

DARLENE R. KETTEN

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EDUCATION

1971	B.A.	Washington University, St. Louis, Mo. Biology and French
1979	M.S.	Massachusetts Institute of Technology, Cambridge, Mass. Biological Oceanography
1985	Ph.D.	The Johns Hopkins University, Bloomberg School of Hygiene and Public Health The Johns Hopkins Medical Institutions Baltimore, Md. Neuroethology and Experimental Radiology

PROFESSIONAL APPOINTMENTS

2013-present	Chief Scientist Senior Scientist emeritus (joint appt. with Harvard Medical School)	WHOI CT Scanner Facility Biology Department Woods Hole Oceanographic Institution
2013-2015	Professor	Centre for Marine Science and Technology, Dept. of Imaging and Applied Physics Curtin University, Perth, Australia
2002-2013	Senior Scientist with Tenure (joint appt. with Harvard Medical School)	Biology Department Woods Hole Oceanographic Institution
2007-present	Assistant Clinical Professor	Department of Otolaryngology Harvard Medical School (part-time appt.)
1993-2007	Assistant Professor	Department of Otolaryngology Harvard Medical School
1988-1993	Instructor Research Associate	Department of Otolaryngology Harvard Medical School Cochlear Implant Research Laboratory, Massachusetts Eye and Ear Infirmary

1997-2002	Associate Scientist (joint appt. with Harvard Medical School)	Biology Department Woods Hole Oceanographic Institution
1987-1988	Lecturer	Organismic and Evolutionary Biology, Museum of Comparative Zoology, Harvard University
1985-1987	Post-doctoral Fellow	Eaton-Peabody Laboratory of Auditory Physiology Harvard Medical School
1985-1986	Post-doctoral Fellow	Communications Biophysics Group, Research Laboratory of Electronics, Massachusetts Institute of Technology

Adjunct Appointments

2013-present	Adjunct Professor	College of Veterinary Medicine Murdoch University Perth, WA Australia
2011-present	Adjunct Professor	Biology Massachusetts Institute of Technology

AWARDS AND HONORS

2015-2016	Jefferson Science Fellow, National Academy of Science, U.S. Department of State
2015	Fellow and Scholar, Elected jointly in Neurosciences and Marine Research, Hanse-Wissenschaftskolleg Institute for Advanced Study
2014	Acoustical Society of America, Awards Committee electee
2013-2014	Premier's Fellow, Western Australia Fellowship Program
2013	Excellence in Science Communication Award, Society for Marine Mammalogy
2012	AAAS Fellow, elected in Biology for Advances in Comparative Anatomy and Biomedical Imaging, American Association for the Advancement of Science (AAAS)
2012	Acoustical Society of America, Animal Bioacoustics, Individual Expert in Bioacoustics (ASAIE)
2012	Member of the Corporation of the Marine Biological Laboratory, Elected by Science Council, 124 th Class
2011	Functional MRI, Honors Fellowship, Martinos Imaging Center, Harvard Medical School
2010	Marine Mammal Research Fellow, Aquatic Mammals, European Cetacean Society
2008	Overseas Fellow, Royal Society of Medicine, UK
2007-2008	Senior Fellow, Auditory Biomechanics Section NIH/NIDCD National Institutes of Deafness and Other Communication Disorders, National Institutes of Health
2001	Fellow, Acoustical Society of America
2001-2004	Fellow, WHOI Ocean Life Institute
2000-2002	Featured Principal Investigator, Office of Naval Research
1998	Seaver Institute Research Award
1997	Mellon Foundation Independent Research Award

1983	Delta Omega Honorary Society, Alpha Chapter Merit Award
1982-1984	NSF Sensory Systems Doctoral Dissertation Research Award
1982-1984	Fellowship in Residence, Smithsonian Institution
1982-1984	Dean's Fellowship, Johns Hopkins Medical Institutions
1981, 1982	Achievement Rewards for College Scientists; ARCS Foundation Fellow and Scholarship Award
1980-1984	NIH Honors Fellowship Award
1978	Sigma Xi Research Award

PROFESSIONAL MEMBERSHIPS

2012- present	American Association for the Advancement of Science (AAAS)
2009- present	International Association of Aquatic Animal Medicine (IAAAM)
2008- present	Royal Society of Medicine (RSM)
2005- present	European Radiological Society (ERS)
2005- present	The Explorer's Club
2004- present	Association of Military Surgeons of the United States (AMSUS)
1996- present	Radiological Society of North America (RSNA)
1982- present	Acoustical Society of America, Fellow (ASA)
1987- present	Association for Research in Otolaryngology (ARO)
1984- present	Society for Marine Mammalogy (SMM)
1987- present	International Society for Stereology
1978- present	Sigma Xi

SPECIALTY COURSES/ACCREDITATIONS

2011	Advanced Functional MRI Imaging, Martinos Center for Biomedical Imaging, Harvard Medical School.
2006	Advanced Forensic Pathology, Armed Forces Institute of Pathology/Certificate
2005	Basic Pathology, MIT-Health Sciences and Technology Program/Faculty Auditor
2004	Veterinary Pathology, Armed Forces Institute of Pathology/Certificate
2003	Neuroradiology and Neuropathology, Armed Forces Institute of Pathology /Certificate
1995	Forensic Pathology, Armed Forces Institute of Pathology/Certificate

NATIONAL/INTERNATIONAL BOARDS, PANELS, AND COMMITTEES

2014-2015	<p>Committee of Scientific Advisors for the Society for Marine Mammalogy</p> <p>Awards Committee, Acoustical Society of America</p> <p>Member of the Corporation of the Marine Biological Laboratory</p> <p>DOSITS Underwater Acoustics Educational Site Review Board</p> <p>NATO 5th Intergovernmental Conference on The Effects of Sound in the Ocean on Marine Mammals</p> <p>Bioacoustics Technical Committee, Acoustical Society of America</p> <p>Subject Matter Expert: Bioacoustics, Acoustical Society of America</p> <p>DOSITS Scientific Advisory Board</p> <p>European Underwater Ambient Noise Monitoring Workshop</p> <p>Expert Testimony; Environmental Noise Hazards, New Zealand Ministry for the Environment</p> <p>Expert Testimony and Advisory Panel, Ministerio de Ambiente, Colombia</p> <p>Review Committee on Ambient Noise Impact Assessments, JIP/NOAA</p> <p>ISO Standards Committee on Bioacoustics</p>
2013-2014	Expert Panel, Cumulative Effects of Underwater Noise, BP

- 2011-2013 Bioacoustics Technical Committee, Acoustical Society of America
 Subject Matter Expert: Bioacoustics, Acoustical Society of America
 DOSITS Scientific Advisory Board
 NATO 4th Intergovernmental Conference on The Effects of Sound in the Ocean on Marine Mammals
 International Quiet Ocean Experiment, Specialty Panel on Acoustic Ecology, UNESCO, Paris.
- 2009-2010 Bioacoustics Technical Committee, Acoustical Society of America
 Subject Matter Expert: Bioacoustics, Acoustical Society of America
 DOSITS Scientific Advisory Board
 Advisory Board/Expert Panel, Marine Mammals and Sound Workshop, jointly sponsored NOAA Fisheries and Deputy Secretary of the Navy for the Environment
 Expert Panel, Cumulative Effects of Underwater Noise, BP, Washington, DC
 Workshop on Dive Physiology, WHOI
- 2008-2009 DOSITS Underwater Acoustics Educational Site Review Board
 NATO 3rd Intergovernmental Conference on The Effects of Sound in the Ocean on Marine Mammals
 Advisory Board, Acoustic Exposure Guidelines NOAA Fisheries
 Review Panel, National Science Foundation, OS/BIO, Neural Systems Cluster
 Animal Bioacoustics Technical Committee member, Acoustical Society of America
- 2006-2007 DOSITS Underwater Acoustics Educational Site Review Board
 NATO 2nd Intergovernmental Conference on The Effects of Sound in the Ocean on Marine Mammals
 Advisor, USN Integrated Coordinating Group
 Advisory Board, Acoustic Exposure Guidelines NOAA Fisheries
 Advisory Board, National Research Program on Sound Effects, CORE
 Advisory Panel, Behavioral Response Research Team (ONR-NOAA)
 Review Panel, Marine Mammal Commission International Workshop on Policy on Sound and Marine Mammals
 Advisory Panel, CORE, Development of Legislative Actions for a National Marine Mammal Research Program
 Panel Member and Speaker, Brazilian Government and International Geophysical Contractors Seminar on Seismic Impacts, Rio de Janeiro, Brazil
 Advisory Expert Panel, NOAA-ONR Necropsy Protocol Standardization Committee
 DOSITS Underwater Acoustics Educational Site Review Board
 Animal Bioacoustics Technical Committee member, Acoustical Society of America
- 2004-2006 Advisory Panel, House of Representatives, Commerce Committee
 Advisory Panel, Congressman Gilchrest special session
 Advisory Panel, Senate Commerce Committee, Acoustic Impacts
 Participant, Royal Navy Workshop on Underwater Impacts
 Advisory Panel, European Science Foundation and National Science Foundation Workshop on Underwater Sound Use
 Section leader and panel, Investigatory Team, NOAA/Northwest Fisheries, Puget Sound/Shoup Incident Report
 Advisory Board, Stellwagon Bank Sanctuary
 Panel, Beaked Whale Workshop, NOAA - Marine Mammal Commission
 Panel, Marine Mammal Commission International Workshop on Policy on Sound and Marine Mammals

- 2003-2004 Subcommittee member and special lecturer, International Whaling Commission Panel Member, Offshore Oil and Gas Producers Workshop on Seismic Impacts, Halifax, N.S. Canada,
Co-Chairman, ASA Policy on Effects of Sound, Acoustical Society of America Advisory Board, Acoustic Exposure Guidelines NOAA Fisheries
Advisory Panel Alternate, Effects of Sound, Marine Mammal Commission, FACA panel
Panel, Beaked Whales and Sound Effects Review Board, Marine Mammal Commission
Chair, Biomedical Applications in Research, Acoustical Society of America
Ocean Studies Board, National Academy of Sciences, National Research Council, Panel member: Ambient Noise in the Oceans and Effects on Marine Mammals
- 2002 Panel member: ASA's Role in Marine Mammal Studies, Acoustical Society of America
Panel member/Lecturer: Sound in the Oceans, Navy-USA Congressional Workshop
Panel member; Deutsche Forschungsgemeinschaft: Antarctic Policies for Sound Use: Impact of Acoustics on Marine Organisms
- 2000-2005 Northeast Consortium Advisory Board;
Right Whale Research Review Panel, Northeast Consortium
Advisory Board on Blast Trauma, NOAA Fisheries
Review Panel, Acoustic Trauma in Beaked Whales, NOAA
- 1999-2003 Environmental Impact Review Panel Member: Ship Shock Impact Assessment, DDG81
- 1998-1999 Organizing Committee, ASA Special Session: Evolution of Hearing and Sound Production, 137th Meeting, Acoustical Society of America, 2nd Convention of the European Acoustics Association, Berlin
Executive Organizing Committee, Fourth International Conference on Biological Sonar, NSF-ONR, Algarve, Portugal
Advisory Panel on Explosive Removal of Oil Platforms, Minerals Management Service (MMS)
Expert Panel and Voting member for USA: Bioacoustics and Environmental Policy Board, NATO/SACLANT
Panel Member: Low Frequency Sound Effects Advisory Panel and Workshop, Office of Naval Research
Panel Member: NMFS Acoustics Guidelines Workshop
- 1997-2000 Low Frequency Active Sonar, ONR Scientific Advisory Board
Expert Panel Member: High Energy Seismic Systems Workshop Minerals Management Service
Right Whale Advisory Panel: New England Aquarium
Animal Bioacoustics Technical Committee member, Acoustical Society of America
- 1996-2003 Review Panel Member: Sea Wolf Ship Shock Impact Assessment
Sounds in the Sea Advisory Board Member, New England Aquarium
- 1995-1996 Technical Specialty Group Member, Animal Bioacoustics, Acoustical Society of America (ASA)
Ad hoc Panel Member, ATOC Advisory Board
- 1993 Blast Injury Advisory Panel; Committee on Hearing and Bioacoustics of the National Academy of Sciences (CHABA/NAS)
- 1992-1993 Small Grants Program Review Board; NIH/NIDCD

- 1991 Low Frequency Sound in the Marine Environment; Office of Naval Research Workshop
- 1989-1990 Advisory Board, Dolphin-Tuna Fisheries Acoustic Trauma Workshop, National Marine Fisheries Service/NOAA
- 1982-1983 Cultural Affairs Committee, The Johns Hopkins Medical Institutions
Gilman Lectureship Selection Committee, The Johns Hopkins Medical Institutions
- 1979-1985 Board of Associates; Bermuda Biological Station

FEDERAL TESTIMONY, CONGRESSIONAL AND OFFICIAL DoD and PENTAGON BRIEFINGS

- 2006-2007 Dept of Justice Declaration/Testimony, LFA, Effects of Sound (July 2007)
Dept of Justice Declaration/Testimony, Pacific Military Exercises, Effects of Sound (Sept. 2007)
Dept of Justice Declaration/Testimony, California Military Exercises, Effects of Sound (Sept. 2007)
AUTEK Stranding response briefing and site visit review (Jan. 2007)
Briefing, ADM Gary Roughhead, Chief of Naval Operations CFFC (July 2007)
Briefings, Asst. Sec. of the Navy Aides, LCDR Keck, CAPT Robin Brake (Feb 2007)
Briefing, Deputy Director of the Naval Meteorology and Oceanography Command, and Naval Oceanographic Office 2006 (Oct 2006)
Briefing, Strategic Studies Group on Thursday (Nov 2007).
Briefing, CAPT Tattlebach CNMOC (Dec 2006)
Briefing, Naval Oceanographic Command, CAPTs Brown and Cousins (Jan 2007)
- 2004-2005 Briefings, Asst. Sec. of the Navy, Hon. Donald Schregardus, Acoustic Impacts Testimony and Advisory Panel on MMPA, House Armed Services Committee
Testimony on MMPA, Senate Armed Services Committee
Briefing, DARPA Workshop on Underwater Acoustics Research
- 2001-2003 Briefing, Swedish Navy, Panel on Underwater Explosions
Testimony and Panel, Congressional Workshop, US Congress House-Senate joint staff
Testimony, Commerce Committee Hearing on Sonar Effects, US House of Representatives
Testimony and Panel, Congressional Hearing on LFA Sonar Effects, U.S. Congressional Commerce Committee
Briefings, Sec. of the Navy, Asst. Sec. Navy, SECNAV Staff, LANTFLEET, Acoustic Impacts/Acoustic Trauma
- 2000 Briefing, Oceanographer of the Navy
Briefing, Senator Edward Kennedy
Briefing, Commander Naval Operations

INSTITUTIONAL ACTIVITIES

Committees

- 2004 Liquid Jungle Laboratory Review Committee
- 2001-2005 Gender Climate Assessment Advisory Committee
- 2001 Mary Sears Award Committee
Ocean Life Institute Proposal Review Committee
Comprehensive Exam Committee (Biology Department)
- 2000 Faculty Search Committee (Biology Department)

Lectures/Presentations/Teaching

- 2012-2013 HIVE Launch (Hub for Immersive Visualisation for eResearch)
Presentations on Stereoscopic 3D Visualization of Marine Mega to Micro Species, Curtin University
WAZE Lecture: Veterinary Imaging, Tufts Veterinary School;
Special Lecture Series: Marine Mammal Auditory Systems and Necropsy Techniques: Taiwan National University, National Chiayi University, National Changkung University
WHOI CT and Necropsy Facilities Tours: 15 tours/talks for Development, Media, Trustees, K-12 groups, WHOI Departmental Guests (Marine Policy, AOPE, Marine Operations), BP, Senate staffers, Middle East Science Ministers Program, U.S. Dept of State, China Educational Ministers, WHOI Directorate visitors.
- 2011 Biology of the Inner Ear (Marine Biology Laboratory), Lecturer and Faculty, AquaVet Lectures and Practical CME Sessions on Radiologic Imaging; MIT, Brains, Minds, Machines Conference.
WHOI CT and Necropsy Facilities Tours: 18 tours/talks for Development, Media, Trustees, Meetings, Regional School groups, NSF Program Management, WHOI Departmental Guests (Geochemistry, Biology, Acoustical Oceanography, Marine Policy), NUWC. JIP, Navy, BP, Sen. Scott Brown, WHOI Directorate visitors.
- 2010 Massachusetts Maritime Academy, Special Lecture
WHOI CT and Necropsy Facilities Tours: 10 tours for Development, Media, Trustees, Meetings, Regional School groups, WHOI Departmental Guests (Geochemistry, Biology, Acoustical Oceanography)
- 2009 Biology of the Inner Ear, Lecture and Faculty, Marine Biology Laboratory
AquaVet Lectures and Practical CME Sessions on Radiologic Imaging
Ocean Life Institute Trustee Meeting
ADM Carr, Director Office of Naval Research inspection tour
Deputy Secretary of the Navy, W. Natter
- 2008 AquaVet Lectures and Practical CME Sessions on Radiologic Imaging
WHOI Trustee Meeting and Open House
Knight Fellows Lecture
- 2007 Lecture on Technologic Developments in Imaging for Minister of the Environment for Spain
Seaver Institute
Imaging Facility Tour and Lecture for Saudi Arabia Minister of Education/King Faisal Technical University
MIT Science Journalism Fellows Lecture
MRF CT UNIT Tours (3)
AquaVet Lectures and Practical Sessions on Radiologic Imaging
- 2006 National University of Singapore Collaborative Research Facility Development
Eighth Wonder/MOU development
Arctic Commission facilities visit
Knight Journalism Fellows lecture
Marine Research facilities tours for trustees and open houses (5)
- 2005 Ocean Science Journalism Fellows
- 2004 WHOI Trustees and Guests Breakfast Series
Ocean Science Journalism Fellows
Naval War College
- 2002 WHOI Trustees Dinner and Lecture

	Biology Department Seminar
	US Congressional Staff and ONR Visit/Briefing
2001	ONR Director Briefing and Tour
2000	Biology Department Seminar
	WHOI/MIT Joint Program Alumni Tour
1999	WHOI Summer Student Fellows Lecture and Laboratory Tour
1998-2001	Knight Fellows Lecture
1998	WHOI Trustees Lecture
	WHOI Associates Day of Science Lecture
1997-2000	Naval Command College Lecture

EDITORIAL BOARDS

1995-1999	Associate Editor, Journal of Marine Mammal Science
2008-present	Curator, Marine Mammals, Encyclopedia of Life

JOURNAL REVIEWS

Acta Otolaryngologica
American Journal of Otology
Anatomical Record
Animal Behaviour
Biological Bulletin
Brain, Behaviour, and Evolution
Journal of the Association for Research in Otolaryngology
Journal of the European Cetacean Society
Journal of Experimental Biology
Journal of Paleontology
Journal of Marine Mammal Science
Journal of the Acoustical Society of America
Journal of Morphology
Nature
Otology and Neurotology

PROPOSAL REVIEWS

National Science Foundation, Sensory Biology, Neurosciences Cluster
National Institutes of Health, National Institutes of Deafness and Communication Disorders (NIH/NIDCD)
Northeast Consortium
Swiss Science Foundation
German Science Foundation
DEFRA
ESF

RESEARCH INTERESTS

Functional Anatomy of the Ear; adaptations for air and water, infra to ultrasonic hearing
Evolution of hearing
Three-dimensional functional modeling of head and neck anatomy and sensory systems
Interactive biomedical imaging models
Cochlear Implant position and speech perception
Blast and Traumatic Brain Injury trauma diagnostic imaging

My work to date has been divided between the theoretical and the practical. On the theoretical side, I conduct basic research on the functional anatomy vertebrate auditory systems, particularly how differences in ear structures are related to different hearing abilities and niche dependent effects on significant acoustic features; e.g. wavelengths in air vs. water. This work involves direct examination of the auditory system of extant and fossil species and measurement and analysis of the topography and material properties of key tissues. The data are obtained by both classic dissection and microscopy techniques as well as recent and developing technologies such as macro and micro computerized tomography (CT scanning), magnetic resonance imaging (MRI), finite element and finite difference modeling (FEM/FDM) and atomic force microscopy (AFM). On the practical side, my skills in biomedical imaging and dissection are used to assist forensic analyses of human trauma and strandings. These two areas cross-pollinate; the basic research helps us to understand how changes in an ear, brought about by pathology, correlate with specific parameters of hearing loss, and the work with human cases, in turn, gives invaluable opportunities for interactive development of ways to better assess head and neck structure, both normal and abnormal in other vertebrates. In many cases, looking at the anatomy of a specimen, current or past, as not only an example of its taxon but also as a record of its particular life history can enrich our knowledge.

My basic research concentrates on how animals evolved infra to ultrasonic hearing, particularly those with exceptional acuity or living in extreme habitats, like bats, elephants, dolphins and whales, deep divers, desert rats, mole rats and marine infauna. The most recent findings from this work include the development of a mathematical model that explains how cochlear spiral configurations are related to the ability to hear ultra-low frequencies, a feature that I was able to demonstrate is common to modern whales and elephants and is found in varying degrees in fossil proboscideans back to gomphotheres. This work also involves frequency mapping models for the cochlear spiral to estimate hearing ranges in extant and extinct species. I have also demonstrated the presence and likely parallel evolution of specialized fatty tissues that act as pinnae in cetaceans, aquatic reptiles, and diving birds and are a key feature for underwater sound reception and localization.

Research on fundamental mechanisms also entails comparing normal and impaired ears to determine how location and nature of pathologies relate to changes in hearing ability. The mapping and ultrahigh resolution CT techniques developed in the basic animal research have become valuable tools in the human studies as well, particularly for cochlear implant and explosive trauma and tinnitus research. The techniques developed for the exceptionally large and dense dolphin head structures are now used for submillimeter diagnostic exams of *in vivo* abnormalities and intracochlear electrode locations in implant patients. Current studies are focusing on the relationship of electrode position to speech perception and on mechanisms of insertion trauma. Results show the interaction of the array curvature with that of the natural cochlea is a critical factor in the success of the implant placement. While the imaging methods and data on patient differences have already had some impact on surgical planning, the greatest benefit from this research will likely be, in the long term, to foster improvements in cochlear implant designs and to provide intraoperative techniques for optimizing array placement in every patient. Most recently, the ultrahigh resolution imaging algorithms developed in this research have been applied to a range of head and neck traumas and are being used for volumetric analyses in traumatic brain injury cases and to map fragment and shrapnel patterns. In addition, a collaborative effort with researchers at Harvard Medical School on *in utero* hearing has evolved recently which is an unusual mix benefitting from both my human and underwater research experience.

FUNDING HISTORY (Total funding, 1992-2013: See also details of WHOI grants, Appended)

Years	Funding Source	PI/Co-PI	Title	Application
1992-2002	NIH/ NIDCD	P.I. J.B. Nadol, Jr. sub-project P.I. D.R.	Basic and applied research on cochlear prostheses: Anatomy	Basic and Clinical

		Ketten	of implantation	Research
1992-1996	ONR	P.I. D.R. Ketten.	Three-dimensional analyses of marine mammal ears	Basic Research
1993-1996	ONR/ ASSERT Award	P.I. D.R. Ketten	3D digital sectioning and analysis of multimodal data	Basic Research
1995-1999	ONR	P.I. Ketten, D.R.	Measures of auditory function in stranded marine mammals	Basic Research
1996-1998	ONR	P.I. D.R. Ketten	Hearing Adaptations in Deep Divers	Basic Research
1997-1999	Mellon Foundation	P.I. D.R. Ketten	In vitro measures of tissue velocities in dolphins	Basic Research
1997-2000	Seaver Institute	P.I. D.R. Ketten co-PI's J. Buck; D. Brown	Anatomical modeling of the dolphin sonar system	Basic Research
1997-1998	SPAWAR	P.I. D.R. Ketten	Behavioral measures of underwater sound reception mechanisms	Basic Research
1998-2008	ONR	P.I. D.R. Ketten co-PI: R. Price; J. Craig	Experimental measures of blast and acoustic trauma	Basic and Clinical Research
1997-2000	SERDP	P.I. D.R. Ketten	Otopathological analysis of marine mammal ears	Basic Research
1997-2002	NIH/NIDCD	P.I. M. Skinner co-P.I. D.R. Ketten	Strategies to optimize benefit from a cochlear implant	Basic and Clinical Research
1999-2003	Advanced Bionics	P.I. D.R. Ketten	In vivo measures of cochlear length and Clarion electrode position	Clinical
2000-2001	SPAWAR	P.I. D.R. Ketten	Cetacean inner ear models	Basic Research
2000-2001	NOAA/NMFS	P.I. D.R. Ketten	Inner and middle ear pathology of stranded beaked whales	Basic Research
2000-2002	ONR & ONR (DURIP)	P.I. D.R. Ketten	Acquisition of a computerized tomographic 2D/3D imaging facility; 2D/3D visualization of real marine structures	Basic and Clinical Research
2001-2003	ONR - ESME	P.I. D.R. Ketten	Models of whale auditory function	Basic Research
2001-2004	NEC subaward (NOAA prime)	P.I. D.R. Ketten	Hearing in the North Atlantic Right Whale	Basic Research
2001-2004	ONR	P.I. D.R. Ketten co-PI: S. Bartol	Evoked Potential Measures of Underwater Hearing	Basic Research
2001-2003	NIH	P.I. C. Wall Co-PI D. Ketten, P. Guyot	Singular Nerve Measures	Basic and Clinical Research
2003--2008	NIH	P.I. D. Mountan co-PI: D.R. Ketten	Inner Ear Models	Basic Research
2003-2005	NIH	P.I. M. Svirsky co-PI: D.R. Ketten	Cochlear Implants and Speech Perception	Basic and Clinical

				Research
2003-2005	NOPP	P.I. D.R. Ketten co-PI: Mountain, Hubbard	Whale Hearing Models	Basic Research
2005-2008	NIH	P.I. D. Mountain co-PI: D.R. Ketten	Active Filtering in the Cochlea	Basic Research
2003-2005	NOPP	P.I. D.R. Ketten co-PI: Mountain, Hubbard	Beaked Whale Hearing Models	Basic Research
2004-2009	OPNAV/DOD	P.I. D.R. Ketten	Under Impulse and Shock Wave Data/Dolphin and Turtle Safety Zones for Mitigation	Basic and Clinical Research
2007-2009	JIP	P.I. D.R. Ketten, co-PI: Mountain	Modeling Mysticete Hearing	Basic Research
2008-2013	ONR	P.I. D.R. Ketten	Imaging Database to Improve Stranding Response Success	Basic Research
2009-2011	ONR	PI: P Tyack co-PI: Fahlman, Ketten, Moore	Imaging the Lung Under Pressure	Basic Research
2010-2013	WHOI	P.I. D.R. Ketten	Finite Element Modeling of Sound Paths in Cetaceans	Basic Research
2010-2014	NIH	P.I. M. Svirsky co-PI: D.R. Ketten	Cochlear Implants and Speech Perception	Basic and Clinical Research
2010-2013	N45/Env Div/NPGS	P.I. D.R. Ketten, co-PI: Mountain	Modeling Beaked and Baleen Whale Hearing	Basic Research
2014-2015	LMRS	P.I. D.R. Ketten, co-PI: Mountain	Macro to Micro Acoustic Power Flow Hearing Models	Basic Research

EDUCATIONAL ACTIVITIES

Advisees/Committees (HMS = Harvard Medical School; HST = Harvard Sciences & Technology; WHOI = Woods Hole Oceanographic Institution)

Dates	Student Name	Role	Student Affiliation	Current Position
Medical Research Fellows				
1993-1995	Jan Vandevenne, M.D.	Research Fellow Project Advisor	Radiology, Mass. General Hospital	Radiologist, Brussels, Belgium
1995-1996	Amin Jalaludin, M.D.	Research Fellow Project Advisor	research fellow, HMS Otolaryngology	Otolaryngologic surgeon, Kuala Lumpur, Malaysia
1996-1998	Jaime Rappaport, M.D.	Research Fellow Project Advisor	research fellow, HMS Otolaryngology	Otolaryngologic surgeon, McGill Hospital, Montreal, Canada
1998-1999	Shiao Jiun-Yih, M.D.	Research Fellow Project Advisor	research fellow, HMS Otolaryngology	Otolaryngologic surgeon, Taiwan
Undergraduate				
2005, 2006	Maya Yamato	Advisor	WHOI Summer Student	Matriculated MIT doctoral program 2007
2008-2010	Matthew Dunn	Advisor	WHOI Summer	Boston College, Boston,

2010	Sarah McKay Strobelh	Advisor	Student WHOI Summer Student	MA Princeton University
2010	Alexandra Scharr	Advisor	WHOI Summer Student	Pomona College, California
M.S. Students				
1993-1995	Lek Mui, M.S.	M.S. Thesis Advisor	MIT/HST, Biomedical Imaging	M.S. awarded, 1995 Macmillan Fellow, Oxford University, Ph.D. student, HST
1995-1997	Edward Baik, M.S.	M.S. Thesis Advisor	MIT/HST, Biomedical Imaging	M.S. awarded, 1997 Engineer, Jet Propulsion Laboratories
1998-2001	Sarah Marsh, M.S.	M.S. Thesis Advisor	M.S. student, MIT, Biology	M.S. awarded 2001 Ph.D. student, Genetics, Univ. of Wisconsin Medical School
2011- 2013	Carolin Nieder	M.S. Thesis co-Advisor	Guest student, Neurosciences	M.S. Awarded 2013, University of Frieburg
Ph.D. Students				
1998-2000	Patrick Miller, Ph.D.	Ph.D. Thesis Committee member	MIT- joint program	Ph.D. awarded 2000, Postdoctoral Investigator, St. Andrews University
1999	Sirpa Nummela, Ph.D.	Official opponent, Ph.D. defense, thesis committee	Ph.D. candidate, Univ. of Helsinki	Ph.D. awarded 1999, Postdoctoral Researcher, Ecology and Systematics, Univ. of Helsinki; Asst. Prof. Northern Ohio Medical School
1999-2004	Jennifer Hammock	Ph.D. Thesis Advisor	Ph.D. student, Biology, MIT	Ph.D. awarded 2005, Research Scientist, FDA2006; Research Associate, Smithsonian Inst.
1999-2004	Susan Parks	Committee member, thesis subproject advisor	Ph.D. student, Biology, MIT	Ph.D. awarded 2004, Post-doctoral investigator, Cornell University 2005- 2006, Asst. Prof. Univ. Penn
1999-2004	Stephanie Watwood	Ph.D. Thesis Committee	Ph.D. student, Biology, MIT	Ph.D. awarded 2004, Rsch Assoc. MIT
2000-2001	Brenda Jensen	Chair, Ph.D. defense	Ph.D. student, Biology	Post-doctoral Fellow, Environmental Health, Boston Univ.
2000-2006	Eric Montie	Thesis Committee	Ph.D. student, Biology, MIT	post-doctoral fellow WHOI, Univ. of Florida
2000-2005	Joanna Wilson	Chair, Ph.D. Thesis proposal	Ph.D. student, Biology, MIT	Post-doctoral fellow WHOI

2002-2006	Regina Campbell Malone	defense Thesis Committee	Ph.D. student, Biology, MIT	Ph.D. awarded 2007, Post doctoral fellow Johns Hopkins University
2007- 2012	Maya Yamato	Ph.D. Thesis Advisor	Ph.D. student, Biology, MIT	Ph.D. Completed Sept. 2012, Post-doctoral fellow, Smithsonian Paleontology
2011- present	Michael Gray	Thesis Committee	Ph.D. student, Georgia Tech Univ.	Graduate Student
2011- present	Sherri Eldridge	Thesis Committee	Ph.D. student, Boston Univ.	Graduate Student

**Postdoctoral
Fellows
Scholars**

2001-2004	Heather Koopman, Ph.D.	Research Advisor	Postdoctoral Scholar	Associate Professor, Univ. of N. Carolina at Wilmington
2001-2004	Soraya Bartol-Moein, Ph.D.	Research Advisor	Postdoctoral Investigator	Asst. Prof. Virginia Wesleyan University
2004-2005	Jennifer Hammock, Ph.D.	Research Advisor	Postdoctoral Investigator	Research Associate, Smithsonian Institution,
2009	Songhai Li, Ph.D.	Research Advisor	Postdoctoral Investigator	Hydrobiolgoy Institute, Wuhan, China
2008-2010	T. Aran Mooney, Ph.D.	Research Advisor	Postdoctoral Scholar	Asst. Scientist, WHOI

Guest Students/Co-Advisor

Alexandra Scharr, graduate student, Stanford, Neurosciences, 2011
Maggie Ryan, High School Summer student, 2011
Matthew Dunn, Boston College Undergraduate, 2009-2011
Louise Brooks, University of California, graduate student (2004-2005)
Susannah Prahl, Kiel University, Germany, graduate student (2000-2006),
Klaus Lucke, Kiel University, Germany, graduate student (1998-99, 2002-2005)
Pedro Frazao Univ. of Lisbon, Portugal, senior honors research thesis (1999)
Paco Olliverdes, Univ. of Texas, doctoral student (1999)
Itamar Tsur D.V.M.; senior Ph.D. candidate, Biology, Univ. of Tel Aviv (2000, 2008, 2009, 2012)
Chantal Van Ginkel, Eckerd College, undergraduate summer student fellow (2013)

TEACHING

Courses Taught

2012	WAZE Animal Imaging, Tufts University
2009, 2011	Marine Biology Laboratory, Biology of the Inner Ear
2010	WHOI, Marine Mammals: Principles of Neuroethology and Marine Sensory Systems
1998-2000	WHOI, Behavior of marine animals: Physiology of Perception
1996-1999	WHOI/MBL/BUMP, joint course: Biology of Marine Mammals
1987-1988	Harvard University, Course Laboratory Assistant, Comparative Physiology
1981-1984	Towson State University, Introductory Biology, Evolutionary Biology
1982-1983	Goucher College, Animal Behaviour
1974-1979	Suffolk University, Embryology, Introductory Biology, Marine Biology

Visiting Faculty Appointments/Specialty Lectures

2012	Guest Lecturer	University of Massachusetts, Boston, Graduate Neurosciences
	Guest Lecturer	WAZE Lecture: Veterinary Imaging, Tufts Veterinary School
	Guest Lecturer	Special Lecture Series: Marine Mammal Sensory Systems and Necropsy Techniques: Taiwan National University, National Chiayi University, National Changkung University
2010	Lecturer/Prosector	Tufts University Veterinary School, Special lecture on Veterinary Imaging AquaVet Special Lectures and Practical Sessions on Radiologic Imaging
2009	Lecturer/Prosector	Necropsy Workshop II, Ministry of the Environment and Bahamas Marine Mammal Research Organisation. Nassau, Bahamas Necropsy Workshop: Cook Islands Stranding Network, Rarotonga, CI
2008	Lecturer/Prosector	Necropsy Workshops I, Ministry of the Environment and Bahamas Marine Mammal Research Organisation. Nassau, Bahamas
2005	Lecturer/Prosector	Necropsy Workshop, Australian Ministry of the Environment, Conservation, Wildlife Impacts and Protection, Dept. of the Environment and Heritage, Hobart, Tasmania and Sydney, NSW, Australia.
2004	Lecturer	NOAA Fisheries Lecture Series on Ocean Acoustics
1989-present	Lecturer	In-service Radiology lectures, MEEI
	Lecturer	Clinical Pathology Conferences, Department of Otology and Laryngology, Harvard Medical School, MEEI
1987- present	Lecturer	Sensory Physiology, Marine Mammal Biology, Brandeis University
2001	Faculty	Pauley Foundation Workshop, Univ. of Hawaii Institute of Marine Biology
2000	Lecturer	Animal Behaviour and Communications Workshop University of California at Davis
1999	Faculty	Acoustical Society Short Course, Marine Mammal Bioacoustics
	Visiting Professor	Institute of Biology, Odense Universitet, Denmark
	Lecturer	Lowell Lecture Series; New England Aquarium
1998	Guest Lecturer	Neurosciences Forum, Parmley Hearing Research Institute, University of Chicago
	Visiting Professor	Acoustical Engineering/Biology, National University of Singapore
	Faculty	Cochlear Implant Workshop, American Academy of Otolaryngology-Head and Neck Surgery
	Faculty	Surgical Workshop; American Academy of Otolaryngology-Head and Neck Surgery
1997	Lecturer	Underwater Acoustics and Low Frequency Sonar: Naval War College
	Guest Lecturer	Sensory Neurosciences Program, Zoology Department, University of Maryland
	Senior Faculty	Marine Forensics Workshop; National Marine Fisheries Service and Armed Forces Institute of Pathology

1996	Senior Faculty	Office of Naval Research Biosonar Workshop, University of California at Santa Cruz
	Instructor	Temporal Bone Workshop, Association for Research in Otolaryngology
1995	Instructor	Acoustical Society of America, Short Course in Marine Mammal Bioacoustics
	Lecturer	NIH Consensus Development Conference, Cochlear Implants
	Section Instructor	Course: Cochlear Implants: The Clinical Issues, Massachusetts Eye and Ear Infirmary
1994	Visiting Lecturer	Earth and Planetary Sciences, Massachusetts Institute of Technology
1993	Guest Lecturer	Neuroradiology Grand Rounds, Barnes Hospital and Washington University School of Medicine
	Guest Lecturer	Neuroscience Colloquium: Howard Baker Lectures, Dept. of Psychology, Florida State University
	Faculty	3-D Reconstruction of Temporal Bones, Satellite Course, Amer. Acad. of Otol.-Head and Neck Surgery
	Senior Faculty	In situ sectioning of cochlear implants, Satellite Course, Amer. Acad. of Otol.-Head and Neck Surgery
1992	Visiting Scientist	Neurobiology, Shoals Marine Laboratory, Cornell University
1991	Research Associate	Sensory Neurobiology Program, Syracuse University

COLLABORATIONS and CO-AUTHORS

Marine Mammal Research

Craig, James; Naval Surface Weapons Center; blast trauma
 Dolphin, William, Ph.D., Boston University; marine mammal evoked potentials
 Fahlman, Andreas, Ph.D., National Medical Center, Bethesda, MD, dive physiology
 Fish, Frank, Ph.D., West Chester University; marine mammal hydrodynamics
 Hubbard, Allyn, Ph.D., Boston University; marine mammal head Finite Element Models
 Jepson, Paul, Ph.D., London Zoo, marine mammal Pathology.
 McCall, Sherman; M.D., Armed Forces Inst. of Pathology; blast trauma
 Nachtigall, Paul, Ph.D., University of Hawaii; marine mammal evoked potentials
 Nweeia, Martin, D.O., Harvard Medical School, narwhals
 Seibert, Ursula, DVM, Kiel University, Germany, marine mammal cranial pathology
 Reidenberg, Joy, Ph.D., Mt. Sinai Hospital; blast trauma
 Sandberg, Glenn, M.D., Armed Forces Inst. of Pathology; blast trauma

Invertebrates

Cohen, Anne, Ph.D., WHOI; coral structure and climate change
 Cantin, Neal, Ph.D., University of Queensland, AU; coral structure
 Lavery, Andone, Ph.D., WHOI; acoustic scattering models
 Stanton, Timothy, Ph.D., WHOI, marine acoustics

Fishes

Edds-Walton, Peggy, Ph.D., Marine Biology Laboratories; fish hearing
 Fay, Richard R. , Ph.D., Marine Biology Laboratories; fish hearing
 Naylor, Gavin, Medical University of South Carolina, elasmobranch
 Popper, Arthur, Ph.D., Univ. of Maryland; fish hearing
 Potter, John, Ph.D., University of Singapore; ocean acoustics
 Webb, Jacqueline, Ph.D., University of Rhode Island fish anatomy and evolution

Auditory Systems and Medical Imaging

Carr, Catherine, Ph.D., University of Maryland, avian and reptilian columellar systems

Chadwick, Richard, Ph.D., NIH, cochlear models and atomic force microscopy
 Eddington, Donald, Ph.D., MIT, Mass. Eye and Ear Infirmary; cochlear implants
 Guyot, Jean-Phillipe, M.D., Hopital Universitaire de Geneve, vestibular surgical approaches
 Holden, Tim, Ph.D., Washington University Medical School; cochlear implants
 Hubbard, Allyn, Ph.D., Boston University; inner and middle ear Finite Element Models
 Lahav, Amir, Brigham and Women's Hospital, fetal and neonate hearing
 Long, Christopher, Ph.D., Cochlear Limited, University of Colorado; cochlear implants
 Mason, Jeffrey, M.D., Ph.D., AFIP, MicroMRI of the Inner Ear and Traumatic Brain Injury
 Mountain, David, Ph.D., Boston University; inner and middle ear Finite Element Models
 Nadol, J.B. Jr., M.D., Harvard Medical School, Mass. Eye and Ear Infirmary; inner ear implants, pathology
 Potter, Kimberley, Ph.D., AFIP, MicroMRI of the Inner Ear and Traumatic Brain Injury
 Riquimaroux, Hiroshi, Ph.D. Doshisha University, Kyoto, Japan, bat biosonar
 Simmons, Andrea, Ph.D., Brown University, Amphibian hearing
 Simmons, James, Ph.D., Brown University, Bat biosonar
 Sisneros, Joseph, Ph.D., University of Washington, fish hearing
 Skinner, Margaret, Ph.D., Washington Univ. School of Medicine; cochlear implants
 Svirsky, Mario, Ph.D., New York University Medical School; cochlear implants and speech perception
 Wall, Conrad, Ph.D., Harvard Medical School, vestibular systems and prostheses
 Walsh, Edward, Ph.D., Boys Town National Research Hospital, large carnivore hearing

BIBLIOGRAPHY

Refereed Journal Publications

(pdfs available <http://csi.who.edu>)

- 1977 Bishop, J.K.B., J.M. Edmond, D.R. **Ketten**, M.P. Bacon, and W.B. Silker The chemistry, biology, and vertical flux of particulate matter from the upper 400 m. of the equatorial Atlantic Ocean. *Deep-Sea Research*, 24, pp. 511-548.
- 1978 Bishop, J.K.B., D.R. **Ketten**, and J.M. Edmond The chemistry, biology, and vertical flux of particulate matter from the upper 400 m. of the Cape Basin in the S.E. Atlantic Ocean. *Deep-Sea Research*, 25, pp. 1121-1161.
- 1979 **Ketten**, D.R. and J.M. Edmond Gametogenesis and calcification of planktonic Foraminifera. *Nature*, 278, pp. 546-548.
- 1980 Bishop, J.K.B., R.W. Collier, D.R. **Ketten**, and J.M. Edmond The chemistry, biology, and vertical flux of particulate matter from the upper 1500 m. of the Panama Basin. *Deep-Sea Research*, 27A, pp. 615-640.
- 1989 Graybeal, A., J.J. Rosowski, D.R. **Ketten**, and A.W. Crompton Inner ear structure in *Morganucodon*, an Early Jurassic mammal. *Zool. Jour. Linn. Soc. Lon.*, 96, pp. 107-117.
- 1990 **Ketten**, D.R. and D. Wartzok Three-dimensional reconstructions of the dolphin ear. In: *Sensory Abilities of Cetaceans: Field and Laboratory Evidence*, J. Thomas and R. Kastelein (eds.), Plenum Press, Proc. NATO ASI Ser. A, Life Sci., vol. 196 pp. 81-105.

- 1991 Zhaxi, L. and D. R. **Ketten** CT Scanning and computerized reconstructions of the inner ear of multituberculate mammals. *J. Vert. Paleont.* , 11(2): 220-228.
- 1993 **Ketten**, D.R., J. Lien, and S. Todd Blast injury in humpback whale ears: Evidence and implications. *J. Acous. Soc. Am.*, Vol. 94, no. 3, pt. 2, pp. 1849-1850.
- 1993 **Ketten**, D.R. The Cetacean Ear: Form, frequency, and evolution. In: *Marine Mammal Sensory Systems*, J. Thomas, R. Kastelein, and A. Supin (eds.), Plenum Press, pp. 53-75.
- 1993 **Ketten**, D.R., D.K. Odell, and D.P. Domning Structure, function, and adaptation of the manatee ear. In: *Marine Mammal Sensory Systems*, J. Thomas, R. Kastelein, and A. Supin (eds.), Plenum Press, pp. 77-95.
- 1994 Nadol, J.B., Jr., **Ketten**, D.R., and B. Burgess Otopathology in a case of cochlear implantation, *Laryngoscope*, vol. 104, no. 3, pp. 299-303.
- 1994 Skinner, M., **Ketten**, D., Vannier, M., Gates, G., Yoffie, R., and Kalender, W. Determination of the position of Nucleus cochlear implant electrodes in the inner ear. *Am. Jour. Otol.* vol. 15, no. 5, pp. 644-651.
- 1994 **Ketten**, D.R. Functional Analyses of Whale Ears: Adaptations for Underwater Hearing, *I.E.E.E Underwater Acoustics*, vol. 1, pp. 264 - 270.
- 1994 **Ketten**, D. R. The Role of temporal bone imaging in cochlear implants. *Curr. Opn. Otol. & HN Surg., Otolgy-Neurotology*, vol. 2, no. 5, pp. 401-408.
- 1995 GA Gates, K Daly, WJ Dichtel, et al. Cochlear implants in adults and children. *JAMA: The Journal of the American Medical Association* 274 (24), 1955-1961
- 1995 **Ketten**, D.R. Estimates of blast injury and acoustic trauma zones for marine mammals from underwater explosions. In: *Sensory Systems of Aquatic Mammals*, R. Kastelein, J. Thomas, and P. Nachtigall (eds.), De Spil Publishers, pp. 391-408.
- 1996 Todd, S., S. Stevick, J. Lien, F. Marques, and D. **Ketten** Behavioural effects of exposure to underwater explosions in humpback whales (*Megaptera novaeangliae*). *Canadian Journal of Zoology*, 74(9):1661-1672.
- 1996 HL Roitblat, D Ketten, WWL Au, PE Nachtigall. A computational model of early stages of dolphin hearing. *The Journal of the Acoustical Society of America* 100 (4), 2643-2643
- 1996 Wang, G., Vannier, M., Skinner, M., Kalender, W., Polacin, A., and **Ketten**, D. Unwrapping cochlear implants by spiral CT, *IEEE Trans. Biomed. Eng.*, vol. 43, no. 9, pp. 891-900.
- 1997 Mass, A.M., D. K. Odell, D.R. **Ketten**, and A. Ya. Supin Ganglion layer topography and retinal resolution of the Caribbean Manatee, *Trichechus manatus latirostris*. *Dokl. Akad. Nauk* 355(3): 427-430 [In Russian]. English translation: *Doklady Biological Sciences* 355: 392-394.
- 1997 **Ketten**, D.R. Structure and Function in Whale Ears, *Bioacoustics*, vol. 8, no. 1, pp. 103-136.

- 1997 André, M., C. Kamminga, and D. **Ketten** Are Low Frequency Sounds a Marine Hearing Hazard: A Case Study in the Canary Islands. Proc. of the Inst. of Acoustics, vol. 19, no. 9, pp. 35-43.
- 1998 **Ketten**, D.R. Marine mammal ears: An Anatomical perspective on underwater hearing. Proc. Int. Cong. on Acoust., vol. 3, pp. 1657-1660.
- 1998 **Ketten**, D.R., Skinner, M., Wang, G., Vannier, M., Gates, and Neely, G. *In vivo* Measures of Cochlear Length and Insertion Depths of Nucleus® Cochlear Implant Electrode Arrays. Annals of Otology, Rhinology, and Laryngology, vol. 107, no. 11, pp. 1-16.
- 2001 Nadol, J.B., Jr., J.Y. Shiao, B.J. Burgess, D.R. **Ketten**, D.K. Eddington, B.J. Gantz, I. Kos, P. Montandon, N.J. Coker, J.T. Roland, Jr., and J.K. Shallop Histopathology of Cochlear Implants in humans. Annals of Otology, Rhinology, and Laryngology. 110(9):883-91.
- 2001 EJ Walsh, DR Ketten, J Arruda, DL Armstrong, T Curro, LG Simmons, LM Wang Temporal bone anatomy in *Panthera tigris*. Acoustical Society of America Journal 115, 2485-2486
- 2001 Webb, J.F., Smith, W.L. and **Ketten**, The Laterophysic Connection, A Unique Swim Bladder-Lateral Line Connection in Butterflyfishes: An Evolutionary Novelty with Implications for Sensory Function. J. Morphol. 248(3): 298-299.
- 2002 de Muizon, C., D.P. Domning, and D.R. **Ketten** Odobenocetops peruvianus, the walrus-convergent delphinoid from the lower Pliocene of Peru. Smithsonian Cont. Paleobiology., no. 93:223-261.
- 2002 Skinner, M.W., D.R. **Ketten**, L.K. Holden, B.R. Whiting, K.T. Bae, L.T. Cohen, J.G. Neely, G.A. Gates, P.G. Smith, G.R. Kletzker Is there a relation between speech recognition and the position of cochlear implant electrodes in the inner ear? Seminars in Hearing, vol. 23(1):97-98.
- 2002 Skinner, M.W., D.R. **Ketten**, L.K. Holden, P.G. Smith, G.A. Gates, J.G. Neely, B. Brunsten, and B. Blocker CT Derived Estimation of Cochlear Morphology and Electrode Array Position in Relation to Word Recognition in Nucleus-22 Recipients. JARO, 03: 332-350.
- 2003 MF Dorman, D Ketten Adaptation by a cochlear-implant patient to upward shifts in the frequency representation of speech Ear and Hearing 24 (5), 457-460
- 2003 Mountain, D.C., Hubbard, A.E., **Ketten**, D.R. and O'Malley, J. The helicotrema: Measurements and models In: Biophysics of the Cochlea: from Molecules to Models. A.W. Gummer, E. Dalhoff, M. Nowotny, M. Scherer (eds.). World Scientific, Singapore, pp. 393-399.
- 2004 **Ketten**, D.R., T. Rowles, S. Cramer, J. O'Malley, J. Arruda, and P. Evans. Cranial Trauma in Beaked Whales. Proceedings of the Workshop on Active Sonar and Cetaceans, ECSN, no. 42, pp. 21-27.
- 2004 Ramcharitar, J.U, Deng, X., **Ketten**, D., and Popper, A. N. Form and Function in the Unique Inner Ear of a Teleost: The Silver Perch (*Bairdiella chrysoura*). J. Comparative Neurology, 475(4), pp. 531-539.

- 2004 **Ketten**, D.R. Marine Mammal Auditory Systems: A Summary of Audiometric and Anatomical Data and Implications for Underwater Acoustic Impacts. *Polarforschung*, 72. Jahrgung, Nr. 2/3, pp. 79-92.
- 2005 Horowitz, S., Simmons, A.M., and **Ketten**, D.R. Optical and tomographic imaging of a middle ear malformation in the bullfrog (*Rana catesbeiana*), *Jour. Acous. Soc. of Amer.*, Vol. 118, No. 2, pp. 1166–1171, August 2005
- 2006 Cox, T.M., T.J. Ragen, A.J. Read, E. Vos, R.W. Baird, K. Balcomb, J. Barlow, J. Caldwell, T. Cranford, L. Crum, A. D'Amico, G. D'Spain, A. Fernández, J. Finneran, R. Gentry, W. Gerth, F. Gulland, J. Hildebrand, D. Houser, T. Hullar, P.D. Jepson, D. **Ketten**, C.D. MacLeod, P. Miller, S. Moore, D. Mountain, D. Palka, P. Ponganis, S. Rommel, T. Rowles, B. Taylor, P. Tyack, D. Wartzok, R. Gisiner, J. Mead, L. Benner. Understanding the Impacts of Anthropogenic Sound on Beaked Whales, *Journal of Cetacean Research and Management*, vol. 7(3), pp. 177-187.
- 2006 Fish, F. E., Nusbaum, M. K., Beneski, J. T. and **Ketten**, D. R.. Passive cambering and flexible propulsors: cetacean flukes. *Bioinspiration and Biomimetics* 1: S42-S48
- 2006 Miller, B.S., Zosuls, A.L., **Ketten**, D.R. and Mountain, D.A. Middle ear stiffness of the bottlenose dolphin (*Tursiops truncatus*) *IEEE Journal of Oceanic Engineering*, vol. 31(1), pp. 87-94
- 2006 Koopman, H.N., S.M. Budge, D.R. **Ketten**, and S.J. Iverson. The topographical distribution of lipids inside the mandibular fat bodies of odontocetes: Remarkable complexity and consistency. *IEEE Journal of Oceanic Engineering*, vol. 31(1), pp. 95-106.
- 2006 Webb, J.F., Smith, W.L., **Ketten**, D.R. The laterophysic connection and swim bladder in butterflyfishes in the genus *Chaetodon* (Perciformes: Chaetodontidae). *Journal of Morphology*. 267:1338–1355.
- 2006 Miller, B.S., S.O. Newburg, A.L. Zosuls, D.C. Mountain, and D.R. **Ketten**. Biomechanics of Dolphin Hearing. A comparison of middle and inner ear stiffness with other mammalian species. In: Nuttal, A.L. (ed.) *Auditory Mechanisms: Processes and Models*. Pp. 121-124.
- 2006 Chadwick, R.S, Manoussaki, D., Dimitriadis, E.K., Shoelson, B., **Ketten**, D.R., Arruda, J., O'Malley, J.T. Cochlear coiling and low-frequency hearing. In: Nuttal, A.L. (ed.) *Auditory Mechanisms: Processes and Models*. pp. 417-424.
- 2007 Parks, S. E., **Ketten**, D. R., O'Malley, J.T., and J. Arruda. Anatomical Predictions of Hearing in the North Atlantic Right Whale. *The Anatomical Record*. 290:734–744
- 2007 Fish, F.E., Beneski, J.T., and D.R. **Ketten**. Examination of the Three-Dimensional Geometry of Cetacean Flukes Using Computed Tomography Scans: Hydrodynamic Implications. *The Anatomical Record*. 290:614–623.
- 2007 Montie, E, Schneider, G., **Ketten**, D., Marino, L., Touhey, K., and Hahn, M. Neuroanatomy of the Subadult and Fetal Brain of the Atlantic White-Sided Dolphin (*Lagenorhynchus acutus*) from in situ Magnetic Resonance Images. *The Anatomical Record*. 290:1459-1479.

- 2007 Southall, B. L., A. E. Bowles, W. T. Ellison, J. J. Finneran, R. L. Gentry, C. R. Greene Jr., D. Kastak, D. R. **Ketten**, J. H. Miller, P. E. Nachtigall, W. J. Richardson, J. A. Thomas and P. L. Tyack. Marine Mammal Noise Exposure Criteria: Initial Scientific Recommendations. *Aquatic Mammals*, vol. 33 (4), pp. 1 - 521
- 2008 Montie, E, Schneider, G., **Ketten**, D., Marino, L., Touhey, K., and Hahn, M Volumetric Neuroimaging of the Atlantic White-Sided Dolphin (*Lagenorhynchus acutus*) brain from in situ magnetic resonance images. *The Anatomical Record*, 291: 263-282.
- 2008 Popper, A.N. and D.R. **Ketten**, Underwater Hearing. In: *The Senses: A Comprehensive Reference* , Elsevier Press, Oxford, England. Vol 3 (225-236).
- 2008 Manoussaki, D., Chadwick, R.S, **Ketten**, D.R., Arruda, J., Dimitriadis, D., O'Malley, J.T. The Influence of Cochlear Shape on Low-Frequency Hearing. *Proc. Natl. Acad. Sci*, vol. 105(6): 6162-6166. (Featured Article of Issue)
- 2008 **Ketten**, D.R. Underwater ears and the physiology of impacts: Comparative liability for hearing loss in sea turtles, birds, and mammals. *Bioacoustics*, vol. 17, no. 1-3, pp. 312-315.
- 2008 Yamato, M., **Ketten**, DR , Arruda, J, and Cramer, S Biomechanical and structural modeling of hearing in baleen whales. *Bioacoustics*, vol. 17, no. 1-3, pp. 100-102.
- 2008 Mountain, DC, Zosuls, A, Newburg, S, and **Ketten**, DR. Predicting cetacean audiograms. *Bioacoustics*, vol. 17, no. 1-3, pp 77-80.
- 2008 Prahl, S., **Ketten**, D.R, Siebert, U. Examinations of Ears in Harbour Pospoises from the North and Baltic Seas. *Bioacoustics*, vol. 17, no. 1-3, pp 85-87.
- 2009 D'Amico, A. D., Gisiner, R., **Ketten**, D. R., Hammock, J. A., Johnson, C., Tyack, P. & Mead, J. Beaked whale strandings and naval activities. *Aquatic Mammals*, vol. 35 no. 4 pp. 452-472.
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- 2009 Filadelfo, R., Pinelis, Y. K., Davis, S., Chase, R., Mintz, J., Wolfanger, J., Tyack, P. L., **Ketten**, D. R., and D'Amico, A. Correlating whale strandings with Navy exercises off Southern California. *Aquatic Mammals*, vol. 35 no. 4 pp. 452-472
- 2010 Webb, J. F., Herman, J. L., Woods, C. F. and **Ketten, D. R.** The ears of butterflyfishes: 'Hearing generalists' on noisy coral reefs? *Journal of Fish Biology*, 77: 1434-1451. doi: 10.1111/j.1095-8649.2010.02765
- 2010 Mooney, TA, Hanlon, RT, Christensen-Dalsgaard, J, Madsen, PT, Nachtigall, PE, **Ketten**, DR. 2010. Sound detection by the longfin squid (*Loligo pealeii*) studied with auditory evoked potentials: sensitivity to low-frequency particle motion and not pressure. *Journal of Experimental Biology*, vol. 213:3748-3759
- 2011 Fontella, J, FE Fish, N Rybczynski, M Nweeia, and DR **Ketten**,. Three-Dimensional Geometry of the Narwhal (*Monodon monoceros*) Flukes in Relation to Hydrodynamics. *Marine Mammal Science* (DOI: 10.1111/j.1748-7692.2010.00439). *Marine Mammal Science*, p.1-10

- 2011 Hooker, S.K., A. Fahlman, M. J. Moore, N. Aguilar de Soto, Y. Bernaldo de Quirós, A. O. Brubakk, D. P. Costa, A. M. Costidis, S. Dennison, K. J. Falke, A. Fernandez, M. Ferrigno, J. R. Fitz-Clarke, M. M. Garner, D. S. Houser, P. D. Jepson, **D. R. Ketten**, P. H. Kvadsheim, P. T. Madsen, N. W. Pollock, D. S. Rotstein, T. K. Rowles, S. E. Simmons, W. Van Bonn, P. K. Weathersby, M. J. Weise, T. M. Williams, P. L. Tyack. Deadly diving? Physiological and behavioural management of decompression stress in diving mammals. *Proc. R. Soc. B* Published online, doi: 10.1098/rspb.2011.2088
- 2011 Mooney, A. T., Li, S., **Ketten, D. R.**, Wang, K., and Wang, D. Auditory temporal resolution and evoked responses to pulsed sounds for the Yangtze finless porpoises (*Neophocaena phocaenoides asiaeorientalis*), *Journal of Comparative Physiology A Neuroethology, Sensory, Neural, and Behavioral Physiology*, 12/2011, vol. 197, Issue 12, p.1149-1158.
- 2012 Mass, A.M., D. R. **Ketten**, D. K. Odell, A. Ya. Supin. Ganglion Cell Distribution and Retinal Resolution in the Florida Manatee, *Trichechus Manatus Latiostris*. On line: DOI: 10.1002/ar.21470. *The Anatomical Record: Advances in Integrative Anatomy and Evolutionary Biology*, vol. 295 (1): 177–186.
- 2012 **Ketten, D.R.** Marine Mammal Auditory System Noise Impacts: Evidence and Incidence. In: *The Effects of Noise on Aquatic Life*, A. Popper and A. Hawkins (eds). *Advances in Experimental Medicine and Biology*, vol. 730, pp. 207-212.
- 2012 Mooney, TA, Hanlon, RT, Christensen-Dalsgaard, J, Madsen, PT, **Ketten, DR**, Nachtigall, PE. “The potential for sound sensitivity in cephalopods.” In: *The Effects of Noise on Aquatic Life*, A. Popper and A. Hawkins (eds). *Advances in Experimental Medicine and Biology*, vol.730, pp. 125-128.
- 2012 Vigness-Raposa, K.J., G. Scowcroft, J. H. Miller, D.R. **Ketten**. Discovery Of Sound In The Sea: An On-Line Resource. In: *The Effects of Noise on Aquatic Life*, A. Popper and A. Hawkins (eds). *Advances in Experimental Medicine and Biology*, vol.730, pp. 135-138
- 2012 Tubelli, A., A. Zosuls, D. R. **Ketten** and D. C. Mountain. Prediction of a Mysticete Audiogram via Finite Element Analysis of the Middle Ear. In: *The Effects of Noise on Aquatic Life*, A. Popper and A. Hawkins (eds). *Advances in Experimental Medicine and Biology*, vol.730, pp. 57-60.
- 2012 Zosuls, A., S. O. Newburg, D. R. **Ketten** and D. C. Mountain. Reverse Engineering the Cetacean Ear to Extract Audiograms. In: *The Effects of Noise on Aquatic Life*, A. Popper and A. Hawkins (eds). *Advances in Experimental Medicine and Biology*, Volume 730, pp.61-64.
- 2012 Yamato, M., **Ketten D. R.**, Arruda J. J., Cramer S. R., and Moore K. The auditory anatomy of the minke whale (*Balaenoptera acutorostrata*): a potential fatty sound reception pathway in a baleen whale, *The Anatomical Record*, vol. 295:991-998.
- 2012 Svirsky, M. A., M B Fitzgerald, A Neuman, E Sagi, C-T Tan, D R **Ketten**, and B Martin. Current and planned cochlear implant research at New York University Laboratory for Translational Auditory Research, *Journal of the American Academy of Audiology*, vol. 23, Issue 6, New York, p.422-437.

- 2012 **Ketten**, D.R., J. Simmons, H. Riquimaroux, S. Cramer and J. Arruda Cochlear structural variants in echolocators, *Journal of the Acoustical Society of America*, 04/2012, Volume 131, Issue 4, p.3423-3423.
- 2012 Christensen-Dalsgaard, J, C Brandt, K Willis, CB Christensen, D **Ketten**, P Edds-Walton, R R. Fay, PT Madsen, CE Carr. Specialisation for underwater hearing by the tympanic middle ear of the turtle, *Trachemys scripta elegans*. *Proc. Royal Soc. Biol. Sci*, vol. 279, Issue 1739, pp. 2816-2824.
- 2012 Foote, K., M. Hastings, **D.R. Ketten**, Y-T Lin, J. Reidenberg, and K. Rye. Sonar-induced pressure fields in a post-mortem common dolphin. *Journal of the Acoustical Society of America*, vol.13, Issue 2, pp.1595-1604.
- 2012 Tubelli, A., A. Zosuls, D. **Ketten**, M. Yamato, and D. Mountain. A prediction of the minke whale (*Balaenoptera acutorostrata*) middle-ear transfer function. *Journal of the Acoustical Society of America*, vol. 132(5), pp. 3263-3272.
- 2013 **Ketten**, D.R., J. Simmons, H. Riquimaroux, S. Cramer, J. Arruda. Critical Cranial and Cochlear Structures in Echolocators. 11th European Conference on Underwater Acoustics 2012 (ECUA 2012), Proceedings of the Institute of Acoustics Volume 34 Pt.3, pp. 572-577.
- 2013 **Ketten**, D.R., T.A. Mooney, S. Cramer, J. Arruda. Evidence of hearing loss in marine mammals via Auditory Evoked Potentials (AEP), Otoacoustic Emissions (OAE), and Computerized Tomography (CT). 11th European Conference on Underwater Acoustics 2012 (ECUA 2012), Proceedings of the Institute of Acoustics Volume 34 Pt.3, pp. 717-720.
- 2013 Willis, K.L., J. Christensen-Dalsgaard, D. R. **Ketten**, and C. E. Carr. Middle ear cavity morphology is consistent with an aquatic origin for testudines. *PLoS One*, 8(1): e54086. doi:10.1371/journal.pone.0054086
- 2013 Williams, S.R, Dennison, S., Dunnigan, B., Moore, B., Zagzebski, K., **Ketten, D.R.**, Cramer, S., Arruda, J. Diagnosis and Management Of Intestinal Partial Obstruction In A Loggerhead Turtle (*Caretta caretta*).*Journal of Zoo and Wildlife Medicine*. 44(2):457-461. doi: <http://dx.doi.org/10.1638/2011-0179R1.1>
- 2014 Tubelli, A.A., Zosuls, A., **Ketten**, D.R., and Mountain, D.C. Elastic modulus of cetacean auditory ossicles. *The Anatomical Record*; vol. 297, issue 5, pp. 892-900.
- 2014 Mooney, TA, S Li, D R **Ketten**, K Wang, D Wang Hearing pathways in the finless porpoise, *Neophocaena phocaenoides*. *Journal of Experimental Biology*, 217, 444-452, doi: 10.1242/jeb.093773.
- 2014 Kim, S.L., Thewissen, J.G.M., Churchill, M.M., Suydam, R.S., **Ketten, D.R.**, and Clementz, M. T. Unique biochemical and mineral composition of whale ear bones. *Physiological and Biochemical Zoology*. 87(4):576–584. DOI: 10.1086/676309
- 2014 Yamato, M., Koopman H., Niemeyer, M., and **Ketten, D.** Characterization of lipids in adipose depots associated with minke and fin whale ears: comparison with “acoustic fats” of toothed whales. Submitted: *Marine Mammal Science*; DOI: 10.1111/mms. 121 20, 15 pp/.

- 2014 **Ketten, D.R.** Sonars and Strandings: Are Beaked Whales the Aquatic Acoustic Canary? *Acoustics Today*. 10(3): 46-56. (Cover article)
https://acousticstoday.org/issues/2014AT/Summer2014/AT_SUMMER_2014.pdf
- 2014 Edds-Walton P.L., Arruda J., R.R. Fay, R.R., and **Ketten D.R.** Computerized Tomography of the Otic Capsule and Otoliths in the Toadfish, *Opsanus tau*. *Journal of Morphology*. 13 pp. DOI 10.1002/jmor.20336.
- 2014 Scharr A.L., Mooney T.A., Schweizer F.E., **Ketten, D.R.** Aminoglycoside Induced Damage in the Statocyst of the Longfin Inshore Squid, *Doryteuthis pealeii*. *Biol. Bull.* **227**: (1):51-60.

In Press/Submitted

- 2015 **Ketten, D.R.**, J. Arruda, and S. Cramer, M. Yamato. Great ears: Low Frequency Sensitivity Correlates in Land and Marine Leviathans. In: *The Effects of Noise on Aquatic Life, II*. A. Popper and A. Hawkins (eds). Springer-Verlag. 15 pp. In press.
- 2015 Yamato, M., **Ketten, D.**, Feijoo, G. Sound propagation through the minke whale (*Balaenoptera acutorostrata*) head modeled using the finite element method. Submitted: *Journal of the Acoustical Society of America*. In revision
- 2015 Mooney T.A., W.C. Yang, H.Y. Yu, **D. R. Ketten**, and I.F. Jen Hearing abilities and sound reception of broadband sounds in an adult Risso's dolphin (*Grampus griseus*), *Journal of Comparative Physiology A*. In press.
- 2015 Ellison et al., Modeling the aggregated exposure and responses of bowhead whales (*Balaena mysticetus*) to multiple sources of anthropogenic underwater sound. Submitted.

Book Chapters/Technical Reports

- 1992 **Ketten, D.R.** The Marine mammal ear: Specializations for aquatic audition and echolocation. In: *The Evolutionary Biology of Hearing*, D. Webster, R. Fay, and A. Popper (eds.), Springer-Verlag, pp. 717-750.
- 1996 **Ketten, D.R.** Estimates of Explosive Impacts on Marine Mammals. Report to East Coast Ecosystems, Government of Canada, Canadian Office of Naval Operations.
- 1997 **Ketten, D.R.** Assessments and Calculations of Acoustic Impacts from Subsurface Blasts. NMFS and Mass. Water Resources Authority Report.
- 1998 **Ketten, D.R.** Marine mammal Hearing and Acoustic Trauma: Basic Mechanisms, Marine Adaptations, and Beaked Whale Anomalies. In: *Report of the Bioacoustics Panel*, NATO/SACLANT, A. D'Amico and W. Verboom (eds.), pp. 2/21, 2/63-78.
- 1998 **Ketten, D.R.** Marine Mammal Auditory Systems: A Summary of Audiometric and Anatomical Data and Its Implications for Underwater Acoustic Impacts. NOAA Tech. Memor. NMFS, NOAA-TM-NMFS-SWFSC-256, 74 pp.
- 1999 Wartzok, D. and D.R. **Ketten** Marine Mammal Sensory Systems. In: *Biology of Marine Mammals*. J. Reynolds and S. Rommel (eds.), Smithsonian Institution Press, pp. 117-175

- 1999 Popper, A., **Ketten**, D.R., Dooling, R., Yost, W., Brill, R., Ridgway, S., and Shusterman, R. Effects of Anthropogenic Sounds on Hearing in Marine Animals. ONR Tech. Rpt., pp. 52-89.
- 2000 **Ketten**, D.R. Cetacean Ears. In: Hearing by Whales and Dolphins. W. Au, R. Fay, and A. Popper (eds.), SHAR Series for Auditory Research, Springer-Verlag, pp. 43-108.
- 2003 Committee on Potential Impacts of Ambient Noise in the Ocean on Marine Mammals, Ocean Noise and Marine Mammals. National Research Council, 204 pages.
- 2004 International Whaling Commission, Scientific Committee Report Annex K: Report of the Standing Working Group on Environmental Concerns, Marine Mammal Hearing and Evidence for Hearing Loss, Appendix 4 (pp 27-31).
- 2005 Norman, S.A., S. Raverty, B. McLellan, A. Pabst, D.R. **Ketten**, M. Fleetwood, J.K. Gaydos, B. Norberg, L. Barre, T. Cox, B. Hanson, and S. Jeffries Multidisciplinary Investigation of Harbor Porpoises (*Phocoena phocoena*) Stranded in Washington State from 2 May – 2 June 2003 Coinciding with the Mid-Range Sonar Exercises of the USS SHOUP. NOAA Northwest Fisheries. U.S. Department of Commerce, National Oceanic and Atmospheric Administration, National Marine Fisheries Service, NOAA Technical Memorandum NMFS-NWR-34.
- 2005 **Ketten**, D.R. Beaked Whale Necropsy Findings for Strandings in the Bahamas, Puerto Rico, and Madeira, 1999-2002, Woods Hole Oceanographic Institution Technical Publication WHOI-2005-09. 36 pp.
- 2006 **Ketten**, D.R., I. Fischer, S. Cramer, S.M. Bartol, and J. OMalley Water, Fats, and Acoustic Impedance: Soft tissue adaptations for underwater hearing in turtles, seabirds and marine mammals. 23rd International Symposium on Sea Turtle Biology and Conservation, Living with Sea Turtles, NOAA Technical Report, p. 162.
- 2007 Nachtigall, Paul E., Purdy Michael G., Tyack Peter L., West Richard D., Worcester Peter F., Costa Daniel P., D' Spain Gerald, **Ketten** Darlene R., and Orcutt John A. Scientific research caucus statement: Report of the federal representatives of the marine mammal commission advisory committee on acoustic impacts on marine mammals (supplement), 01/2006, p.1-22,
- 2007 Young, N. (ed) Authors: Arruda, J.; Costidis, A.; Cramer, S.; **Ketten**, D.R.; McLellan, W.; Montie, E.W.; Moore, M.; Rommel, S., Odontocete salvage, necropsy, ear extraction, and imaging protocols. ONR/NOA Fisheries, 157 pp.
<https://reefshark.nmfs.noaa.gov/pr/mm/sysadmin/nrsworkshop/>
- 2007 **Ketten**, D. R., S. Cramer, and J. Arruda. A Manual for the Removal, Fixation, and Preservation of Cetacean Ears. WHOI Technical Report. WHOI-2012-01, 26.pp.
- 2008 **Ketten**, D. R., E. Montie. Imaging Procedures for Stranded Marine Mammals. WHOI Technical Report, WHOI-2008-02, pp. 1-27.
- 2011 Bureau of Ocean Energy Management (BOEM), Department of Navy (DON), National Oceanic and Atmospheric Administration (NOAA), Marine Mammals and Sound Workshop: Report to the National Ocean Council Ocean Science and Technology Interagency Policy Committee, 69 pp.

- 2015 **Ketten, D.R.** Naval Sonars, Strandings, and Responsible Stewardship of the Seas. In: Navies and Soft Power: Historical Case Studies of Naval Power and the Non-use of Military Force, B. A. Elleman and S.C.M. Paine (eds.) Naval War College Press. Pp. 127-145.

Theses

- 1979 **Ketten, D.R.** Development of Planktonic Foraminifera: Oceanic Distributions and Growth in Culture. M.S. thesis, Massachusetts Institute of Technology, 128 pp.
- 1984 **Ketten, D.R.** Correlations of Morphology with Frequency for Odontocete Cochlea: Systematics and Topology. Ph.D. thesis, The Johns Hopkins University, 335 pp.

Plenary/Keynote Lectures

- 1998 **Ketten, D.R.** Man-made noise in the oceans: Irrelevant or irreparable? Plenary lecture, World Marine Mammal Conference; joint meeting, European Cetacean Society and the Society for Marine Mammalogy, Monaco.
- 1998 **Ketten, D.R.** Marine mammal ears: An Anatomical perspective on underwater hearing. Plenary Lecture, Acoustical Society of America, joint with International Acoustical Society, Seattle, Washington.
- 2002 **Ketten, D.R.** Structure, function, and injury: Marine vs. air-adapted ears. Plenary Lecture, Workshop on Significance of Sound Waves in the Marine Environment. Universitaet Kiel, Forschungs- und Technologiezentrum Westkueste, Germany.
- 2003 **Ketten, D.R.** If You've Seen One Mammal Ear, Have You Really Seen Them All? Keynote Lecture, International Conference on Communication by Animals, Acoustical Society of America, College Park, MD
- 2004 **Ketten, D.R.** Science, Strandings, and Conservation. Keynote Lecture, Workshop on Australian and New Zealand Stranding Response Efforts, Australian Ministry of the Environment, Conservation, Wildlife Impacts and Protection, Dept. of the Environment and Heritage, Sydney, NSW, Australia.
- 2005 **Ketten, D.R.** How to See What Whales Hear: Anatomical and Mathematical Modeling of Underwater Hearing. NIH-NIDCD Special Lecture.
- 2006 **Ketten, D.R.** Lessons from strandings: hearing, underwater sound, and hearing loss. Invited paper, Seismic Activity and the Marine Environment, Seminar, Rio de Janeiro, Brazil.
- 2006 **Ketten, D.R.** Mitigation: new directions and dead ends Invited plenary paper, Seismic Activity and the Marine Environment, Seminar, Rio de Janeiro, Brazil.
- 2007 **Ketten, D.R.** and S. Bartol-Moehn Hearing in Sea Turtles, Invited plenary paper The Effects of Noise on Aquatic Life, Nyborg, Denmark
- 2007 **Ketten, D.R.** Underwater Ears and the Physiology of Impacts: Comparative Liability for Hearing Loss in Sea Turtles, Birds, and Mammals, Invited plenary paper The Effects of Noise on Aquatic Life, Nyborg, Denmark
- 2007 **Ketten, D.R.** Effects of Noise: Comparisons for Air and Water Borne Sounds in Mammalian Ears. Neurosciences Colloquium, University of Maryland.

- 2009 **Ketten, D.R.** Underwater Ears and Potential Impacts: What whales can and cannot hear. Israeli Zoological Society, Keynote Lecture, University of Tel Aviv, Tel Aviv, Israel.
- 2009 **Ketten, D.R.** Whale and Bat Sonar: Imaging to Understand Convergence, Divergence, and Parallelism Hadassah Hospital, Dept. of Otolaryngology, Special Lecture for the Neurosciences, Jerusalem, Israel.
- 2013 **Ketten, D.R.** The Vertebrate Ear: Does Better Hearing Carry Higher Risk? 3rd International Conference: The Effects of Noise on Aquatic Life. Budapest, Hungary.
- 2014 **Ketten, D.R.** J. Arruda, S. Cramer, A. Zosuls, and D. Mountain. Biomechanical Modeling of Hearing in Whales: Implications for Underwater Acoustic Impacts. Keynote Address, Marine Megafauna Symposium, Australian Marine Science Association (AMSA 2014), Canberra, Australia.
- 2015 **Ketten, D.R.** Underwater Ears: Structure, Function, and Noise, Neurosciences Colloquium, Institut für Zoologie Rheinische Friedrich-Wilhelms-Universität, Bonn University, Bonn, Germany.

Invited Lectures/Papers

- 1978 Bishop, J.K.B., D.R. **Ketten**, R. Collier, M. Kurz, and J.M. Edmond The chemistry, biology, and vertical flux of particulate matter from the upper 1500 m. of the equatorial Pacific Ocean. Invited paper, Amer. Soc. of Limnology and Oceanography.
- 1984 **Ketten, D.R.** and D. Shirazian Stenurus infections of the harbor porpoise: A new finding and its behavioral implications. Invited paper, Helminthological Society of Washington.
- 1984 **Ketten, D.R.** Applications of recent radiographic procedures to the cochlear structures of cetaceans. Invited paper, Delta Omega Honor Society, Ann. Sess. Rsch. in Public Health.
- 1989 **Ketten, D.R.** and D. Wartzok Three-dimensional reconstructions of the dolphin cochlea. Invited paper, Sensory Biology Symposium, Fifth International Theriological Congress, Rome, Italy.
- 1990 **Ketten, D.R.** The Marine mammal ear: Specializations for aquatic audition and echolocation. Invited paper, Wever-Van Berjeik Symposium on the Evolution of the Ear.
- 1991 **Ketten, D.R.** Multi-electrode Interactions with Inner Ear Structure. Invited paper, Asilomar Conference on Cochlear Implantation.
- 1991 **Ketten, D.R.** The Cetacean Ear: Form, Frequency, and Function. Invited paper, Sensory Systems and Behavior of Marine Mammals, USSR Academy of Sciences, Severtsov Institute of Evolutionary Morphology and Ecology of Animals, and The Andreev Acoustical Institute, Third International Symposium on Marine Mammals, Moscow, USSR.
- 1991 **Ketten, D.R., D.K. Odell, and D.R. Domning** Structure, Function, and Adaptation of the Manatee Ear. Invited paper, Sensory Systems and Behavior of Marine Mammals, USSR Academy of Sciences, Severtsov Institute of Evolutionary Morphology and Ecology of Animals, and The Andreev Acoustical Institute, Third International Symposium on Marine Mammals, Moscow, USSR.

- 1991 **Ketten**, D.R. Specializations of marine mammal ears for aquatic audition and echolocation. Invited paper, Symposium on Communication, Ninth Biennial Conference on the Biology of Marine Mammals.
- 1992 **Ketten**, D.R. If you've seen one mammalian cochlea, have you really seen them all? Invited paper, Association for Research in Otolaryngology.
- 1992 **Ketten**, D.R. Anatomy and Function of the Whale Ear. Invited paper, American Association of Veterinary Anatomists.
- 1993 **Ketten**, D.R. Cetacean inner ear anatomy: How to see what whales hear. Invited paper, National Marine Fisheries Service and International Wildlife Coalition, Northeast Regional Marine Mammal Stranding Conference.
- 1993 **Ketten**, D.R., J. Lien, and S. Todd Blast injury in humpback whale ears: Evidence and implications. Invited paper, 126th Meeting, Acoustical Society of America.
- 1993 Lien, J., S. Todd, P. Stevick, F. Marques, and D. **Ketten** The reaction of humpback whales to underwater explosions: Orientation, movements, and behavior. Invited paper, 126th Meeting, Acoustical Society of America.
- 1993 **Ketten**, D.R. Low frequency tuning in marine mammal ears, Invited paper, Symposium on Low Frequency Sound in the Ocean, Tenth Biennial Conference on the Biology of Marine Mammals.
- 1994 **Ketten**, D.R. Differences in post-meningitic occlusions in children vs. adults, Invited paper, Conference on Pediatric Implantation, New York.
- 1994 **Ketten**, D.R., J. Lien, S. Todd, and S. Ridgway Acoustic damage in whale ears: Aging vs. injury. Invited paper, Harderwijk International Marine Mammal Sensory Symposium, Netherlands.
- 1994 **Ketten**, D.R. Functional Analyses of Whale Ears: Adaptations for Underwater Hearing, Invited paper. I.E.E.E Underwater Acoustics Conference, OSATES Oceans '94, Brest, France.
- 1994 **Ketten**, D.R. Whale ears: Structural analyses and implications for acoustic trauma. Invited paper, 128th Meeting, Acoustical Society of America.
- 1995 **Ketten**, D.R. Radiologic Assessment. Invited paper, Cochlear Implants in Adults and Children. 100th NIH Consensus Development Conference, Washington, D.C.
- 1995 **Ketten**, D.R. How Low Can a Whale Ear Go: A Three-D Model Approach to Marine Mammal Hearing. Invited paper, XXIV International Ethological Conference, Hawaii.
- 1995 **Ketten**, D.R. and M.W. Skinner Three-Dimensional Measures of Inner Ear Neuroanatomy and Position of Nucleus Cochlear Implant Electrodes. Invited paper, 1995 International Conference on Implantable Auditory Prostheses. Asilomar, California.
- 1996 **Ketten**, D.R., J.B. Nadol, Jr., B.J. Burgess, J.A. Trehey In vivo vs. in situ measures in cochlear implantation. Invited paper, Association for Research in Otolaryngology, Temporal Bone Workshop.

- 1996 **Ketten**, D.R. Structure of the Cetacean Ear. Invited paper, Association for Research in Otolaryngology, Marine Mammal Symposium.
- 1996 **Ketten**, D.R. Acoustic Trauma in Whale Ears. Invited paper, American Cetacean Society.
- 1997 **Ketten**, D.R. Marine Mammal Hearing: How do they do it and what are we doing to it? Invited paper, 1997 Northeast Regional Stranding Network Conference.
- 1997 **Ketten**, D.R., M. W. Skinner, G. Gates, J. B. Nadol, Jr., and J. G. Neely In vivo Measures of Intracochlear Electrode Position and Greenwood Frequency Approximations, Invited paper, 1997 International Conference on Implantable Auditory Prostheses. Asilomar, California.
- 1997 Brill, R.L., P. W. B. Moore, L. A. Dankiewicz, and D.R. **Ketten** Evidence of hearing loss in an Atlantic bottlenose dolphin (*Tursiops truncatus*). Invited paper, 134th Meeting, Acoustical Society of America.
- 1997 **Ketten**, D.R., P. W. B. Moore, L. A. Dankiewicz, and W. Van Bonn The slippery slope of a Johnsonian ear: Natural variability versus natural loss. Invited paper, 134th Meeting, Acoustical Society of America.
- 1998 **Ketten**, D.R. Imaging the Auditory System from Stem to Stern: Inner ear disease and cochlear implantation, Invited paper, Special Session on Imaging, American Academy of Audiology.
- 1998 **Ketten**, D.R. Marine mammal Hearing and Acoustic Trauma: Basic Mechanisms, Marine Adaptations, and Beaked Whale Anomalies. Invited paper, Bioacoustics Session. NATO/SACLANT Mtg. on LFS Effects, La Spezia, Italy.
- 1998 **Ketten**, D.R. *In vivo* Imaging of Intracochlear Electrode Positions, Invited paper, Cochlear Implant Workshop, Amer. Academy. of Otolaryngology-Head and Neck Surgery.
- 1998 **Ketten**, D.R. In vivo Analyses of Insertion Trauma, Invited paper, Surgeon's Workshop on Cochlear Implantation, Amer. Academy. of Otolaryngology-Head and Neck Surgery.
- 1998 **Ketten**, D.R. Acoustic/Explosive Effects on Marine Mammals, Invited paper, 1998 Information Transfer Meeting, Minerals Management Service.
- 1999 **Ketten**, D.R. Whale Ears and Anatomy: How to See What They Hear. US NE Student Chapter for Marine Mammalogy. Invited paper, WHOI.
- 1999 **Ketten**, D.R., H. Krum, E. Chittick, C. Merigo, and E. Melvin Acoustic Fatheads: Parallel Evolution of Soft Tissue Conduction Mechanisms in Marine Mammals, Turtles, and Birds, Invited paper. Joint meeting, Acoustical Society of America/ European Acoustics Association, Berlin. J. Acoust. Soc. Am. Volume 105, Issue 2, pp. 1110-1110.
- 1999 **Ketten**, D.R. M. W. Skinner, J.Y. Shiao, J. B. Nadol, Jr., and C. J. Long Implantation measures: Electrode Paths, Trauma Sites, and Spiral Ganglion Distributions Invited paper, Conference on Implantable Auditory Prostheses.
- 1999 **Ketten**, D.R. Ear damage in whales, Invited paper, Marine Mammal Bioacoustics Short Course, Acoustical Society of America and Society for Marine Mammalogy.

- 2000 **Ketten**, D.R. In vivo Imaging and Cochlear Implants: Current Images and Future Directions. Invited paper. CI2000: International Surgical Conference on Implantation.
- 2001 **Ketten**, D.R. Whales, Ship Strikes, and Sound: What We Know and What We Need to Know, Invited paper, European Cetacean Society, Rome, Italy.
- 2001 **Ketten**, D. R., O'Malley, J., Mead, J., Sandberg, G., and McCall, S. Beaked Whale Auditory Systems: Structure, Specializations, and Correlates of Trauma, Invited paper, Thirteenth Biennial Conference on the Biology of Marine Mammals.
- 2002 **Ketten**, D.R. Ocean noise as a stressor of marine mammals, Invited paper, Florida Marine Mammal Health Conference, Gainesville, Fla.
- 2002 **Ketten**, D.R. Bahamas Beaked Whales, Invited paper, Annual Meeting of NOAA Fisheries Working Group on Marine Mammal Unusual Mortality Events.
- 2002 **Ketten**, D.R. Marine Mammal Hearing and Evidence for Hearing Loss, Invited paper, IAGC Workshop on Seismic Exploration.
- 2002 **Ketten**, D.R. Anthropogenic effects of Ocean Noise: Known and potential causes of hearing loss in Marine Mammals Invited paper, Deutsche Forschungsgemeinschaft, Workshop, Impact of Acoustics on Marine Organisms, Berlin.
- 2002 **Ketten**, D.R. Marine Mammals and Ocean Noise: Normal vs. Damaged Hearing Invited paper, SERDP Annual Technology Exchange Meeting, Washington, D.C..
- 2003 **Ketten**, D.R. Effects of noise on Hearing: Marine mammal evidence and analyses Invited paper, European Cetacean Society, Workshop on Effects of Sonar, Gran Canarias.
- 2003 **Ketten**, D.R. Underwater Ears and the Physiology of Impacts: Is it Don Ho, Smoking Sonars, or What? Invited paper, Fourteenth Biennial Conference on the Biology of Marine Mammals
- 2004 **Ketten**, D.R. Cranial Trauma: Evidence for and against acoustic impacts. Invited paper, IWC, Sorrento, Italy.
- 2004 **Ketten**, D.R. Marine Mammal Hearing and Evidence for Hearing Loss, Invited paper, IWC Workshop on Acoustics, Sorrento, Italy.
- 2004 **Ketten**, D.R., Dolphin, W.F, Williams, R. Arruda, J.O'Malley, J. In vivo imaging correlated with otoacoustic emissions as a metric for ear disease in seals. Invited paper Acoustical Society of America, San Diego.
- 2005 **Ketten**, D.R., J. Shoshani, D. P. Domning, J. O'Malley, J. Arruda, S. Cramer, C. O'Connell, and J. Meng Great ears: functional comparisons of land and marine leviathan auditory systems. Invited paper, 9th International Mammalogical Congress. Sapporo, Japan
- 2008 **Ketten**, D. R , A. E Bowles, W. T Ellison, J. J. Finneran, R. L Gentry, C. R Greene , D. Kastak, J. H. Miller, P. E Nachtigall, W. John Richardson, B. Southall, J. A Thomas, and Peter Tyack . Proposed Marine Mammal Noise Exposure Criteria: Current Data Base, Limitations, and Research Needs. Acoustical Society of America, ACOUSTICS 2008, Paris, France. Journal of the Acoustical Society of America, 06/2008, Volume 123, Issue 5, p.2988.

- 2008 **Ketten**, D.R., J. Arruda, J. O'Malley, S. Cramer, and J. Hammock Non-Anthropogenic deafness in marine mammals: Hearing that is Going, going, gone. Invited paper Acoustical Society of America, Miami. Journal of the Acoustical Society of America, 11/2008, Volume 124, Issue 4, p.2505
- 2009 Mooney, TA, Hanlon, RT, Christensen-Dalsgaard, J, Madsen, PT, **Ketten**, DR, and Nachtigall, PE. Do squid hear echolocating predators? Acoustic sensitivity of the longfin squid, *Loligo pealeii*. 5th Animal Sonar Symposium. Kyoto, Japan.
- 2009 **Ketten**, D. R., Yamato, M., Clark, C., Ellison, W., Mountain, D., Zosuls, A. Mysticete Hearing: Basso, Biosonar, or Both? Invited paper 5th Animal Sonar Symposium, Kyoto, Japan.
- 2010 **Ketten**, D.R. Marine Mammal Auditory System Noise Impacts: Evidence and Incidence. 2nd International Meeting on the Effects of Noise on Aquatic Life. Cork, Ireland.
- 2010 Mooney, TA, Hanlon, RT, Christensen-Dalsgaard, J, Madsen, PT, **Ketten**, DR, and Nachtigall, PE. The hearing of the longfin squid (*Loligo pealeii*) and sensitivity to low frequency noise. 2nd International Meeting on the Effects of Noise on Aquatic Life. Cork, Ireland.
- 2010 **Ketten**, D.R., J. Arruda, S. Cramer, and M. Dunn Cochlear Morphometrics from CT: Length, Insertion, and Neuronal Distribution Estimates. Objective Measures in Auditory Implants, 6th International Symposium, St. Louis, Mo.
- 2011 Mooney, TA, S Li, D R **Ketten**, K Wang, D Wang Hearing pathways in the finless porpoise, *Neophocaena phocaenoides*, and implications for noise impacts. J. Acoust. Soc. Am. Volume 129, Issue 4, p. 2431.
- 2011 **Ketten**, D R, C R Williams, TA Mooney K Matassa, and K Patchet *In vivo* measures of hearing in seals via auditory evoked potentials, otoacoustic emissions, and computerized tomography. The Journal of the Acoustical Society of America 129, p. 2431.
- 2011 **Ketten**, D.R. Hearing Risks in Underwater Ears: What the Incidence of Hearing Impairment in Wild Animals May Tell Us about Potential Impacts. NATO Conference on Effects of Sound on Marine Mammals, Amsterdam, Netherlands.
- 2011 **Ketten**, D.R. Noise Impacts in Air-Adapted Ears: Mechanisms of Damage, Recovery, and Permanent Loss. International Bioacoustics Congress, La Rochelle, France
- 2012 **Ketten**, D.R., J. Simmons, H. Riquimaroux, S. Cramer, J. Arruda. Cochlear Structural Variants in Echolocators. Special Session on Biosonar: Joint meeting: Acoustical Society of America (ASA), Acoustical Society of China (ASC), Western Pacific Acoustics Conference (WESPAC) and the Hong Kong Institute of Acoustics (HKIOA), Journal of the Acoustical Society of America, 04/2012, Volume 131, Issue 4, p.3423-3423.
- 2012 **Ketten**, D.R. Underwater Hearing Impacts: Causes, Severity, and Types of Hearing Loss in Marine Species. Ocean Acoustics 2012, Third International Conference on Ocean Acoustics, Office of Naval Research Ocean Acoustics Program, The Chinese Academy of Sciences, National Natural Science Foundation of China, Beijing, China.

- 2012 **Ketten, D.R.** Modeling Minke Whale Hearing: Anatomical Substrates of Hearing. 2nd Programme Review Meeting of the Joint Industry Programme (JIP) on Exploration & Production Sound and Marine Life. Herndon, VA.
- 2012 **Ketten, D.R., T.A. Mooney, S. Cramer, J. Arruda.** Evidence of hearing loss in marine mammals via Auditory Evoked Potentials (AEP), Otoacoustic Emissions (OAE), and Computerized Tomography (CT). Hearing Physiology Special Session 11th European Conference on Underwater Acoustics (ECUA 2012), Edinburgh, UK
- 2012 **Ketten, D.R., J. Simmons, H. Riquimaroux, S. Cramer, J. Arruda.** Critical Cranial and Cochlear Structures in Echolocators. Biomimetics Special Session 11th European Conference on Underwater Acoustics (ECUA 2012), Edinburgh, UK
- 2012 **Ketten, D.R., D Wang, T.A. Mooney, S Li, K Wang.** Rivers to Open Ocean: Evidence for Marine Mammal Hearing Impacts. Sensory World of Fish and Fisheries: The Impact of Human Activities, Shanghai Ocean University
- 2012 **Ketten, D.R. Error! Reference source not found.** answers. Australian Acoustical Society. Australian Acoustical Society. Fremantle, WA.
- 2013 **Ketten, D. R.,** "The vertebrate ear: does better hearing carry higher risk?", 3rd International Conference: The Effects of Noise on Aquatic Life, Budapest, Hungary, pp. 85, 2013.
- 2013 **Ketten, D.R.** Parallel Adaptations for Underwater Hearing in Whales, Turtles, and Sea Birds. Colloquium, Interdisciplinary Center for Vertigo and Balance Disorders, Zürich University Hospital.
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