

CURRICULUM VITA

David M. Fields

Bigelow Laboratory for Ocean Sciences
180 McKown Pt Rd
West Boothbay Harbor
ME 04553

Personal

Born: 1964
Citizenship: USA

Education

- 1981 - 1986 **B.S. Biology. University of Utah**
1985 - 1986 **Boston University Marine Program (BUMP) - Undergraduate Semester**
 Woods Hole, MA
1988 - 1989 **University of Washington - Department of Oceanography**
1989 - 1991 **M.S. State University of New York - Stony Brook.** Thesis title: "Outer limits and
inner structure: the 3 - dimensional flow field of *Pleuromamma xiphias*."
1990 **University of Hawaii - Institute of Marine Biology.**
 Behavioral Ecology and Ethology of Coral Reef Animals.
1992 - 1996 **Ph.D. Coastal Oceanography. State University of New York - Stony Brook.**
Dissertation title: "Implication of a moving fluid on predator-prey interactions among
copepods".

Academic\Professional Appointments

- 1997 - 1998 **Postdoctoral Fellow - WATER Institute - University of Wisconsin.**
1998 - 2001 **Postdoctoral Fellow - Georgia Institute of Technology**
2000-2004 **Consultant - Kona Blue Water Farms. Kailua Kona, HI**
2001-2004 **Research Scientist - Georgia Institute of Technology - Atlanta, GA 30332**
2004-Present **Senior Research Scientist – Bigelow Laboratory for Ocean Sciences – West Boothbay**
 Harbor, ME 04575
2005-Present **Faculty of the Graduate School – University of Maine - Orono**
2006-Present **Research Scientist - Norwegian Institute of Marine Research - Austevoll**

Publications

- Yen, J. and D.M. Fields. 1992. Escape responses of *Acartia hudsonica* (Copepoda) nauplii from the flow field of *Temora longicornis* (Copepoda). *Erg. der Limnol.*: 36:123-134.
Fields, D.M. and J. Yen. 1993. Outer limits and inner structure: the 3 - dimensional flow field of *Pleuromamma xiphias* (Copepoda). *Bull. Mar. Sci.* 53: 84-95.
Jonasdottir, S. H., D.M. Fields, and S. Pantoja. 1995. Copepod egg production in Long Island Sound as a function of the chemical composition of seston. *Mar. Ecol. Prog. Ser.* 119: 87-98.
Fields, D.M. and J. Yen. 1996. The escape behavior of *Pleuromamma xiphias* from a quantifiable fluid mechanical disturbance. In Lenz, P.H. D.K. Hartline, J.E. Purcell, and D.L. Macmillan. (eds.), *Zooplankton: Sensory Ecology and Physiology*. Vol. 1, pp. 323-340. Gordon and Breach Publ., Amsterdam.
Fields, D.M. 1996. The Interaction of Calanoid Copepods with a Moving Fluid Environment: Implications for the Role of Feeding Current Morphology in Predator - Prey Interactions. Ph.D. State University of New York. p. 353.
Fields, D.M. and J. Yen. 1997. Implication of copepod feeding currents on the spatial orientation of their prey. *J. Plankton Res.* 19: 79-85.
Fields, D.M. and J. Yen. 1997. The escape behavior of marine copepods in response to a quantifiable fluid mechanical disturbance. *J. Plankton Res.* 19: 1289-1304.
Fields, D.M., J.R. Strickler, S. Wroczynski and D. Vande Slute. 1998. The creation of laboratory

- generated turbulence. Technical Report #48 to the WATER Institute.
- Fields, D.M. 1998. The implications of biologically and physically created fluid motion on the sensory horizon of copepods. *Oceanography*. 11(2): 26.
- Moore, P.A., D.M. Fields, and J. Yen. 1999. The physical constraints of chemoreception in foraging copepods. *Limnol. Oceanogr.* 44(1): 166-177.
- Gries, T. K Johnk, D.M. Fields and J.R. Strickler. 1999. Size and structure of 'footprints' produced by *Daphnia*: impact of animal size and density gradients. *J. Plankton Res.* 21:509-523.
- Fields, D.M. 2000. Characteristics of the high frequency escape reactions of *Oithona sp.* *Marine and Freshwater Behaviour and Physiology* 34: 21-35.
- Preston, BL, Snell, TW, Fields, DM, Weissburg, MJ. 2001. The effects of fluid motion on toxicant sensitivity of the rotifer *Brachionus calyciflorus*. *Aquatic Toxicology* 52(2), 117-131.
- Doall, MH, JR Strickler, DM Fields, J Yen. 2002. Mapping the attack volume of a free-swimming planktonic copepod, *Euchaeta rimana*. *Marine Biology*. 140: 871-879.
- Fields, D.M., D. S. Shaeffer, M.J. Weissburg. 2002. Mechanical and neural responses from the mechanosensory hairs on the antennule of *Gaussia princeps*. *Mar. Ecol. Prog. Ser.* 227:173-186.
- Fields, D.M and J. Yen, 2002. Fluid mechanosensory stimulation of behavior from a planktonic marine copepod *Euchaeta rimana* Bradford. *J. Plankton. Res.* 24(8): 747-755.
- Lapensa, S. T.W. Snell, D.M. Fields, M. Serra. 2002. Predatory interactions between a cyclopid copepod and rotifer sibling species. *Freshwater Biology* 47: 1685-1695
- Thompson, C, D.M. Fields, Zhang, Z-R, N McCarty. 2004. Inhibition of CIC-2 by a peptide component of scorpion venom. *J. Gen. Physiol.* 122: 29A
- Lapensa, S. T.W. Snell, D.M. Fields, M. Serra. 2004. Selective feeding of *Artodiaptomus salinus* (Copepoda, Calanoida) on co-occurring sibling rotifer species. *Freshwater Biology* 49: 1053-1061
- Fields, D.M. and M.J. Weissburg. 2004. Rapid depolarization rates from the antennules of copepods. *J.Comp. Phys A* 190(11): 877-882
- Thompson CH, Fields DM, Olivetti PR, Fuller MD, Zhang ZR, Kubanek J, McCarty NA. 2005. Inhibition of CIC-2 by a peptide component of scorpion venom. *J. Membrane Biol.* 208: 65-76.
- Fields, D.M. and M.J. Weissburg. 2005. Evolutionary and ecological significance of mechanosensory morphology: Copepods as a model system. *Mar. Ecol. Prog. Ser.* 287: 269-274
- Fields, D.M. Weissburg, M.J. and Browman, HI. 2007. Chemoreception in the salmon louse (*Lepeophtheirus salmonis*): an electrophysiological approach. *Dis. Aquat. Org.* 78:161-168.
- *Fields, D.M and J. Yen, In Prep. Structure and suspected function of the feeding current of marine copepods: a case study for three copepod species.
- Mellard, J.P, Fields, D.M., Brown, J., Weissburg, M.J., Yen, J. *Submitted*. Copepod mechanoreception in viscous fluid environments. *Society for Integrative and Comparative Biology*.

Collaborator

J. Yen (GIT); M. Weissburg (GIT); N. McCarty (Emory) M. Sieracki (BLOS); A. Milligan (OSU); M. Serra (Valencia Spain); S. Lapensa (Valencia Spain); Houshuo Jiang (WHOI); C. O'Kelly (BLOS); R Wahle (BLOS); H Browman (IMR-Norway); LS Incze (USM).

Grants and Awards

1990	Graduate Student Travel Award	
1991	Graduate Student Travel Award	
1991	Nominated for best Masters Thesis - SUNY Stony Brook	
1992 - 1993	Natural History Museum of NY - Learner Gray Award	
1993	Graduate Student Travel Award	
1999 - 2002	P.I. Marc Weissburg – J. Yen	NSF - Sensory Systems
	3 Yr Post Doctoral Salary	
	“Signal Recognition by Zooplankton”	
2002-2004	P.I. Kona Blue Water Farms.	NSF – ATP
	Consultant – David Fields	
2003 - 2008	P.I. David Fields	NSF - Sensory Systems

2003 - 2009	“Mechanoreception in marine copepods: detecting complex fluid signals” Co P.I. – P.I. Browman, H. Research Council of Norway “The sensory biology of host detection in the parasitic salmon louse, <i>Lepeophtheirus salmonis</i> : electrophysiological and behavioural investigations”
2005 – 2006	PI Annette Sharone NSF Centers for Ocean Sciences Education Excellence - Oceans in the Earth-Sun System
2006 - 2007	Co P.I. – P.I. Browman, H. Research Council of Norway “Proof of Concept for an inexpensive salmon lice trap”
2007 – 2009	PI-David Fields NSF-Biological OCE The role of phytoplankton ballast material in deterring copepod grazing
2007 - 2008	REU Supplement. Mechanoreception in Marine Copepods: Detecting Complex Fluid Signals
2007 - 2009	Co PI – PI Incze L. ONR-Marine Mammal S&T Energy transfer to upper trophic levels on a small offshore bank.
2007 - 2009	P.I – David Fields NSF-IOB Collaborative Research: From structure to information in mechanosensory systems. The role of sensor morphology in detecting fluid signals.
Pending	Co PI - PI Goes J. NSF-Bio OCE Collaborative Research - The emergence of unusual Noctiluca blooms in the Arabian Sea during the northeast monsoon - causes and consequences

Invited Seminars

- 1996 - University of Wisconsin Milwaukee - “The interactions of copepods with a moving fluid environment”.
- 1997 - University of Wisconsin Milwaukee - “The role of kinematic viscosity in a ecology of plankton”
- 1997 - Stazione Marina di Napoli, Naples Italy – “Mechanoreception in marine organisms”
- 1998 - The Oceanographic Society, Paris France - “The role of biologically and physically forced fluid motion on the sensory horizon of copepods”.
- 1999 – Georgia Institute of Technology - “The detection of biologically and physically forced fluid motion by the mechanoreceptors of copepods”.
- 1999 – University of Minnesota – “The distribution of copepods in an active fluid environment”.
- 2000 – United Engineering Foundation Tuscany, Italy – “Decoding complex fluid mechanical signals: Neural responses from the mechanosensory hairs on the antennule of *Gaussia princeps*”.
- 2001 – University of Alabama - Dauphin Island Marine Laboratory.
- 2002 – University of Northern Colorado.
- 2003 – Austevoll Aquaculture Research Station, Norway
- 2003 – Bigelow Oceanographic Institute, ME
- 2004 – University of Texas – Austin
- 2006 – University of Maine – Orono
- 2006 – ASLO Victoria Canada

Published Abstracts - Reports

- Fields, D.M 1990. Early to bed early to rise: proximate cues for crepuscular activities in the cleaning wrasse, *Labroides phthiophagus*. *First international Coconut Island conference on the behavioral ecology and ethology of coral reef animals*. August 10, University of Hawaii, Oahu HI, USA.
- Fields, D.M and J. Yen. 1991. Outer limits and inner structure: the 3 - dimensional flow field of *Pleuromamma xiphias* (Copepoda). *Proceedings of Zooplankton Ecology Symposium* 21-25 August 1991, Lawrence University, Appleton, Wi, USA.
- Fields, D.M. and J. Yen. 1992. The feeding ecology of *Pleuromamma xiphias*: a vertically migrating copepod. *Abstr. Aquatic Science Meeting Amer. Soc. Limnol. Oceanogr.*, - Santa Fe, NM, 9-14 February 1992.

- Yen, J. and D.M Fields. 1992. Escape responses of *Acartia hudsonica* (Copepoda) nauplii from the flow field of *Temora longicornis*. Abstr. *Aquatic Science Meeting Amer. Soc. Limnol. Oceanogr.*, Santa Fe, NM, 9-14 February 1992.
- Fields, D.M. and J. Yen. 1994. The escape of *Pleuromamma xiphias* in response to a quantifiable fluid dynamic disturbance. *EOS, Trans. Am. Geophys. Union* 75:184.
- Moore, P.A., D.M. Fields, and J. Yen. 1994. The fine scale structure of chemical signals within the feeding current of a calanoid copepod. *EOS, Trans. Am. Geophys. Union* 75:163.
- Yen, J. and D.M Fields. 1994. Behavioral responses of *Euchaeta rimana* to a controlled fluid mechanical disturbance. *EOS, Trans. Am. Geophys. Union* 75:184.
- Fields, D.M. and J. Yen. 1995. The escape behavior of marine copepods in response to a quantifiable fluid mechanical disturbance. *Symp. The sensory ecology and physiology of zooplankton.* Oahu, Hawaii.
- Fields, D.M. and J. Yen. 1996. Implication of copepod feeding currents on the spatial orientation of their prey. *1996 Ocean Sciences Meeting, AGU, San Diego, CA, 12-16 February 1996.*
- Fields, D.M. and J. Yen. 1997. The escape response of marine copepods to shear, a quantified fluid mechanical disturbance. Abstr. *Aquatic Science Meeting Amer. Soc. Limnol. Oceanogr.*, Santa Fe, NM, 9-14 February 1997.
- Fields, D.M. 1998. The implications of biologically and physically created fluid motion on the sensory horizon of copepods. *Oceanography.* 11(2) :26
- Fields, D.M., J. Yen, D.S. Shaeffer, M.W. Miller and M.W. Weissburg. 1999. Behavioral thresholds for *Euchaeta rimana* in response to fluid mechanical signals. Abstr. *Aquatic Science Meeting Amer. Soc. Limnol. Oceanogr.*, Santa Fe, NM, 1-5 February.
- Fields, D.M., D.S. Shaeffer, M.W. Miller and M.W. Weissburg. 2000. Physiological thresholds of *Gaussia princeps* to controlled mechanical stimuli. Abstr. *Aquatic Science Meeting Amer. Soc. Limnol. Oceanogr.*, Copenhagen, DK, June.
- Fields, D.M., D.S. Shaeffer, M.J. Weissburg. 2000. Living in the dark: The role of mechanoreception in the ecology of marine copepods. Abstr. *Second International Symposium on -The Mechanics of Plants, Animals and their Environments: Sensors and Sensing in the Natural and Fabricated World.* Tuscany Italy, June.
- Yen J. and D.M. Fields. 2000. Hydrodynamic prey mimic elicits capture from an aquatic microcrustacean copepod. Abstr. *Second International Symposium on -The Mechanics of Plants, Animals and their Environments: Sensors and Sensing in the Natural and Fabricated World.* Tuscany Italy, June.
- Fields, D.M., A. Reed, and M.W. Weissburg. 2001. The rapid behavioral response of *Calanus finmarchicus* to controlled mechanical stimuli. Abstr. *Aquatic Science Meeting Amer. Soc. Limnol. Oceanogr.*, Albuquerque, NM, Feb.
- Fields, D.M., D.S. Shaeffer, M.W. Miller and M.W. Weissburg. 2002. Decoding Complex Fluid Mechanical Signals: Neural Responses From the Mechanosensory Hairs on the Antennule of *Gaussia princeps*... Abstr. *Aquatic Science Meeting Amer. Soc. Limnol. Oceanogr.*, Honolulu, HI, Feb.
- Chang Y., D.M. Fields, J. Brown, J. Yen, and D. Webster. 2002. Pleopod kinematics of the krill, *Euphausia pacifica* Abstr. *Aquatic Science Meeting Amer. Soc. Limnol. Oceanogr.*, Victoria, Canada, June.
- A.I. Liatis*, D.M. Fields and M.J. Weissburg 2002 Neural Recordings from *Euphausia pacifica* in response to mechanical stimulation. *Howard Hughes Presentations* Georgia Institute of Technology.
- Fields, D.M. 2003 Copepod mechanoreceptors as a model system for mechanosensory orientation. Georgia Tech Robotic Initiative.
- Mellard, J.P.; Fields, D.M.; Brown, J.; Weissburg, M.J.; Yen, J. 2004 Behavioral Adaptation of a polar copepod. ASLO, Savannah GA July.
- Mellard, J.P.*; Fields, D.M.; Brown, J.; Weissburg, M.J.; Yen, J. 2005 Effects of Viscosity on Copepod Signal Detection. Society for Integrative and Comparative Biology. San Diego, CA January.

- Proceedings from a Workshop on Right Whale Foraging in the Nearshore Waters of the Northern Gulf of Maine Edited by Laura Taylor Singer* and Laura Ludwig. April 15, 2005 Saco, Maine*
- Fields, D.M. 2006. The Orientation of Copepods: Does it matter? ASLO – Victoria BC Canada
Incze, L.S., Wolff, N., Rosen, S., Baukus, A., Stevick, P., Hebridean Kraus, S. Fields, DM., Advection, internal waves and trophic funneling on a small offshore bank. ASLO – 2007 Santa Fe
- Fields, DM and H. Jiang. Sensory morphology and fluid structure: determining the form function relationship in mechanosensory hairs. ASLO – 2007 Santa Fe

Academic Service

Courses Taught

- 1986 - 1987 **High school science teacher.**
 Steamboat Springs CO. Grades 9-12. Taught all levels of biology and math including calculus.
- 1993 **Co-Taught advanced undergraduate marine zooplankton.**
 State University of New York - Stony Brook, NY with Dr. Jeannette Yen. Organized lectures and labs for 3 weeks (3 classes, 1 lab per week).
- 1997 **Lecturer for Animal Behavior Course.**
 University of Wisconsin - Milwaukee, WI. - Dr. J.R. Strickler
 Animal Behavior - Course # 204 - 530 – 3 lectures.
- 1998 **Lecturer for Ecology Course.**
 Georgia Institute of Technology. Atlanta GA. - Dr. M. Weissburg
 Ecology – Four lectures (general).
- 1999 **Lecturer for Ecology Field Course.**
 Georgia Institute of Technology. Atlanta GA. - Dr. T. Snell
 Ecology – Use of optical tools in the field. (1 lecture – 1 lab)
- 2000 **Lecturer for Biological Oceanography.**
 Georgia Institute of Technology. Atlanta GA. - Dr. J. Montoya
 Oceanography - Two lectures (Global Warming).
- 2000 **Lecturer for Ecology Field Course.**
 Georgia Institute of Technology. Atlanta GA. - Dr. T. Snell
 Ecology – Use of optical tools in the field. Predation – Fish and zooplankton
 (2 lecture – 2 labs).
- 2002 **Senior Seminar Course.**
 Georgia Institute of Technology. Atlanta GA.
 (8 lecture).
- 2005 **Ecology “Down Under”.**
 Georgia Institute of Technology. Atlanta GA.
- 2005 **Small-Scale Physical-Biological Interactions in the Plankton**
 Bigelow Laboratory for Ocean Sciences. West Boothbay Harbor. ME
- 2006 **Ecology “Down Under”.**
 Georgia Institute of Technology. Atlanta GA.
- 2007 **Ecology “Down Under”.**
 Georgia Institute of Technology. Atlanta GA.
- 2007 **Small-Scale Physical-Biological Interactions in the Plankton**
 Bigelow Laboratory for Ocean Sciences. West Boothbay Harbor. ME

Students Supervised

Graduate Students

- 2001 **Ph.D. Committee** – Ben Preston - Georgia Institute of Technology.
- 2003 **Ms Committee** – Yin Chang - Georgia Institute of Technology.
- 2004 **Ph.D. Committee** - Sara Lapensa Universidad de Valencia, Spain
- 2005 **Ph.D. Committee** – Soren Hansen University of Maine Orono

2006 **Ph.D. Committee** –Rachael Lansley - Georgia Institute of Technology.

Undergraduate Students

- 1993 **Supervised Undergraduate Project.**
State University of New York - Stony Brook, NY. Peter Esser - Project title “Examining the escape behavior of zooplankton”. (Professor Dr. J. Yen).
- 1997 **Supervised Undergraduate Project.**
University of Wisconsin - Milwaukee, WI. Michelle Taylor - Project title “Mechanical signals eliciting the escape of copepods”. (Professor Dr. J. R. Strickler).
- 1997 **Supervised Undergraduate Research Education (REU) Student.**
University of Wisconsin - Milwaukee, WI. Dinora Carolina Penalva- Project title “Feeding rates of *Daphnia pulicaria* at different temperatures”.
- 1998-99 **Supervised Undergraduate Project.**
Georgia Institute of Technology - Atlanta, GA. David Schaeffer - Project title “Neurological response of copepods to controlled fluid mechanical signals”.
- 1998 **Supervised Undergraduate Project.**
Georgia Institute of Technology - Atlanta, GA. Matt Miller - Project title “Effects of Fluid viscosity on the swimming behavior of *Daphnia pulicharia*”.
- 1999 **Supervised Undergraduate Project.**
Instituto Cavanilles de Biodiversidad y Biología Evolutiva.
Universidad de Valencia - Atlanta, GA. Sara Lapensa
- 2000 **Supervised Undergraduate Project.**
Georgia Institute of Technology - Atlanta, GA. Alana Reed -
- 2000 **Supervised Undergraduate Project.**
Georgia Institute of Technology - Atlanta, GA. Catherine Lee –
- 2001 **Supervised Undergraduate Project.**
Georgia Institute of Technology - Atlanta, GA. Ayo Afejuku – The role of chemical signals in mediating the fluid mechanical threshold of copepods.
- 2002-3 **Supervised Undergraduate Project.**
Georgia Institute of Technology - Atlanta, GA. A.I. Liatis – Neural recordings from the antennules of *Euphasia pacificus*.
- 2004-5 **Supervised Undergraduate Project.**
University of New England – Maine. Sarah Weissman. Behavior of marine copepods

Professional Services

NSF Panels – 2008 - Sensory Systems

Grant reviewer:

National Science Foundation (NSF)
Biological Oceanography
Sensory Systems

National Oceanic and Atmospheric Association (NOAA) - Florida Bay Foundation.

Journal reviewer:

Contributing Editor - Aquatic Biology.
Review Editor - Marine Ecological Progress Series.
Journal of Plankton Research.
Hydrobiologia.
Limnology and Oceanography.
Estuaries.

Education Panel

Panel for Interdisciplinary Program in Biology and Mechanical Engineering.
University of Wisconsin - Milwaukee, WI.

Relevant Experience

Lipid research.

- 1987 - 1988 Weyerhaeuser Paper Company. Federal Way, WA - Duties included lipid extractions and quantitative analysis.
- 1989 - 1991 State University of New York - Stony Brook (Jeannette Yen) - Analyzed lipid content of Long Island Sound copepods using a Mark IV Iatroscan for lipid identification and quantification.

Scientific cruises.

- 1990 *Oceanus* - Bermuda-Woods Hole - (David Carron P.I.) 700m net collections - Feeding of *Pleuromamma xiphias* on micro-zooplankton - Chlorophyll analysis for Dr. D. Lonsdale
- 1991 - 1996 *Onrust* - Long Island Sound - Seven single day cruises for copepod and algal collections. Volunteered to assist 1st year graduate students in conducting fish trawls and plankton net tows.
- 1997 *Neeskay* - Lake Michigan (Fox Point Cruise) - Plankton tows from 20 meters.
- 1999 *Pt. Sur*- Monterey Canyon – Plankton Hauls at 800- 1000meters

1993-1996

Field station.

Designed and managed Dr. Yen's field station at Natural Energy Laboratory of Hawaii, Kailua-Kona, HI. Designed and maintained optical equipment. Also sampled and identified copepods collected from 585 meters and from surface. Experience with high speed microcinematography with Dr. J. Rudi Strickler.

1994-1996

Industrial larval biology.

Black Pearl Inc. Kailua-Kona, HI - Maintained algal and larval oyster cultures. Spawning was induced and eggs allowed to be fertilized. Spats were raised for 4 months and shipped to grow-out stations in Micronesia. To improve settling, larval behavior was studied using video analysis. In addition, we experimented with inorganic mineral concentrations within the culture media in an effort to alter pearl coloration. Tasks also involved periodic diving for animal collection (100+ feet depth).

Thesis Advisors

Ph.D. Jeannette Yen Don Ping Wang
J. Rudi Strickler Akira Okubo
Steve Morgan Darcy J. Lonsdale

Post Doctoral Advisors

J.R. Strickler M.J. Weissburg

Additional Education

- 1991 PADI Diver Certification. Presently over 210 Dives
Certified University of Hawaii Diver.
- 1993 Small Boat License. Certified U.S. Coast Guard Auxiliary. Stony Brook, New York
- 1997 Instrument shop certification –UWM
- 1998 Instrument shop certification – GIT

Professional Societies

- 1989 - present American Society of Limnology and Oceanography.
- 1994 - present American Geophysical Union.
- 1997 - present The Oceanography Society