an anguilliform type of and the implications for the underlying neuronal basis of escape behavior. *Brain Behav. Evol.* 52: 7-22 1998.
24. **Zottoli, S.J.**, *Newman, B.C., *Rieff, H.I. and *Winters, D.C. Decrease in occurrence of fast startle responses after selective Mauthner cell ablation in goldfish (*Carassius auratus*). *J. Comp. Physiol. A.* 184: 207-218, 1999.
25. **Zottoli, S.J.**, *Akanki, F.R., *Hiza, N.A., *Ho-Sang Jr., D.A., *Motta, M., *Tan, X., *Watts, K.M. and Seyfarth, E.-A. Physiological characterization of supramedullary/dorsal neurons of the cunner, *Tautoglabrus adspersus*. *Biol. Bull.*, 197: 239-240, 1999.
26. **Zottoli, S.J.**, *Arnolds, D.E.W., *Asamoah, N.O., *Chevez, C., *Fuller, S.N., *Hiza, N.A., *Nierman, J.E., and *Taboada, L.A. Dye coupling evidence for gap junctions between supramedullary/dorsal neurons of the cunner, *Tautoglabrus adspersus*. *Biol. Bull.*, 201: 277-278, 2001.
27. *Arnolds, D.E., **Zottoli, S.J.**, *Adams, C.E., *Dineen, S.M., *Fevrier, S., *Guo, Y., and *Pascal, A.J., Physiological effects of tricaine on the supramedullary/dorsal neurons of the cunner, *Tautoglabrus adspersus* *Biol. Bulletin*, 203: 188-189, 2002.
28. **Zottoli, S.J.**, *Burton, O.T., *Chambers, J.A., *Eseh, R., *Gutiérrez, L.M. and *Kron, M.M. Transient use of tricaine to remove the telencephalon has no residual effects on physiological recordings of supramedullary/dorsal neurons of the cunner, *Tautoglabrus adspersus* *Biol. Bull.*, 205: 211-212, 2003.
29. **Zottoli, S.J.** and *Freemer, M.M. Recovery of C-starts, equilibrium and targeted feeding after whole spinal cord crush in the adult goldfish, *Carassius auratus*. *J Exp Biol.* 206:3015-3029, 2003.
30. Bierman, H.S., Schriefer, J.E., **Zottoli, S.J.** and Hale, M.E. The effects of head and tail stimulation on the withdrawal startle response of the rope fish (*Erpetoichthys calabaricus*). *J. Exp. Biol.* 207: 3985-3997, 2004.
31. Weiss, S.A., **Zottoli, S.J.**, Do, S.C., Faber, D.S. and Preuss, T. Correlation of C-start behaviors with neural activity recorded from the hindbrain of free-swimming goldfish (*Carassius auratus*). *J. Exp. Biol.* 209: 4788-4801, 2006.
32. Bierman, J.S., **Zottoli, S.J.** and Hale, M.E. Evolution of the Mauthner axon cap. *Brain Behav Evol.* 73:174-187, 2009.
33. Greenwood, A.K., Peichel, C.L. and **Zottoli, S.J.** Distinct startle responses are associated with neuroanatomical differences in pufferfishes. *J. Exp. Biol.*, 213: 613-620, 2010.
34. **Zottoli, S.J.**, *Wong, T.W., Agostini, M.A. and *Meyers, J.R. Axon cap morphology of the sea robin

- (*Prionotus carolinus*) Mauthner cell is correlated with the presence of 'signature' field potentials and a C-type startle response. *J. Comp. Neurol.*,519: 1979-1998 2011.
35. Gilland E., Straka, H., *Wong, T.W., Baker, R. and **Zottoli, S.J.**, A hindbrain segmental scaffold specifying neuronal location in adult goldfish, *Carassius auratus*. *J. Comp. Neurol.*,522: 2446-2464, 2014.
 36. Sánchez-García, M.A., **Zottoli, S.J.** and Roberson, L.M. Hypoxia has a lasting effect on fast-startle behavior of the tropical fish *Haemulon plumieri*. *Biol. Bull.* 237: 48-62. 2019.
 37. *Koganti, L., Liu, J.,*DeMajewski, A., Agostini, M.A., *Wong, T.W., Faber, D.S. and **Zottoli, S.J.** Invasion of microglia/macrophages and granulocytes into the Mauthner axon myelin sheath following spinal cord injury of the adult goldfish, *Carassius auratus*. *J. Morphol.* 281: 135-152. 2020.
 38. **Zottoli, S.J.**, Faber, D.S., *Dannhauer, A.C., *Hering, J,*Northen, S. Survival and axonal outgrowth of the Mauthner cell following spinal cord crush does not drive post-injury startle responses. *Front. Cell Dev. Biol.*, 19 November 2021 | <https://doi.org/10.3389/fcell.2021.744191>

*Williams College undergraduates

Historiography Publications:

1. Seyfarth, E.-A. and **Zottoli, S.J.** Ludwig Mauthner (1840-1894): Neuroanatomist and noted ophthalmologist in fin-de siècle Vienna. *Brain, Behav., and Evol.* 37: 252-259, 1991.
2. **Zottoli, S.J.** and Seyfarth, E.-A. Julia Barlow Platt (1857-1935): Achievements and disappointments of a pioneer comparative embryologist and neuroscientist. *Brain, Behav. Evol.* 43: 92-106, 1994.
3. **Zottoli, S.J.** The origins of the Grass Foundation. *Biol. Bull.* 201: 218-226 2001.
4. **Zottoli, S.J.**, Cioni, C and Seyfarth, E.-A. Reticulospinal neurons in anamniotic vertebrates: A celebration of Alberto Stefanelli's contributions to comparative neuroscience. *Brain Res. Bull.* 74: 295-306, 2007.
5. Malkusch, W. and **Zottoli, S.J.** Being Objective: A tribute to Rudi Rottenfusser. *The Collecting Net*, 6: 5-6, 2010.
6. **Zottoli, S.J.** How the early voltage clamp studies of José del Castillo inform "modern" neuroscience. *The NEUROSCIENTIST.* 18: 415-421, 2012.
7. Pereda, A.E., Schweizer, F.E. and **Zottoli, S.J.** On the training of future neuroscientists: Insights from the Grass Laboratory. *Neuron* 79:12-15, 2013.
8. **Zottoli, S.J.** and E.-A. Seyfarth. The Marine Biological Laboratory (Woods Hole) and the scientific advancement of women in the early 20th century: the example of Mary Jane Hogue (1883-1962) *J. Hist. Biol.*, 48:137-167, 2015.
9. Leonard, J. and **S.J. Zottoli**, *The Georgie C. Bowden: For the love of one boat.* Friendship Sloops, Sailing New England Pp. 33-35, 2017.
10. **Zottoli, S.J.** and E.-A. Seyfarth. Mary Jane Hogue (1883-1962): A pioneer in human brain tissue culture. *J. Hist. Neurosciences, J. Hist. Neurosci.* 27:333-354, 2018

Review, Articles, Books, Book Chapters

1. **Zottoli, S.J.** Comparative morphology of the Mauthner cell. In: *Neurobiology of the Mauthner Cell*, Edited by D.S. Faber and H. Korn, Raven Press, NY, 1978.
2. **Zottoli, S.J.** and *Danielson, P.D. The lateral line afferent and efferent systems of the goldfish with special reference to the Mauthner cell. In: (P. Görner, S. Coombs, and H. Münz, eds.) *Neurobiology and Evolution of the Lateral Line System.* Springer-Verlag, N.Y., 1989.
3. **Zottoli, S.J.**, *Davis, G.W. and *Northen, S.C. Comparative studies of the Mauthner cell in teleosts. In: (I. Benedetti, B.Bertolini and E.Capanna, eds.) *Neurology Today. Selected Symposia and Monographs*, Vol. 7, Unione Zoologica Italiana, Mucchi Editore, Modena, 1992, pp. 53-64.
4. **Zottoli, S.J.**, *Bentley, A.P., *Feiner, D.G., *Hering, J.R., *Prendergast, B.J. and *Rieff, H.I. Spinal cord regeneration in adult goldfish: implications for functional recovery in vertebrates. *Prog. Brain Res.* 103: 219-228, 1994.
5. **Zottoli, S.J.**, *Bentley, A.P. and *Prendergast, B.J. and *Rieff, H.I. Comparative studies on the Mauthner cell of teleost fish in relation to sensory input. *Brain Behav. Evol.* 46: 151-164, 1995.
6. **Zottoli, S.J.** and Faber, D.S. The Mauthner cell: What has it taught us? *The Neuroscientist*, 6: 25-37, 2000.
7. Bhatt, D.H., Patzelova, H., McLean, D.L., Fetcho, J.R. and **Zottoli, S.J.** Functional regeneration in the larval zebrafish spinal cord. In: (C.G. Becker and T. Becker eds.) *Model Organisms in Spinal Cord Regeneration*, WILEY-VCH Verlag GmbH & Co. KgaA, Weinheim, pp. 263-288, 2007.
8. Smith, J.C., Morgan, J.R., Buxbaum, J.D., Smith, P.J., **Zottoli, S.J.** and Bloom, O.E. Regeneration in the era of functional genomics and gene network analysis. *Biol. Bull.*, 221: 18-34, 2011.

*Williams College undergraduates

Selected Papers and Posters presented at scientific meetings

1. Evolution of the Mauthner axon cap and fast-start escape response. Neuroscience Abstracts (2007) Bierman, H., S. **Zottoli, S.J.** and Hale, M.E.
2. Does fast-start circuitry contribute to pufferfish inflation? Greenwood, A.K., Peichel, K. and **Zottoli, S.** JBJC abstract (2008).
3. Reticulospinal neurons in anamniotic vertebrates: A celebration of Alberto Stefanelli's contributions to comparative neuroscience. **Zottoli, S.J.**, Cioni, C. and Seyfarth, E.-A. 54th Convegno Gruppo Embriologico Italiano, Roma 4-7 giugno (2008).
4. *Lutjanus jocu* (Dog snapper) as a bio-indicator of emerging contaminants and changes in environmental condition. Sánchez-García, M., **Zottoli, S.J.**, and Roberson, L. Ocean Sciences Meeting, Honolulu Hawaii, Feb. (2014).
5. Impact of Hypoxia on Startle Response (C-start) of Fish in a Tropical Urban Estuary, M. Sanchez-Garcia, M., Zottoli, S.J. and Roberson-Murillo, L., Ocean Sciences Meeting, New Orleans, LA (2016).
6. The electrophysiological identification of Mauthner cells in the cunner fish (*Tautoglabrus adspersus*). Alvarez, J., Blum, T., Zottoli, S. and Roberson, L. Marine Biological Laboratory Poster Session (2017).