SHERYL COOMBS

Title: Professor Current as of: 4/24/07

Address: Bowling Green State University
Department of Biological Sciences and
JP Scott Center for Neuroscience, Mind and Behavior
Bowling Green, Ohio 43403

Phone: (419) 372-1206
Fax: 419-372-2024
E-mail: scoombs@bgnet.bgsu.edu

Place of Birth: Boulder, Colorado

Research Interests: Sensory biology with primary focus on comparative studies of vertebrate hair cell systems. Neurophysiological, behavioral, anatomical and modeling techniques are applied to questions of how the nervous system extracts information about various stimulus features (e.g. the size, location and distance of prey) and how complex, natural behaviors (e.g. prey capture behavior) are guided by multisensory contributions (e.g. auditory and lateral line).

Professional Experience

2004 – Present: Professor of Biological Sciences, Bowling Green State University
2002 – 2004: Professor of Biology, Loyola University Chicago
1997 - 2004: Professor of Hearing Sciences, Parmly Hearing Institute
1992 - 1997: Research Professor, Parmly Hearing Institute, Loyola University Chicago
1988 - 1991: Research Associate Professor, Parmly Hearing Institute, Loyola University
1983 - 1988: Research Assistant Professor, Parmly Hearing Institute
1981 - 1983: Postdoctoral Associate, Parmly Hearing Institute.
1975 - 1980: Doctoral Candidate, Department of Zoology, University of Hawaii and Department of Anatomy, Georgetown University.
1972 - 1975: Research Associate, Kresge Hearing Research Institute, University of Michigan Medical Center.
1970 - 1972: Research Assistant, Kresge Hearing Research Institute

Education: B.S. (Biology), 1969, University of Michigan, Ann Arbor, Michigan
Ph.D. (Zoology), 1980, University of Hawaii, Honolulu, Hawaii

Teaching Interests: Sensory Physiology and Ecology, Neurobiology, Neuroethology, Fluid Mechanics

Teaching Experience

Bowling Green State University
Sensory Ecology (BIOL 400/580)(Fall 2007)
Neuroethology (BIOL 418/520)(Spring 2006, 2007)

Fluid Mechanics for Biologists (BIOL 780)(Spring 2005)

Loyola University of Chicago

Lab in Neuroscience (NS 301, 302)(1998-2004)
Seminar in Neuroscience (NS 300)(1998-2004)
Directed Reading in Neurobiology (Bio 493)(1989, 1995)
Directed Research (Bio 422)(1989, 1996-1997)
Sensory Processing (Psych 421) (1988)
Neuroendocrinology (Bio 395/495)(1985)
Lab in Biopsychology-Neurophysiology (Psych 311), (1983-1984)
Neurobiology (Bio 395/495) (1983)
Animal Behavior (Bio 320/Anth 350)(1983)

University of Hawaii

Graduate assistant lab instructor for General Zoology, Comparative Physiology and Comparative Vertebrate Anatomy, Zoology Department (1976 - 1978)

Students and Postdoctoral Associates

Brandon Casper, Postdoctoral Associate (2007 – Present)
Saurabh Sharma PhD (2005- Present) "Exploratory behaviors of blind cavefish"
Paul Patton, Postdoctoral Research Scientist (2004 – Present)
Jia Cuihong, M.S. (2000 - 2004), "Organization of lateral line inputs in the hindbrain of the clawed frog, *Xenopus laevis*"
Chris Braun, Postdoctoral Associate (1997 – 2001)
Max Kanter, M.S. (1999 - 2000), "Lateral-line mediated detection of artificial prey in the presence of background flow by Lake Michigan mottled sculpin (*Cottus bairdi*)."
Julie Abboud, M.S. (1996 - 1998), "Mechanosensory control of head posture during prey capture in the mottled sculpin, *Cottus bairdi*."
Ruth Conley, Postdoctoral Associate (1994-1997)

Membership in Learned and Professional Societies

Acoustical Society of America
American Association for the Advancement of Science
American Society of Ichthyologists and Herpetologists
Animal Behavior Society
International Society for Neuroethology
JB Johnston Club
Sigma Xi
Society for Integrative and Comparative Biology
Society for Neuroscience

Grant Support

2006: DARPA "Polymer Bioinspired Sensor Integration", Chang Liu, P.I. (UIUC), S. Coombs, one of several Co-PI in multi-university contract ($353,000/18 months subcontract to

BGSU, Phase II)

2005: DARPA “Polymer Bioinspired Sensor Integration”, Chang Liu, P.I. (UIUC), S. Coombs, one of several Co-PI in multi-university contract ($1,545,572; $160,000/year subcontract to BGSU, Phase I).

2004: DARPA “Polymer Bioinspired Sensor Integration”, Chang Liu, P.I. (UIUC), S. Coombs, Co-PI ($54,000 subcontract to Loyola – 9 month seed money).

2003 – 2004 Life Sciences Education and Research, Department of Defense (Defense Advanced Research Projects Agency, DARPA), $4,595,860, 24 months - 9/17/03 * 9/16/05 (25% effort as 1 of 26 participating faculty members).

1985 - 2003: NIH Program Project "Information processing by the auditory system", William Yost, P.I., Sheryl Coombs, Toby Dye, Dick Fay, and William Shofner, Co-PI's. Total Award (last 5-year period): $5,961,675

1994 - 1997: ONR grant "Localization of low frequency, hydrodynamic sources by Fish", S. Coombs, P.I., Ruth Conley and John Montgomery, Co-P.I.’s. Total Award (3 years): $247,537

1989 - 1991: NSF Grant "Use of the Lateral Line for Foraging in Antarctic Notothenioid Fishes", John Janssen, P.I. and Sheryl Coombs, Co-PI. Total Award (3 years): $153,540

1987 - 1988: NSF ($10,170) and ONR ($12,344) conference grants for “Neurobiology and Evolution of the Lateral Line System," Sheryl Coombs, P.I.

1984 - 1985: NIH grant "Sensory Processing in a Vertebrate Hair Cell System", Sheryl Coombs, P.I. and John Janssen, Co-PI. (3 year grant refunded after two months as part of the program project grant above) Total Award (3 years): $151,434

1982 - 1985: NIH grant "Temporal Mechanisms in Acoustic Processing", Sheryl Coombs, P.I. Total Award (3 years): $49,816

1981 - 1983: NSF grant "Neural Mechanisms of Directional Hearing", Richard R. Fay, P.I., Sheryl Coombs, Co-PI. Total Award (3 years): $174,956

1977 - 1980: NIH Predoctoral Fellowship

Extramural Service

“Effects of Sound on Fish and Turtles", Standards Committee S3 of the Acoustical Society of America (2005 – Present).

Council Member, Executive Committee, International Society for Neuroethology (2005 – Present)

Bioacoustic Committee, Acoustical Society of America (2004 – Present)

Editorial Board, *Brain, Behavior and Evolution* (1994-present)

NOAA, NMFS Panel on Noise Exposure Criteria for Turtles and Fish (2004-2005)

Treasurer, International Society for Neuroethology (1998 - 2005)

Education Committee, Animal Care Committee, Association for Research in Otolaryngology, (1995-1997)

Chair, Long Range Planning Committee, Association for Research in Otolaryngology (1991-1993)

Council Member at Large, Association for Research in Otolaryngology (1990-1993)

Chair, Sponsors and Exhibits Committee, Association for Research in Otolaryngology (1989-1990)

Judge, Outstanding Young Scientist Competition, Museum of Science and Industry (1986-1993)
Scientists and Schools Steering Committee, Museum of Science and Industry (1982-1989)
Ad Hoc Reviewer for: Journal of the Acoustical Society of America, Journal of Experimental Biology, Copeia, Journal of the Marine Biological Association, Journal of Comparative Physiology, NSF and NIH.

Intramural Service

Budget Subcommittee (JP Scott Center for NMB)(2007)
Chair, Curriculum Subcommittee (JP Scott Center for NMB)(2007)
Member, Graduate Committee (2005 – Present)
Associate Director, JP Scott Center for Neuroscience, Mind and Behavior (2005 – Present)
Editorial Board Member, Neuroscience and Aging Institute Newsletter (2002 - 2004)
Chair, Lab Safety and Animal Care Committee, Parmly Hearing Institute (1993 - 2003).
Advisory Board Member, Interdisciplinary Neuroscience Minor (1997 - present)
Chair, BioSafety Proposal Committee, Research Services (1999- 2000)
Program Review Committee, Council of Graduate School Programs (1999 - 2000)
Chair, Faculty-Student Advisory Committee, Parmly Hearing Institute (1997 - 1998)
Institutional Animal Care and Use Committee (1993 - 1999).
Accreditation Review Committee (1994-1995)

Publications

Coombs, S, Anderson, E., Braun, C., and Grosenbaugh, M and (In Press). The hydrodynamic footprint of a benthic, sedentary fish in unidirectional flow. J. Acoust. Soc. Am.

Yang, Y., Chen J, Engel, J. Pandya, S. , Chen, N. Tucker, C. , Coombs, S., Jones, D and Liu, C. (2006) Distant touch hydrodynamic imaging with an artificial lateral line Proc. Natl. Acad. Sci. USA, 10.1073/pnas.0609274103

Coombs, S. and G.D, Grosmann (2006) Mechanosensory-based orienting behaviors in fluvial and lacustrine populations of mottled sculpin *(Cottus bairdi) Mar. Freshwater Behav. Physiol* 39: 113-130.

Coombs, S and S. vanNetten (2006). The Biomechanics and Hydrodynamics of Octavolateralis Sensory Systems with Special Emphasis on the Lateral Line. In: *Biomechanics*. (G. Lauder and R. Shadwick, eds). *Fish Physiology*, Academic Press

Coombs, S. and J.C. Montgomery (2005). Comparing octavolateralis sensory systems: what can we learn? In: *Comparative Hearing: Electroreception*. (A.N. Popper and R.R.Fay, eds.) *Springer Handbook of Auditory Research*, Springer-Verlag, N.Y.

Kanter, M. and Coombs, S. (2003). Rheotaxis and prey detection in uniform currents by Lake Michigan mottled sculpin (*Cottus bairdi*). J. Exp. Biol.206: 59-60

Coombs, S. and Braun, C.B. (2003). Information processing by the lateral line. In: *Sensory Processing of the Aquatic Environment* (S.P. Collin and N.J. Marshall, eds.) Springer-Verlag, N.Y., p. 122-138

Coombs, S., New, JG, and Nelson, M. (2002). Information-processing demands in electrosensory and mechanosensory lateral line systems. J. Physiol. 96 (5-6): 341-354

Coombs, S. and JG New (2002) Multimodal Sensory Guidance of Complex Behaviors. Guest

Editors on special issue of Brain, Behav. Evol. 59
Braun, CB, Coombs, S. and Fay, RR (2002). What is the nature of multisensory interaction between octavolateralis sub-systems? Brain, Beh. Evol. 59: 162-176
Nelson, MA, MacIver, ME. and Coombs, S (2002). Modeling electrosensory and mechanosensory images during the predatory behavior of weakly electric fish. Brain, Beh. Evol. 59: 199 - 210.
Coombs, S. (2002). Imaging of the hydrodynamic environment by the peripheral lateral line system. Bioacoustics 12: 148-150.
Coombs, S. (2001). Smart Skins: Information processing by the lateral line system. Autonomous Robots 11: 255-261
Coombs, S, Braun, C.B. and Donovan, B. (2001). Orienting response of Lake Michigan mottled sculpin is mediated by canal neuromasts. *J. Exp. Biol.* 204: 337-348
Montgomery, J.C., S. Coombs and C.F. Baker (2001). The mechanosensory lateral line of hypogean fish. Biology of Hypogean Fishes Special Issue, Guest Editor Dr. Aldemaro Romero *Environ. Biol. Fishes* 62: 87-96
Abboud, J.A. and S. Coombs (2000). Mechanosensory based orientation to elevated prey by a benthic fish. *Mar. Freshwater Behav. Physiol*.33: 261-279
Braun, C.B. & Coombs, S. (2000). The overlapping roles of the inner ear and lateral line: the active space of dipole source detection. *Phil. Trans. Roy. Soc. Lond*. 355: 1115-1119
Coombs, S, J. Finneran and R.A. Conley (2000). Hydrodynamic imaging by the lateral line system of the Lake Michigan mottled sculpin. *Phil. Trans. Roy. Soc. Lond.* 355: 1111-1114
Coombs, S. (1999) Signal detection theory, lateral line excitation patterns and prey capture behavior of the mottled sculpin. Anim. Behav. 58(2), 421-430.
Coombs, S. and J.C. Montgomery (1999). The enigmatic lateral line system. In: *Comparative Hearing: Fishes and Amphibians*. (A.N. Popper and R.R.Fay, eds.) *Springer Handbook of Auditory Research*, V. 11: 319-362, Springer-Verlag, N.Y.
Conley, R.A. and S. Coombs (1998). Dipole source localization by mottled sculpin. III. Orientation after site-specific, unilateral blockage of the lateral line system. J. Comp. Physiol. 183: 335-344
Coombs, S, J. Mogdans, M. Halstead and J. Montgomery (1998). Transformations of peripheral inputs by the first order brainstem nucleus of the lateral line system. J. Comp. Physiol. 182: 609-626
Montgomery, J.C. and S. Coombs (1998). Peripheral encoding of moving sources by the lateral line system of a sit-and-wait predator. J. Exp. Biol. 201(1): 91-102.
Coombs, S. and R.A. Conley (1997). Dipole source localization by mottled sculpin. I. Approach strategies. J. Comp. Physiol. 180:387-399.
Coombs, S. and R.A. Conley (1997). Dipole source localization by mottled sculpin. II. The role of lateral line excitation patterns. J. Comp. Physiol. 180:401-415.
New, J.G., Coombs, S, McCormick, C.A. and Oshel, P. (1996) The cytoarchitecture and internal organization of the medial octavolateralis nucleus in the goldfish, *Carassius auratus*. J. Comp. Neurol. 364: 1-13.
Coombs, S., M. Hastings and J. Finneran (1996). Measuring and modeling lateral line excitation patterns to changing dipole source locations. J. Comp. Physiol. 178: 359-371.
Montgomery, J., Coombs, S. and M. Halstead (1995). Biology of the Mechanosensory Lateral Line in Fishes. Rev. Fish Biol. & Fisheries 5: 399-416

Coombs, S. (1995). Natural orienting behaviors for measuring lateral line function. In: *Methods in Comparative Psychoacoustics* (R. Dooling, R.R. Fay, G. Klump and W.C. Stebbins, eds). Birkhauser. 237-248.

Montgomery, J., Coombs, S., Conley, R.A. and Bodznick, D. (1995). Hindbrain sensory processing in lateral line, electrosensory and auditory systems: A comparative overview of anatomical and functional similarities. Audit. Neurosci.1: 207-231.

Coombs, S. and Montgomery, J. (1994). Structural diversity in the lateral line system of antarctic fish: Adaptive or non-adaptive? Sensory Systems 8: 150-155.

Coombs, S. and Montgomery, J. (1994). Evolution and function of superficial neuromasts in the antarctic notothenioid, *Trematomus bernacchii*. Brain, Behavior & Evolution 44: 287-298.

Montgomery, J., S. Coombs and J. Janssen (1994). Form and function relationships in the lateral line system: Comparative data from six species of antarctic notothenioid fish. Brain, Behavior & Evolution 44: 299-306.

Coombs, S. (1994). Nearfield detection of dipole sources by the goldfish, *Carassius auratus,* and mottled sculpin, *Cottus bairdi*. J. Exp. Biol. 190: 109-129

Coombs, S., J. Montgomery and R. Conley (1994). Brainstem organization and function in the lateral line, electrosensory and auditory systems. In: *Contributions of electrosensory systems to neurobiology and neuroethology: Proceedings of a conference in honor of the scientific career of Thomas Szabo*. J. Comp. Physiol. 173(6): 682-683

Coombs, S. and R.R. Fay (1993). Source level discrimination by the lateral line system of the mottled sculpin. J. Acous. Soc. Am. 93: 2116-2123.

Fay, R. and Coombs, S. (1992). Psychometric functions for intensity discrimination in the goldfish (*Carassius auratus*): Psychophysics and Neurophysiology. J. Acoust. Soc. Am. 92: 189-201

Coombs,S. and J. Montgomery (1992). Fibers innervating different parts of the lateral line system of the Antarctic fish, *Trematomus bernacchii*, have similar neural responses despite large variations in peripheral morphology. Brain, Behavior & Evolution 40:217-233.

Montgomery, J. and S. Coombs (1992). Physiological characterization of lateral line function in the Antarctic fish, *Trematomus bernacchii*. Brain, Behavior & Evolution 40: -216.

Coombs, S., J. Janssen and J. Montgomery (1991). Functional and evolutionary implications of peripheral diversity in lateral line systems. In: *The Evolution of Hearing* (D. Webster, A.N. Popper and R.R. Fay, eds.) Springer-Verlag, N.Y.

Coombs, S. and J. Janssen (1990). Behavioral and neurophysiological assessment of lateral line sensitivity in the mottled sculpin, *Cottus bairdi*. J. Comp. Physiol. A. 167: 557-567

Janssen, J., Coombs, S. and Pride, S. (1990). Feeding and orientation of mottled sculpin, *Cottus bairdi*, to water jets. Environmental Biology of Fishes 29: 43-50.

Coombs, S. and J. Janssen (1990). Water Flow Detection by the Mechanosensory Lateral Line. In: *Comparative Perception*. (W.C. Stebbins and M. Berkley, eds). John Wiley and Sons.

Coombs, S. and R.R. Fay (1989). The temporal evolution of masking and frequency selectivity in the goldfish (*Carassius auratus*). J. Acous. Soc. Am. 86: 925-933

Coombs, S., R.R. Fay and J. Janssen (1989). Hot film anemometry for measuring lateral line stimuli. J. Acoust. Soc. Am. 85: 2185-2193.

Coombs, S., P. Görner and H. Münz (eds) (1989). *The Mechanosensory Lateral Line:*

Neurobiology and Evolution. Springer-Verlag, N.Y.

Coombs, S. and J. Janssen (1989). Peripheral processing by the lateral line system of the mottled sculpin, *Cottus bairdi*. In: *The Mechanosensory Lateral Line: Neurobiology and Evolution*. (S. Coombs, P. Görner, H. Münz, eds). Springer Verlag, N.Y.

Fay, R.R. and Coombs, S. (1988). Psychophysics and neurophysiology of frequency selectivity and masking in the goldfish. In: *Basic Issues in Hearing*. (H. Duifhuis, W. Horst, and H. Wit, eds). Groningen University Press: Groningen, The Netherlands

Coombs, S., J. Janssen and J. Webb (1988). Diversity of lateral line systems: evolutionary and functional considerations. In: *Sensory Biology of Aquatic Animals* (J. Atema, R.R. Fay, A.N.Popper and W. N. Tavolga, eds.) pp. 553-594, Springer Verlag, N.Y.

Janssen, J. Coombs, S. , Hoekstra, D. and Platt, C. (1987) Postembryonic growth and anatomy of the lateral line system in the mottled sculpin, *Cottus bairdi* (Scorpaeniformes: Cottidae). Brain, Behav. Evol. 30: 210-229.

Coombs, S. and R.R Fay (1987). Response dynamics of goldfish saccular fibers: Effects of stimulus frequency and intensity on fibers with different tuning, sensitivity and spontaneous activity. J. Acous. So. Am. 81:1025-1035.

Coombs, S. and R. Fay (1985). Adaptation effects on the detection of amplitude modulation: Neurophysiological and behavioral assessment in the goldfish auditory system. Hear. Res. 19: 57-71

Stebbins, W.C., Coombs,S. and Prosen, C. (1984) Comparative Psychoacoustics: New directions. In: *Recent Advances: Hearing Sciences* (C. Berlin, ed.) College Hill Press, San Diego Fay, R.R.,Yost, W.A. and Coombs, S. (1983) Psychophysics and neurophysiology of repetition noise processing in a vertebrate auditory system. Hear. Res. 12: 31-55

Fay, R.R. and Coombs, S. (1983). Neural mechanisms in sound detection and temporal summation. Hear. Res. 10: 69-92

Coombs, S. and Popper, A.N. (1982). Structure and function of the auditory system in the clown knifefish, *Notopterus chitala*. J. Exp. Biol. 97: 225-239

Coombs, S. and Popper, A.N. (1982) Comparative frequency selectivity in fishes: Simultaneous and forward masked psychophysical tuning curves. J. Acoust. Soc. Am. 71(1): 133-141

Popper, A.N. and Coombs, S. (1982). The morphology and evolution of the ear in Actinopterygian fishes. Am. Zool. 22: 311-328

Coombs, S. (1981). Interspecific differences in hearing capabilities for select teleost species. In: *Hearing and Sound Communication in Fishes*. (Tavolga, W.N.; Popper, A.N.; and Fay, R.R.; eds.) Springer- Verlag, New York.

Popper, A.N., and Coombs, S. (1980) Acoustic detection in fish. In *Environmental Physiology of Fishes*. (M. Ali, ed.) Plenum Press, New York.

Popper, A.N. and Coombs, S. (1980). Auditory mechanisms in teleost fishes. Am. Sci. 68(4): 429-440.

Coombs, S. and Popper, A.N. (1979). Hearing differences among Hawaiian squirrelfish (family Holocentridae) related to differences in the peripheral auditory system. J. Comp. Physiol. 132A: 203-207.

Hawkins, J.E. Jr., Johnsson, L-G., Stebbins, W.C., Moody, D.B., and Coombs, S. (1976) Hearing loss and cochlear pathology in monkeys after noise exposure. Acta. Otolaryngol. 81: 337-343.

Stebbins, W.C., and Coombs, S. (1975). Behavioral assessment of ototoxicity in nonhuman primates. In *Behavioral Toxicology* (B. Weiss and V.G. Laties, eds.) Plenum Press, New York.

Conferences and Symposia Organized

Symposium on "*Multimodal sensory guidance of complex behaviors*", August 2001, Bonn, Germany (with J. New).

Symposium on "*A comparative approach to understanding brainstem processing in octavolateralis systems*", February 1994, Sarasota, Fla.

Conference on "*The neurobiology and evolution of the lateral line system*", September 1987, Bielefeld, Germany (with P. Görner and H. Münz).

Invited Presentations

Coombs, S. Recent advances in lateral line research. Fish bioacoustics: A tribute to Arthur Myrberg, Acoustical Society of America Symposium, Honololulu, Hawaii, November 2006

Coombs, S. Sensory guidance in aquatic environments by lateral line sensor arrays, Department of Mechanical and Aerospace Engineering, University of Virginia, October 2005

Coombs, S. Lateral line inspirations for new hydrodynamic sensing technologies. BioSense Kick-Off Meetings, DARPA, Woods Hole, MA, July 2005

Coombs, S. Fishy Business: Information Processing by the Lateral Line, Kresge Hearing Research Institute, University of Michigan, March 2005

Coombs, S. Flow Sensing by the Lateral Line, Dept. of Biology, Georgia Tech, Atlanta, Ga, March 2005

Coombs, S. What fish can teach us about dynamic signal processing: lateral line population codes for hydrodynamic imaging of the environment, Engineering Department, University of Illinois - Urbana Champaign, October 2004

Coombs, S. Dynamic acquisition of information during prey capture behavior. Psychology Department, Brown University, Providence, RI, March 2003

Coombs, S. Information processing by electrosensory and mechanosensory lateral line systems. Neurobiology of Electrosensory Organisms, Bonn Germany, July 2001

Coombs, S. Imaging of the hydrodynamic environment by the lateral line system. Conference on Fish Bioacoustics: Sensory, Biology, Behavior and Practical Applications, Evanston, Il. June 2001

Coombs, S. Smart skins: Information processing by the lateral line system of fish. NASA Workshop on Biomorphic Robotics, Jet Propulsion Lab, NASA, Pasadena, Ca., August 2000.

Coombs, S. Touch at a distance: How fish use their lateral line sensory system, Warnell School of Forest Resources, University of Georgia, Athens, GA, June 2000

Coombs, S. Hydrodynamic imaging by the lateral line system, Tenth International Conference on Perception and Action, Edinburgh University, Scotland, August 1999

Coombs, S. The ebb and flow of lateral line research (1988-1998). First International Conference on Sensory Biology of the Aquatic Environment, Heron Island, The Great Barrier Reef, Australia, March 1999

Coombs, S. The lateral line and free neuromast system: Structure and Function. Workshop on *Using sound to modify fish behavior at power-production and water-control facilities.*

Portland State University, Portland, Or. Dec. 1995

Coombs, S. Behavior and neurobiology of the lateral line system. School of Biological Sciences, University of Kentucky, Lexington, Ky. April 1995

Coombs, S. The neurobiology of the lateral line system: Anatomy, physiology and behavior. University of Maryland, College Park, Maryland. March 1995

Coombs, S. Anatomy, function and evolution of the lateral line system. Marine Biological Laboratory, Boston University Marine Program, Woods Hole, Massachussets. April 1994

Coombs, S. Recent physiological and behavioral studies of lateral line function in Antarctic and North American fishes. U.S. - Russian Meeting on Sensory Biology. University of Maryland, College Park, Maryland. September 1993

Coombs, S. Lateral line function in a monophyletic radiation of antarctic fish. Oberlin College, Oberlin, Ohio. April 1993

Coombs, S. Structure and function in the lateral line system of fish. Kresge Hearing Institute, University of Michigan, Ann Arbor, Jan. 1993

Coombs, S. Understanding brainstem organization and function in the lateral line system: Lessons from electrosensory systems. Conference on Contributions of Electrosensory Systems to Neurobiology and Neuroethology. Montreal, Canada. Aug. 1992

Coombs, S. The neurobiology of the lateral line system in antarctic fish. Department of Cell Biology, Neurobiology and Anatomy, Medical School. Loyola University of Chicago. April 1991

Coombs, S, J. Janssen and J. Montgomery. Functional and evolutionary implications of peripheral diversity in lateral line systems. Conference on The Evolutionary Biology of Hearing. Mote Marine Lab, Sarasota, Fla. May 1990.

Coombs, S. Comparative neurobiology of fish lateral line systems. Department of Biology, Colorado State University. January 1990.

Coombs, S. The octavolateralis system of fishes. Symposium on New Perspectives on Animal Psychophysics. Association for Research in Otolaryngology. St. Petersburg, Fla. Feb., 1989

Janssen, J. and S. Coombs. Functional changes in the lateral line during development. Functional Development of Sensory Systems and Acquisition of Behavior in Larval Fishes. American Society of Ichthyologists and Herpetologists, June 1988.

Coombs, S. Lateral Line Function in the Lake Michigan Mottled Sculpin. Department of Biological Sciences, University of Illinois. January 1988

Coombs, S. Sensory Adaptation in the Peripheral Auditory System of the Goldfish: Possible Mechanisms and Functions. Biology Department, Boston University. March 1986

Coombs, S., Janssen, J. and Webb, J. Diversity of lateral line systems: phylogenetic, ecological and functional considerations. International conference on Sensory Biology of Aquatic Animals. Mote Marine Laboratory, Sarasota, Florida. June 1985

Coombs, S. What the fish ear tells us about vertebrate auditory processing. Symposium on Comparative Hearing. Association for Research in Otolaryngology. Clearwater, Fla., Feb., 1985

Coombs, S. Acoustic processing by water-logged ears: a fishy tale. Department of Psychology, University of Michigan. April 1984

Coombs, S. Sensory ecology of fishes: "Herring Aids". Department of Ecology, Ethology and Evolutionary Biology University of Illinois. March 1984

Coombs, S. Neurobiology of fish hearing. Dept. of Psychology, State University of New York at Stony Brook. March 1984.

Coombs, S. Neurobiology of fish hearing. Communicative Disorders Research Conference. Loyola University Medical Center. Maywood, Il. June 1983

Coombs, S. Comparative neurobiology of fish auditory systems and its implications for acoustic behaviors. Symposium on Physiological Basis of Behavior. Fourth Biennial Conference on Ethology & Behavioral Ecology of Fishes. May, l983.

Coombs, S. Comparative neurobiology of fish auditory systems. Biology Department Seminars, Bowdoin College, Brunswick, ME. March, l983.

Coombs, S. Comparative studies of fish hearing. Biology Departmental Seminars, Loyola University of Chicago, Sept. 1982.

Coombs, S. Comparative studies of fish hearing. Psychology Departmental Seminars, Cornell University, Ithaca, NY. Feb., 1982.Coombs, S. A comparative look at water-logged ears: a fishy sounding story. University of Chicago's Evolutionary Morphology Group Seminar Series. Dec, 1981.

Popper, A.N., and Coombs, S. The morphology and evolution of the ear in Actinopterygian fishes. American Society of Zoologists Symposium on Evolutionary Morphology of Actinopterygian Fishes. Dec., 1980.

Popper, A.N., and Coombs, S. Acoustic detection in fish. NATO Symposium on Environmental Physiology. Lennoxville, Quebec, Aug., 1979.

Coombs, S. C.. Acoustic processing in some water-logged vertebrates. Eaton Peabody Laboratory at Massachusetts Eye and Ear Infirmary. M.I.T., Cambridge, Massachusetts. April, l979.

Abstracts and Contributed Presentations

Patton. P and Coombs, S. (2007) Localizing lateral line sensory cues: evaluating measures of central tendency for spatially distributed stimulation patterns *Proceedings of the 8th International Congress of Neuroethology*, Vancouver, Canada, July 2007

Sharma, S., Patton, P and Coombs, S (2007) Close encounters, alien environments and a tale of two fishes. *Proceedings of the 8th International Congress of Neuroethology*, Vancouver, Canada, July 2007

Casper, B, Coombs, S and Patton, P. Close encounters of the obstacle kind in alien environments by blind cavefish. *Proceedings of the 8th International Congress of Neuroethology*, Vancouver, Canada, July 2007

McConney, ME, Ornatska, M. Coombs, S., Tsukruk, V. (2006) Elastic properties of flow sensing structures in blind cavefish. Material Research Society, Boston, Fall 2006

McConney, ME, Ornatska, M. Coombs, S., Tsukruk, V. (2006) Morphology and properties of flow sensing structures in the fish lateral line system. Material Research Society, Boston, Fall 2006

Chang Liu, Jonathan Engel, Jack Chen, Nannan Chen, Saunvit Pandya, Yingchen Yang, Craig Tucker, Sheryl Coombs, Joseph Humphrey, and Horst Bleckmann (2006), **"Polymer Micro and Nano Scale Fabrication Technology Development for Bioinspired Sensing"**, IEEE International Conference on Nano/Micro Engineered and Molecular Systems, Zhuhai, China, January 18-21, 2006

Coombs, S. and Patton, P. (2006) The effects of source distance and orientation on lateral line stimulation patterns and source localization by Lake Michigan mottled sculpin.

Acoustical Society of America Symposium, Honolulu, Hawaii, November 2006

Chen, J. Engel, J. Chen, N. Pandya, S. Coombs, S. and Liu, C. (2006) Artificial Lateral Line and Hydrodynamic Object Tracking," MEMS 2006 Conference, Istanbul, Turkey , January 22 - 26, 2006

Coombs, S. and Fay, R.R (2005) Behavioral detection of dipole sources at different locations by goldfish Program No. 849.2 2005 Abstract Viewer/Itinerary Planner. Washington, D.C. Society for Neuroscience

Coombs, S. and Zic, M. (2004) Frequency Distribution Metrics for Describing and Tracking Information-Bearing Dimensions of Lateral Line Population Codes during Prey Capture Behavior *Proceedings of the 7th International Congress of Neuroethology*, Nyborg, Denmark, August 2004

Cuihong, J., Braun C.B. and Coombs, S. (2002). Hindbrain termination cites of lateral line nerve fibers from oppositely oriented hair cells in the clawed frog, *Xenopus laevis.* Program No. 849.9. Abstract Viewer/Itinerary Planner. Washington, DC: Society for Neuroscience, Online.

Coombs, S. and Grossman, G.D. (2001). Mechanosensory-based rheotactic behaviors in fluvial and lacustrine populations of mottled sculpin *(Cottus bairdi). Proceedings of the 6th International Congress of Neuroethology*, Bonn, Germany, August 2001

Fay, R.R., S. Coombs and A. Elepfandt (2001). Response of Goldfish Otolithic Afferents to a Moving Dipole Sound Source. Bioacoustics

Coombs, S, Anderson, E.J., Braun, C.B. and Grosenbaugh, M.A. (2001). How fish body parts alter local hydrodynamic stimuli to the lateral line. SICB Abstracts, p. 149.

Kanter, M. and Coombs, S. (2000). Lateral-line mediated detection of artificial prey in the presence of background flow by Lake Michigan mottled sculpin (*Cottus bairdi*). Neurosci. Abst. (Program 55.7) 26: 146

Coombs, S. and Braun, C.B. (2000). Canal neuromasts mediate orientation to prey in Lake Michigan mottled sculpin. Neurosci. Abst.

Coombs, S. and Finneran, J. A. (2000). 3-D models of lateral line excitation patterns during prey acquisition by Lake Michigan mottled sculpin. J. Acoust. Soc. Am. Suppl. 107(5): 2786.

Simmons, A.M. and Coombs, S. (2000). Pressure and pressure-gradient sensitivity of the tadpole medulla. J. Acoust. Soc. Am. Suppl. 107(5): 2835

Abboud, J. A. and S. Coombs (1999) The role of the lateral line system in controlling vertical head posture during prey capture behavior by mottled sculpin. 79th Annual Meeting of the American Society of Ichthyologists and Herpetologists, Pennsylvania State University State College, June 1999.

Braun, C.B. and S. Coombs (1999) The distance range of inner ear and lateral line function in mottled sculpin. Neurosci. Abst. 25: 131.

Coombs, S., Braun, C.B. and Donovan, B. (1998) The role of lateral line canal neuromasts in prey capture behavior by the mottled sculpin. *Proceedings of the 5th International Congress of Neuroethology*. San Diego, Ca. Aug. 1998

Abboud, J. and Coombs, S. (1998) Mechanosensory control of vertical head posture during prey capture behavior by mottled sculpin. *Proceedings of the 5th International Congress of Neuroethology*. San Diego, Ca. Aug. 1998

Braun, C.B. and Coombs, S. (1998) A comparison of ethological and psychological approaches to the study of lateral line function. *Proceedings of the 5th International Congress of*

Neuroethology. San Diego, Ca. Aug. 1998

Conley, R.A. and Coombs, S. (1998). Unilateral denervation of the lateral line system alters angular striking accuracy and distance determination in the prey strike behavior of mottled sculpin. *Proceedings of the 5th International Congress of Neuroethology*. San Diego, Ca. Aug. 1998

Coombs, S. (1998). Distance Range of Mottled Sculpin Lateral Line System. Association for Research in Otolaryngology, St. Petersburg Beach, Fla. Feb. 1998

Coombs, S. and R.R.Fay (1997). Encoding of dipole near fields by the goldfish auditory system. Neursci. Abst. 23(1): 179.

Coombs, S, J. Mogdans, M. Halstead, and J. Montgomery (1997). Responses of cells in the first-order lateral line brainstem nucleus suggest rudimentary amplitude and phase-encoding pathways. Association for Research in Otolaryngology, St. Petersburg Beach, Fla. Feb. 1997

Conley, R. and S. Coombs (1997). Spatial excitation patterns, not bilateral computations, are important for source localization by the lateral line system. Association for Research in Otolaryngology, St. Petersburg Beach, Fla. Feb. 1997

Alborg, L. , S. Coombs and J.G. New (1996). Strike behavior in the muskellunge, *Esox masquinongy*: Relative contributions of lateral line and visual sensory systems. Neurosci. Abstr. 22: 446

Coombs, S. (1996). Interpore spacings on canals may determine distance range of lateral line system. Soc. Neurosci. Abstr. 22: 1819

Conley, R.A. and Coombs, S. (1996). The use and misuse of lateral line excitation patterns in determining source location by the mottled sculpin. Association for Research in Otolaryngology, St. Petersburg Beach, Fla. Feb. 1996

Coombs, S. and R.A. Conley (1995). Approach strategies used by mottled sculpin in localizing dipole sources. Soc. Neurosci. Abstr. 21: 1452

Coombs, S. and Conley, R.A. (1995). Source distance determination by the mottled sculpin lateral line. In: M. Burrows, T. Matheson, P.L. Newland and H. Schuppe (Eds.) *Nervous Systems and Behavior*. *Proceedings of the 4th International Congress of Neuroethology*. p. 349.

Coombs, S. M. Hastings and J. Finneran (1995). Lateral line excitation patterns for encoding sound source location and distance. Association for Research in Otolaryngology, St. Petersburg Beach, Fla. Feb. 1995

New, J.G., S. Coombs, C.A. McCormick, and P. Oshel(1994). The cytoarchitectural organization of the medial octavolateralis nucleus of the goldfish. Soc. Neurosci. Abstr. 20: 972.

Montgomery, J.C., Coombs, S.L., Bodznick, D. and New, J.G. Brainstem organization and function in mechanosensory lateral line systems. Association for Research in Otolaryngology, St. Petersburg Beach, Fla. Feb. 1994

Coombs, S., Montgomery, J.C., and Conley, R.A. A comparative overview of brainstem organization and function in octavolateralis systems. Association for Research in Otolaryngology, St. Petersburg Beach, Fla. Feb. 1994

Coombs, S. (1993) Nearfield source location by mottled sculpin in a dipolar flow field. Soc. Neurosci. Abstr. 19: 575

Coombs, S., J. Montgomery and R. Conley (1993). Organizational similarities among brainstem nuclei of octavolateralis systems. Association for Research in Otolaryngology, St.

Petersburg Beach, Fla. Feb 1993
Coombs, S. (1992). Effects of source distance on threshold detection and source level discrimination by the lateral line system of the mottled sculpin. Soc. Neurosci. Abstr. 18: 1401
Coombs, S., J. Montgomery and R. Conley (1992). Brainstem organization and function in lateral line, electrosensory and auditory systems. Conference on Contributions of Electrosensory Systems to Neurobiology and Neuroethology, Montreal, Canada August 1992.
Coombs, S. and J. Montgomery (1991). Frequency response properties of lateral line nerve fibers innervating superficial neuromasts on the head and trunk of the antarctic fish, *Trematomus berhnacchii*. Association for Research in Otolaryngology, St. Petersburg Beach, Fla. Feb. 1992
Coombs, S. and J. Montgomery (1991). Similar frequency responses from fibers innervating morphologically different parts of the lateral line system in an antarctic fish. Soc. Neurosci. Abstr. 17: 630
Coombs, S. and R. Fay (1991). Intensity discrimination by the lateral line system of a teleost fish, *Cottus bairdi*. Association for Research in Otolaryngology, St. Petersburg Beach, Fla. Feb. 1991
Fay, R. and S. Coombs (1990). Psychometric functions for intensity discrimination in the goldfish. Association for Research in Otolaryngology, St. Petersburg Beach, Fla. Feb. 1990
Jones, W., S. Coombs, and J. Janssen (1989). Ultrastructure of superficial neuromasts in the mottled sculpin, *Cottus bairdi*. Electron Microscopy Society of America
Jones, W., S. Coombs, J. Janssen, and J. Schluep (1989). Ultrastructure anatomy of superficial neuromasts of the mottled sculpin, *Cottus bairdi*. Association for Research in Otolaryngology, St. Petersburg Beach, Fla. Feb. 1989
Coombs, S. and J. Janssen (1988). The response of a hot film anemometry system and the mechanosensory lateral line of a teleost fish to the local flow field of a dipolar source. J. Acoust. Soc. Am. 84 (Supplement 1): S78
Fay, R., S. Coombs and C. Wheeles (1988) Classical respiratory conditioning used in auditory psychophysics of the goldfish: Methods and results in detection and discrimination studies. J. Acoust. Soc. Am.83 (Supplement 1): S17
Coombs, S. and J. Janssen. Behavioral and Physiological Assessment of Lateral Line Sensitivity in a Teleost Fish. Association for Research in Otolaryngology. Clearwater Fla, Feb. 1988.
Coombs, S. and R. Fay . Tone-on-tone temporal masking patterns related to PST histogram profiles of saccular fibers in goldfish. Association for Research in Otolaryngology. Clearwater Fla., Feb. 1987
Coombs, S., J. Janssen, D. Hoekstra and C. Platt (1986). Postembryonic growth of the lateral line system in the mottled sculpin, *Cottus bairdi*. Soc. Neurosci. Abst. 12: 1048.
Coombs, S. and Fay, R. PST histogram profiles from goldfish saccular nerve fibers as a function of stimulus intensity and frequency. Association for Research in Otolaryngology. Clearwater, Fla. Feb.,1986.
Coombs, S. and Fay, R. (1985) Amplitude-modulated noise detection by goldfish revisited. J. Acoust. Soc. Am. Suppl.
Coombs, S. and Fay, R. Patterns of adaptation in goldfish saccular (auditory) nerve units.

Association for Research in Otolaryngology. Clearwater, Fla. Feb., 1985
Platt, C., Coombs, S. and Janssen, S. (1984) Lateral line neuromasts are larger in the head than in the trunk of the sculpin, *Cottus bairdi*. Am. Zool. 24: 134A
Fay, R. and Coombs, S. (1984). Sound intensity processing under continuous adaptation. J. Acoust. Soc. Am. Suppl. 76: S12
Coombs, S. and Fay, R. (1984). Factors affecting detection of amplitude fluctuations by the goldfish auditory system. Soc. Neurosci. Abst. 10: 190
Coombs, S. and Fay, R.R. (1984) Acoustic coding by the ear of the sunfish *(Lepomis gibbosus*). Sensitivity, tuning and directionality of 8th nerve units. J. Acous. Soc. Am. Suppl.
Fay, R., S. Coombs & J. Baumann (1983). Three-dimensional directional sensitivity of goldfish 8th nerve fibers. J. Acoust. Soc. Am. Suppl. 74: S7
Fay, R.R., Yost, W.A., and Coombs, S. (1982). Ripple noise processing by the goldfish auditory system. Neurosci. Abst. 8: 43
Coombs, S. and R. Fay. Neural correlates of auditory detection. Chicago area Neuroscience meetings, May 1982
Shen Jun, S. Coombs, R. Fay, A.N. Popper, and W.N. Saidel. (1982). Hearing in the jewel cichlid. J. Acoust. Soc. Am. Suppl. 71: S49
Coombs, S. and R. Fay . Neural correlates of temporal summation at threshold in the goldfish auditory system. Association for Research in Otolaryngology. St. Petersburg Beach, Fla. Jan., 1982.
Fay, R., and Coombs, S. (1981). Acoustic energy detection by goldfish. Am. Zool. 20 (4)
Fay, R., and Coombs, S. (1981) Neural correlates of masked threshold. J. Acoust. Soc. Am. Suppl. 70: S94.
Coombs, S., and Popper, A.N. Psychophysical tuning curves for different fish species. Association for Research in Otolaryngology. St. Petersburg Beach, Florida. Jan., 1981.
Coombs, S., and Popper, A.N. (1980). Auditory sensitivity and inner ear ultrastructure in *Osteoglossum bicirrhosum*. Am. Zool. 20(4): 785.
Coombs, S. (1979). Hearing sensitivity in an osteoglossomorph fish. Neurosci Abst. 5: 18.
Coombs, S. (1978). Auditory sensitivity in two species of Hawaiian squirrelfish. Pac. Sci. 33(1): 119.
Stebbins, W.C., Moody, D.B., Coombs, S., Johnson, L-G., Clark, C.S., and Hawkins, J.R., Jr. (1974). Acoustic trauma in monkeys related to the frequency spectrum of the noise. J. Acoust. Soc. Amer. 55: 416.