

**CURRICULUM VITAE**  
**MARY M. HAGEDORN**  
Smithsonian Institution  
(hagedornm@si.edu)

**Personal:**

Citizenship: U.S.

**Education:**

*Jackson College*, Tufts University, Medford, MA 02155. Bachelor of Arts in Biological Science, February 1975.

*Tufts University*, Medford, MA 02155. Master of Science in Biology, May 1976.

*Scripps Institution of Oceanography*, University of California at San Diego, Ph.D. in Marine Biology, December 1983.

Languages: English, Spanish, French

**Professional Experience:**

1978-1979	Behavioral research, U California at San Diego, Dr. W. Heiligenberg, advisor.
1979-1983	Graduate student, University of California at San Diego.
1984-1986	NIH National Science Research Award, Cornell U.
1986-1987	NIH National Science Research Award, Inst. of Neurosciences, University of Oregon.
1987-1992	Research Associate, Inst. of Neurosciences, University of Oregon.
1992-1995	Career Development Fellow and Research Associate, Smithsonian Institution.
1993-Present	Research Scientist, Department of Reproductive Sciences, Smithsonian Institution
1993- Present	Visiting Assistant Research Scientist, Department of Biology, University of Maryland at College Park.
1996-Present	Scientific Facilitator with the Conservation Breeding Specialist Group, IUCN (World Conservation Union).
2003-Present	Adjunct Faculty, University of Hawaii, Hawaii Institute of Marine Biology

**Research Experience:**

1978-1979: Behavioral research on the electromotor response of weakly electric fish under the direction of Dr. W. Heiligenberg.

1979-1983: Dissertation research on the population ecology, courtship behavior and neurophysiology of *Hypopomus occidentalis* a pulse-type electric fish.

1984-1985: The evolution of an electric organ from an acoustic organ: behavioral and physiological recordings of a new weakly electric fish, the catfish *Synodontis sp.*

- Acoustical studies during courtship and mating of the mormyrid, *Pollimyrus isidori*. A study of the natural history of an African wave-type electric fish, *Gymnarchus niloticus* in the Gambia river, West Africa.
- 1986-1987: Anatomical and physiological studies on visual processing of information in African Cichlid fish, *Haplochromis burtoni*. Anatomical and physiological studies of an efference copy in a wave-type electric fish, *Gymnarchus niloticus*.
- 1987-1988: Behavioral and molecular techniques used to delineate the development of the jamming avoidance response in the weakly electric fish, *Eigenmannia*. Neuroethological studies of the visual system. Anatomical and physiological studies on a visually mediated aggressive behavior the eye-bar response.
- 1988-1990: Autoradiographic, immunohistochemistry, and molecular techniques used to describe the onset and development of rod precursors in the developing retina of *Haplochromis burtoni*. Investigation of individually identified cells in the developing retina of a teleost using confocal and time-lapsed microscopy.
- 1991-1992: Physiological basis of audition. Whole cell voltage clamping of frog saccular hair cells.
- 1993- 1999: Neuroethology of social communication in electric fish. Biodiversity of electric fish.
- 1993- Present: Membrane physiology, molecular biology, osmoregulation, and cryobiology of non-mammalian systems.

### Field Experience:

- Panama: (1979-1986) Ten field trips over 7 years working in association with the Smithsonian Tropical Research Institute in the rivers of the Atlantic drainage on the ecology of *Hypopomus occidentalis*.
- Venezuela: (1981-1982) Two field trips to the Amazon and one to the Western plains studying social communication in electric fish.
- The Gambia, West Africa: (1984) A fisheries study in association with the Michigan River Resources Team, O.M.V.G., and the Ministry of Fisheries, The Gambia, monitoring the fish communities that use the flood plains of the river Gambia.
- Florida: (1985) Social communication in mature electric fish, *Gymnarchus niloticus*, in seminatural ponds.
- Pakitza, Peru: (1990; 1993) Biodiversity and ecology of electric fish in Western Amazonas.
- Río Napo and Aguas Negras, Peru: (1993-1994) Biodiversity and ecology of electric fish.
- Río Pastaza and Marañón, Peru: (1999) Biodiversity and ecology of electric fish.
- Coconut Island, Hawaii Institute of Marine Biology, Kaneohe Bay, Hawaii: (2002 and 2003) Physiology of Pacific coral larvae.
- Florida Keys: (2005) Physiology of Atlantic coral larvae.
- Puerto Rico : (2006 to 2009) Cryobiology of coral endangered coral larvae and sperm.
- Singapore and Sulawesi (2010) Cryobiology of coral.
- Belize: (2011) Conservation of endangered Staghorn coral (*Acropora cervicornis*).
- Australia: (2011) Freezing the Great Barrier Reef.

### Teaching Experience:

- Teaching Assistant in General Biology, General Biology Laboratory, courses in Ecology and Evolution, Tufts University, 2 years.
- Teaching Assistant in the Neurobiology Techniques Laboratory, Cornell University, Fall 1985.

Visiting Assistant Professor, Introduction to Animal Behavior, Biology 115, University of Oregon, January 1987.  
 International Biodiversity Course, Biodiversity of the Aquatic Ecosystem, Conservation Research Center, Smithsonian Institution, May 1994.  
 Scientist in the Classroom, teaching science to inner-city grammar school students, Biodiversity Course, Johns Hopkins University, 1999, 2000  
 Native Hawaiian science program, Nā Pua No'eau, 2008, 2009,  
 Scientist in Program, NMNH, 2009  
 FONZ Class on Coral Conservation 2009  
 Ocean Acidification, Hawaii Institute of Marine Biology 2010

### **Honors and Awards:**

1975 B.A. degree received with cum laude status in Biology  
 1979 Smithsonian Institution Short-term Fellow- \$10,000  
 1979 National Geographic Field Award- \$6,000

1980 Foundation for Ocean Research, field award- \$6,000  
 1983-86 National Institutes of Health, National Research Science Award, Fellowship- \$25,000  
 1985 Smithsonian Visiting Scientist Award- \$4,000  
 1989 O.N.R. Scholarship - Hopkins Marine Station Summer Course- \$2,000  
 1990 Smithsonian Field Award – Biolat - \$10,000  
 1992 Smithsonian Field Award - Biolat- \$10,000  
 1992-95 Smithsonian Career Development Award - \$150,000  
 1993 Sea Grant College of Maryland - \$10,000  
 1993 Smithsonian Field Award - Biolat- \$10,000  
 1994 Smithsonian Field Award - Biolat- \$10,000  
 1995-2000 National Institutes of Health, RO1 Award - \$350,000  
 1996 Sea Grant College of Maryland - \$100,000  
 1996 John Ball Zoo Conservation Society - \$1,000  
 1998 Sea Grant College of Maryland - \$80,000  
 2000 Sea Grant College of Maryland - \$44,000  
 2000 Donation from the S. Sichel Foundation - \$100,000  
 2000-02 George E. Burch Fellowship in Theoretic Medicine and Affiliated Theoretic Sciences, Smithsonian Institution - \$100,000  
 2001 Sponsored an International Workshop on Conservation of Endangered Fish Species Through the Cryopreservation of Fish Embryos - \$20,000  
 2002 Coral Cryopreservation - Friends of the National Zoo - \$5,500  
 2002-06 National Institutes of Health RO1 Award - \$1,200,000  
 2005 Nominated as a Pew Fellow in Marine Conservation  
 2005 Coral Larva Physiology, Smithsonian Marine Network Grant - \$4,500  
 2006 Coral Larva Physiology, Smithsonian Marine Network Grant - \$4,500  
 2007 NOAA Coral Conservation Award - \$30,000  
 2007-10 Zebrafish Sperm Cryopreservation, NIH- \$1,250,000  
 2007 Morris Animal Foundation Grant - \$89,000  
 2008 Awakening Consumer Award for Conservation  
 2008 Smithsonian Women's Committee Grant - \$22,5000  
 2009 Smithsonian Women's Committee Grant - \$22,5000  
 2009 Coral Cryopreservation, Smithsonian Marine Network Grant - \$14,800

2009-11 Donation from S. Engel's Foundation - \$30,000  
2012 Rolex Award for Endeavor Finalist

### Memberships:

Society for Cryobiology  
Editorial Board, Journal of Cryobiology  
Former Board of Governors, Society for Cryobiology  
Member of USDA's Aquatic Committee for the National Animal Germplasm Program  
Member Scientific Advisory Board of an international coral conservation organization, SECORE

## BIBLIOGRAPHY

### Publications:

- Hagedorn M. (1983) Social signals in electric fish. Doctoral dissertation. The University of California, San Diego.
- Hagedorn M, Heiligenberg W. (1985) Court and spark: Electric signals in the courtship and mating of gymnotoid fish. *Anim. Behav.* 33: 254-265.
- Hagedorn M, Carr CE. (1985) Single electrocytes produce a sexually dimorphic signal in the South American electric fish, *Hypopomus occidentalis*. (Gymnotiformes, Hypopomidae). *J. Comp. Phys.* 156: 511-523.
- Hagedorn M. (1986) The ecology, courtship and mating of gymnotiform electric fish. pp. 497-525, In: Electroreception, eds. Bullock, T. H., Heiligenberg, W., John Wiley & Sons, New York.
- Crawford JD, Hagedorn M, Hopkins CD. (1986) Acoustic communication in an electric fish, *Pollimyrus isidori* (Mormyridae). *J. Comp. Physiol.* 159: 297-310.
- Hagedorn M. (1988) The ecology and behavior of a pulse-type fish, *Hypopomus occidentalis* (Gymnotiformes, Hypopomidae), in a fresh water stream in Panama. *Copeia* 1988, No. 2: 324-335.
- Hagedorn M, Heiligenberg W, Carr CE. (1988) The development of the Jamming Avoidance Response in the weakly electric fish, *Eigenmannia*. *Brain Behav. Evol.* 31:161-169.
- Hagedorn M, Zelick R. (1990) Relative dominance among males dominance is expressed in the electric organ discharge characteristics of a weakly electric fish. *Anim. Behav.* 38: 520-525.
- Hagedorn M, Womble M, Finger T. (1990) Synodontid catfish, a new group of weakly electric fish: Possible cues to the evolution of the electric system. *Brain Behav Evol* 35: 268-277.
- Hagedorn M. (1992) Review of Electrocommunication in Teleost Fishes: Behavior and Experiments, by B. Kramer. *Copeia* 1: 693-694.
- Hagedorn M, Fernald RD. (1992) Retinal growth and cell addition during embryogenesis of the teleost, *Haplochromis burtoni*. *J. Comp. Neurol.* 321 (2): 193-208.
- Hagedorn M, Vischer H, Heiligenberg W. (1992) Development of the jamming avoidance response in weakly electric fish. *J. Neurophys.* 23(10):1446-1466.
- Hagedorn M. (1992) Social influences on the courtship and breeding of gymnotiform electric fish. In: Proceedings of the International Australian Lungfish Breeding Workshop; D. Moreno, ed.; Cleveland Metroparks Zoo pp. 40-50.

- Hagedorn M. (1995) The electric fish, *Hypopomus occidentalis*, can rapidly modulate the amplitude and duration of their electric organ discharges. *Anim. Behav* 49: 1409-1413.
- Hagedorn M, Keller C. (1996) Species diversity of gymnotiform fishes in Manu Bioreserve, Pakitza, Peru. pp. 483- 502, In: Manu: The biodiversity of Southeastern Peru (D.E. Wilson and A. Sandoval, eds.). Smithsonian Institution Press, Washington DC, 679 pp.
- Hagedorn M, Hsu EW, Pilatus U, Wildt DE, Rall WF, Blackband SJ. (1996) Magnetic resonance microscopy and spectroscopy reveal kinetics of cryoprotectant permeation in a multicompartmental biological system. *Proc. Nat. Acad. Sci.* 93: 7454-7459.
- Hagedorn M, Kleinhans FW, Wildt DE, Rall WF. (1997) Chill sensitivity and cryoprotectant permeability of dechorionated zebrafish embryos, *Brachydanio rerio*. *Cryobiology* 34: 251-263.
- Hagedorn M, Kleinhans FW, Freitas R, Liu J, Hsu E, Wildt DE, Rall WF. (1997) Water distribution and permeability of zebrafish embryos, *Brachydanio rerio*. *J. Exp. Zool.* 278: 356-371.
- Hagedorn M, Hsu E, Kleinhans WF, Wildt DE. (1997) New approaches for studying the permeability of fish embryos: towards successful cryopreservation. *Cryobiology* 34: 335-347.
- Hagedorn M, Kleinhans FW, Artemov D, Pilatus U. (1998) Characterization of a major permeability barrier in the zebrafish embryo. *Biology of Reproduction* 59:1240-1250.
- Hagedorn M, Mack A, Evans B, Fernald RD. (1998) The Embryogenesis of rod photoreceptors in the teleost fish retina, *Haplochromis burtoni*. *Developmental Brain Research* 108:217-227.
- Hagedorn M. (1999) Potential *ex-situ* conservation impact to fish biodiversity through the cryopreservation of fish embryos. In: *Biology of Tropical Fish* (A. L. Val and V. M. F. Almeida-Val, eds.), pp. 303-315, INPA, Manaus, Brazil.
- Janik M, Kleinhans FW, Hagedorn M. (2000) Overcoming a permeability barrier by microinjecting cryoprotectants into zebrafish embryos (*Brachydanio rerio*). *Cryobiology* 41: 25-34.
- Hagedorn M, Kleinhans FW. (2000) Problems and prospects in cryopreservation of fish embryos. In: *Cryopreservation in Aquatic Species* (T. R. Tiersch and P. M. Mazik, eds.), pp. 161-178, World Aquaculture Society, Baton Rouge, Louisiana.
- Hagedorn M, Lance SL, Fonseca DM, Kleinhans FW, Artemov D, Fleischer R, Hoque ATMS, Pukazhenti BS. (2002) Altering the membranes of fish embryos with aquaporin-3: an essential step for cryopreservation. *Biology of Reproduction* 67:961-966.
- Hagedorn M. (2004) The Lure of Field Research on Electric Fish. In: *The Senses of Fishes: Adaptations for the Reception of Natural Stimuli*, ed. G. Von der Emde, J. Mogdans and B. G. Kapoor, Boston : Kluwer Academic Publishers, pp.377.
- Lance SL, Peterson AE, Hagedorn M. (2004) Developmental Expression of Aquaporin-3 in Zebrafish Embryos (*Danio rerio*) *Comp Biochem Physiol C Toxicol Pharmacol.* 2004 Jul; 138(3):251-8.
- Hagedorn M, Peterson AE, Mazur P, Kleinhans FW. (2004) High ice nucleation temperature of zebrafish: slow freezing is not an option. *Cryobiology*. Oct; 49(2):181-9.
- Hagedorn M. (2006) Avian genetic resource banking: can fish embryos yield any clues for bird embryos? *Poult Sci.* 85(2):251-4.
- Hagedorn M, Pan R, Cox E, Hollingsworth L, Lewis TD, Leong JC, Krupp DA, Mazur P, Rall WF, MacFarlane D, Fahy G, Kleinhans FW. (2006) Coral larvae conservation: Physiology and reproduction. *Cryobiology* 52:33-47.

- Hagedorn M, Carter VL, Steyn RA, Krupp D, Leong J, Lang RP, Tiersch TR. (2006) Preliminary studies of sperm cryopreservation in the mushroom coral, *Fungia scutaria*. *Cryobiology* 52(3):454-8.
- Hand S, Hagedorn M. (2008) Aquatic Preservation: New Methods for Animal and Cell Preservation In: Oceans and Human Health, eds, PJ Walsh, SL Smith, LE Fleming, HM Solo-Gabriele, W Gerwick, pp 613-632, Elsevier, New York .
- Petersen D, Carl M, Borneman E, Brittsan M, Hagedorn M, Laterveer M, Schick M. Noah's ark for the threatened Elkhorn coral *Acropora palmata*. (2008) *Coral Reefs* 27: 715-715.
- Hagedorn M, Ricker J, McCarthy M, Meyers SA, Tiersch TR, Varga ZM, Kleinhans FW. Biophysics of zebrafish (*Danio rerio*) sperm. (2009) *Cryobiology* 58(1): 12-9.
- Hagedorn M, Carter VL, Hollingsworth L, Leong JC, Kanno R, Borneman EH, Petersen D, Laterveer M, Brittsan M, Schick M. (2009) *Ex situ* culture of Caribbean and Pacific coral larvae comparing various flow-through chambers. In: Proceedings of the Smithsonian Marine Science Symposium, eds. Lang MA, Macintyre IG, Rutzler K, pp. 259- 268, Smithsonian Institution Press, Washington DC.
- Hagedorn M, Carter VL, Ly S, Andrell RM, Yancey PH, Leong JC, Kleinhans FW. Analysis of internal osmolality in developing coral larvae, *Fungia scutaria*. (2010) *Physiol Biochem Zool.* 2010 Jan-Feb;83(1):157-66.
- Yancey PH, Heppenstall M, Ly S, Andrell RM, Gates RD, Carter VL, Hagedorn M. Betaines and dimethylsulfoniopropionate (DMSP) as major osmolytes in Cnidaria with endosymbiotic dinoflagellates. (2010) *Physiological and Biochemical Zoology* 83(1): 197-73.
- Hagedorn M, Carter VL, Leong JC, Kleinhans FW. (2010) Physiology and Cryosensitivity of Coral Symbiotic Algae (*Symbiodinium sp.*). *Cryobiology* 60:147-158.
- Hagedorn M, Byers O. (2010) Conserving the world's reefs through live and frozen banks. *Animal Keepers' Forum* Vol 37, no 12. p558-563.
- Hagedorn, M. 2011. Conserving Coral Reefs. In: *Cryopreservation in Aquatic Species*. Tiersch, T. R. and C. C. Green, Editors. World Aquaculture Society, Baton Rouge, Louisiana. Pp. XX-XX. (in press)
- Hagedorn M, Carter VL. (2011) Zebrafish reproduction: revisiting the basics to increase sperm cryopreservation success. *PLoS ONE* 6(6): e21059. doi:10.1371/journal.pone.0021059
- Erfteemeijer PLA, Hagedorn M, Laterveer M, Craggs J, and James R. Guest JR (2011) Effect of suspended sediment on fertilization success in the scleractinian coral *Pectinia lactuca*. (in press)
- Parkinson JE, Yasmin Abidi N, Ruiz DV, Brittsan M, Carl M, Carter VL, Christie BL, Hagedorn M, Henley M, Pulver A, Schick M, Villaverde R, Petersen D, LaJeunesse TC Baums IB (2011) Early flexibility and winnowing of algal symbionts in *ex situ* coral restoration. (submitted)
- Hagedorn M, Gordon MM, Carter VL, Meyers SM (2011) Oxidative stress in zebrafish (*Danio rerio*) sperm during cryopreservation. (submitted)
- Hagedorn M, Carter VL, Martorana K, Paresa MK, Acker J, Baums IB, Borneman EH, Brittsan M, Byers M, Henley M, Laterveer M, Leong JC, McCarthy M, Meyers S, Nelson BD, Petersen D, Tiersch T, Cuevas Uribe R, Wildt D. (2011) Preserving and using germplasm and dissociated embryonic cells for conserving Caribbean and Pacific coral. (submitted)
- Hagedorn M, Farrell A, Carter VL (2011) Cryobiology of coral fragments (in prep)

## Abstracts:

- Hagedorn M, Carr CE. (1983) Single electrocytes produce a sexually dimorphic signal in a South American electric fish. *Neurosciences Abst.* 9: 532.
- Crawford JD, Hagedorn M, Hopkins CD. (1985) Acoustic song in an electric fish. *Neurosciences Abst.* 11: 270.
- Hagedorn M, Heiligenberg W, Carr CE. (1986) The development of the Jamming Avoidance Response. *Neurosciences Abst.* 12: 313.
- Hagedorn M, Finger T. (1986) Two species of *Synodontis* are weakly electric. *First International Congress of Neuroethology* 1: 98.
- Hagedorn M, Fernald RD. (1987) The neuroethology of a visually mediated response: the eye-bar response. *Neurosciences Abst.* 13: 620.
- Hagedorn M, Fernald RD. (1988) The neuroethology of the eye-bar response: the motor control. *Neurosciences Abst.* 14: 690.
- Hagedorn M, Fernald RD. (1990) Embryonic origin of teleost rod photoreceptors. *ARVO* 31 (4): 158.
- Hagedorn M. (1990) Social signals in South American gymnotiform electric fish. *Amer. Physiol. Soc.* (56.2).
- Hagedorn M, Fernald RD. (1991) Immunohistochemical staining of the developing teleost retina: is GABA a pioneering substance for rods? *Neurosciences Abst.* 17:185.
- Hagedorn M. (1991) Social influences on the breeding of tropical fish. *International Australian Lungfish Breeding Conference* (in press).
- Roberts WM, Hagedorn M. (1992) Cytoplasm of frog saccular hair cells has a calcium buffer more effective than 0.5 mM BAPTA. *Biophys. J.* 61: A142.
- Hagedorn M, Roberts WM. (1992) Biotinylated charybdotoxin blocks calcium activated potassium channels in frog saccular hair cells. *Soc. Neurosci. Abstr.* 18: 73.
- Hagedorn M, Westerfield M, Wildt DE, Rall WF. (1993) Preliminary studies on the cryobiological properties of dechorionated zebrafish embryos. *Cryobiology* 30:614.
- Hagedorn M, Freitas R, Wildt DE, Rall. WF. (1995) Progress on creating a genetic bank for endangered species of fish: I. Osmometric studies of dechorionated zebrafish embryos. *Cryobiology* 32:566-567.
- Hagedorn M, Hsu E, Wildt DE, Rall WF, Blackband SJ. (1995) Progress on creating a genetic bank for endangered species of fish: II. Permeability studies of dechorionated zebrafish embryos. *Cryobiology* 32: 567.
- Hsu E, Hagedorn M, Blackband SJ. (1995) Chemical shift MR microscopy of cryoprotectant permeation in fish embryos. *36th Experimental NMR Conference, Boston, 1995.*
- Hsu E, Hagedorn M, Blackband SJ. (1995) Cryoprotectant permeation into zebrafish embryos using chemical shift selective MR Microscopy. *Society for Magnetic Resonance Third Annual Meeting, Nice, France, August 1995.*
- Hagedorn M, Hsu E, Pilatus U, Wildt DE, Rall WF, Blackband SJ. (1996) Magnetic resonance microscopy reveals a permeability barrier for cryoprotectants in dechorionated zebrafish embryos. *Cryobiology* 33: 667-668.
- Hagedorn M, Kleinhans FW, Hsu E, Pilatus U, Wildt DE, Blackband SJ, Rall WF. (1996) Permeability studies of dechorionated zebrafish embryos. *Cryobiology* 33: 646-647.
- Kleinhans FW, Hagedorn M. (1996) Modeling of permeability parameters in dechorionated zebrafish embryos. *Cryobiology* 33: 647.
- Hagedorn M, Kleinhans FW, Hsu E, Pilatus U, Wildt DE, Blackband SJ, Rall WF. (1996). Permeability studies of dechorionated zebrafish embryos: another difficult model. *Workshop on Transgenic Mouse Sperm Cryopreservation, May 1996, NIH.*

- Hagedorn M, Kleinhans FW, Hsu E, Pilatus U, Wildt DE, Blackband SJ, Rall WF. (1997) Cryopreservation of fish embryos. International Symposium of the Biology of Tropical Fishes, Oct. 6-9, 1997, Manaus, Brazil.
- Hagedorn, M., D. Artemov, U. Pilatus and F. W. Kleinhans (1998) Characterization and consequences of permeability barriers in zebrafish embryos. *Cryobiology* 37:424.
- Kleinhans FW, Hagedorn M. (1998) Zebrafish embryo modeling: are two compartments better than one? *Cryobiology* 37:423.
- Janik M, Kleinhans FW, Hagedorn M. (2000) Microinjection of cryoprotectants in the yolk of zebrafish embryos (*Brachydanio rerio*). Proceedings: Soc. Stud. Reprod., Biol. Reprod. Suppl. 62:146 (abstract 102).
- Hagedorn M, Janik M. (2000) Cryopreservation of Fish embryos. First International Symposium on a Gene Bank for Aquaculture, Rare and Endangered Fish and Other Hydrobiont Species, Pushchino, Russia Nov. 20-24, 2000.
- Hagedorn M, Kleinhans FW. (2001) Asymmetry in Membrane Permeability in Zebrafish Embryos. *Cryobiology* 41:58.
- Lance SL, Peterson AE, Hagedorn M. (2002) AQP3GFP expression in zebrafish embryos: timing and developmental effects. *Cryobiology* 45:104.
- Hagedorn M, Peterson AE, Mazur P, Kleinhans FW. (2003) High ice nucleation temperature of zebrafish embryos. *Cryobiology* (in press).
- Hagedorn M. (2003) Zebrafish, genomic preservation, membranes, and evolution. Aquatic Animal Models Conference, NIH.
- Hagedorn M, Lang RP. (2005) Coral sperm cryopreservation. *Cryobiology* 51:352.
- Hagedorn M, Pan R, Cox E, Hollingsworth L, Lewis TD, Leong JC, Krupp DA, Mazur P, Rall WF, MacFarlane D, Fahy G, Kleinhans FW. (2005) Coral conservation and cryopreservation. *Cryobiology* 51:404-405.
- Hagedorn, M. (2006) Aquaporins in fish embryos and its role in cryopreservation. American Physiological Society (in press).
- Hagedorn M, Steyn RA, Carter VL, Lang RP, Krupp DA, Kleinhans FW. (2006) Coral Conservation Through Cryopreservation. ASLO Abstract for February 20-24, 2006.
- Andrell R, Ly S, Hagedorn M, Carter VL, Yancey P. (2007) Glycine betaine as the major osmolyte in larva and adult *Fungia scutaria* coral. Society for Integrative and Comparative Biology (in press).
- Hagedorn M, Luis Padilla L. (2007) Preserving endangered coral. *Cryobiology* 55:353.
- Hagedorn M, Ricker J, McCarthy M, Meyers SA, Tiersch TR, Kleinhans FW. (2008) Biophysics of Zebrafish (*Danio rerio*) Sperm. Society for Study of Reproduction.
- Carter V, Varga Z, Hagedorn M. (2010) Zebrafish Reproduction: Revisiting the Basics to Increase Sperm Cryopreservation Success. 8<sup>th</sup> Conference on Zebrafish Development and Genetics, Madison, WI (in press).
- Hagedorn M, Comizzoli P, Pukazhenth B, Wildt D (2010) Preserving Long-Term Collections in the Marine Environment. Smithsonian Marine Geo Meeting June, 2010.
- Pukazhenth B, Comizzoli P, Hagedorn M. (2011) Fertility Conservation in Non-Domestic Species: Challenges, Successes and Lessons for Human Medicine. American Society of Andrology Annual Meeting 36th Annual Conference April 2 – 5, 2011 (in press).
- Hagedorn M, Carter V, Farrell, A. (2011) Cryopreservation and the Possibility of Creating a Frozen Coral Genetic Bank for the Northwestern Hawaiian Islands. 10<sup>th</sup> Northwestern Hawaiian Islands Meeting, Jan. 24 to 25<sup>th</sup>, University of Hawaii.
- Hagedorn M, Carter V, Petersen, D. (2012) Cryopreserving and Banking Coral: What has been done to date? 12<sup>th</sup> International Coral Reef Symposium, Cairns Australia.



- Hagedorn M, Carter V, Farrell, A. (2012) Do toxins in Montiporid corals play a role in competition and survival on the reef? 12<sup>th</sup> International Coral Reef Symposium, Cairns Australia.
- Petersen D, Brittsan M, Roik A, Tollrian R, Baums I, Hagedorn M. (2012) Reef conservation promoted by public aquaria and scientists – SECORE. 12<sup>th</sup> International Coral Reef Symposium, Cairns Australia.

### Book Reviews:

- Hagedorn M. (1990) Review of: *Electrocommunication in Teleost Fishes: Behavior and Experiments.*, B. Kramer, p. 240. Springer-Verlag: New York, Copeia.
- Hagedorn M. (1997) The world of electric fish. Review of: *Electric Fishes, History and Behavior.* Moller, P., p. 584. Chapman & Hall: London. Environ. Biol. of Fish. 49: 151-152.
- Hagedorn M. (1996) Review of: *Fishes of the Amazon and their Environment Physiological and Biochemical Aspects.* A.L. Val and V.M.F. de Almeida-Val. Reviews in Fish Biology and Fisheries. 6(4): 475-476.
- Hagedorn M, Tricas TC. (2005) The Sixth Sense. Review of : *Electroreception*, TH Bullock, CD Hopkins, AN Popper, and RR Fay (eds), Springer, New York, New York. (in press).

### Popular Articles

- Hagedorn M. (1996) Why create a genetic bank for endangered species of fish? Neoceratodus Newsletter, D. Moreno, A. Graffins, N. Gans, eds. Cleveland Metroparks Zoo: Cleveland.
- Petersen D, Borneman E, Brittsan M, Hagedorn M, Laterveer M. (2007) Conserving the threatened Elkhorn coral, *Acropora palmata*. AZA Magazine Jan. pp 23-25.

### Invited Presentations:

- Symposium Speaker, Frontiers in Neuroethology, San Diego, CA (1/95).
- Seminar speaker, Maryland Center for Marine Biotechnology, Baltimore, MD (6/95).
- Invited Speaker, Science Outreach, Washington, D.C. Public Schools ((5/95).
- Symposium Speaker at the International Society for Neuroethology, Cambridge, England (9/95).
- Symposium Speaker, Workshop on Transgenic Mouse Sperm Cryopreservation, NIH, Bethesda, MD (5/96).
- Symposium Speaker, Regional Aquatic Workshop, AZA, Boston, MA (6/96).
- Invited Speaker, Biology Department, George Mason University, Washington, DC (9/96).
- Invited Facilitator, CBSG Workshop on Edward's Aquifer, San Marcos, TX (10/96).
- Invited Speaker, Sidwell Friends High School Biology Class, Washington, DC (10/97).
- Invited Speaker, Oregon Museum of Science and Industry, Portland, OR (4/97).
- Invited Speaker, Biology Dept., Portland State University, Portland, OR (4/97).
- Invited Speaker, Special Seminar, Portland State University, Portland, OR (4/97).
- Invited Speaker, Advocates for Women in Science and Engineering, Portland, OR (4/97).
- Invited Speaker, Portland Community College, Portland, OR (4/97).
- Invited Speaker, Metro Washington Park Zoo, Portland, OR (4/97).
- Invited Speaker, Biology Dept., Lewis and Clark College, Portland, OR (4/97).

Invited Speaker, Binnesmead Elementary School, Portland, OR (4/97).  
 Invited Speaker, Environmental Middle School, Portland, OR (4/97).  
 Symposium Speaker, Cryopreservation of Salmonid Fishes Workshop, Moscow, ID (7/97).  
  
 Special Panelist, European Union study section panel, Lisbon, Portugal (9/98).  
 Symposium Speaker, World Aquaculture Society, Las Vegas, NV (2/98)  
 Invited Speaker, Employee Speaker Series, Smithsonian Institution, Washington, D.C. (3/98)  
 Symposium Organizer and Speaker, International Workshop on Comparative Gametes and Embryos Cryopreservation, NIH, Atlanta, GA (5/98).  
 Invited Speaker, USDA Germplasm and Gamete Physiology Laboratory, Beltsville, MD (9/98).  
 Invited Facilitator, CBSG Workshop on Endangered Salmonids, Portland, OR (11/98).  
 Invited Facilitator, CBSG Workshop on Research Priorities for National Marine Fisheries, Seattle, WA (1/99).  
 Invited Facilitator, CBSG Workshop on Red Wolf Survival Plan, Virginia Beach, VA (4/99).  
 Invited Facilitator, 7th World Congress on Breeding Endangered Species, Cincinnati, OH (5/99).  
 Symposium Organizer, World Congress on Cryobiology, Marseille, France (7/99).  
 Invited Speaker, World Bank, Washington, DC (4/00)  
 Invited Speaker, 25th Anniversary of the Conservation Research Center, Smithsonian Institution, Front Royal, VA (5/00).  
 Invited Speaker, First International Symposium on a Gene Bank for Aquaculture, Rare and Endangered Fish and Other Hydrobiont Species, Pushchino, Russia Nov. 20-24, 2000.  
 Invited Speaker, Biology Department, Woods Hole Oceanographic Institute, Woods Hole, MA (12/01)  
 Symposium Organizer: International Cryopreservation Meeting for Aquatic Species, Washington, D.C. (3/01)  
 Invited Speaker, Fisheries, Aquaculture and Veterinary Sciences, University of Rhode Island, Kingston, RI (12/01)  
 Invited Speaker, Bodega Marine Lab, UC Davis, Bodega, CA (1/02)  
 Invited Speaker, Smithsonian's National Zoological Park, Washington, DC (2/02)  
 Invited Speaker, Smithsonian's Environmental Research Center, Edgewater, MD (2/02)  
 Invited Speaker, Biology Department, University of Maine, Orno, ME (3/02)  
 Invited Speaker, Harbor Branch Oceanographic, Fort Pierce, FL (4/02)  
 Invited Speaker, University of Hawaii Institute for Marine Biology (5/02)  
 Invited Speaker, University of Miami (6/02)  
 Invited Speaker, Smithsonian Conservation Research Center, Fort Royal, VA (3/03)  
 Invited Speaker, National Zoological Park (4/03)  
 Invited Speaker, Atlantic Rangers, Alexandria, VA (3/03)  
 Invited Speaker, Smithsonian Marine Station, Fort Pierce, FL (3/03)  
 Symposium Organizer and Speaker Aquatic Animal Models of Human Disease Conference, NIH, Manassas, VA (10/03)  
 Invited Speaker, Smithsonian Travel Associates Education Program, Panama (03/04)  
 Symposium Speaker, Society for Cryobiology, Coral Conservation (7/05)  
 Poster Presentation, Society for Cryobiology (7/05)  
 Invited Speaker, Poultry Science Association National Meetings, (8/05)  
 Symposium Organizer and Speaker, Cryopreservation of Zebrafish Sperm, West Coast Zebrafish Conference, Eugene, OR (9/05)  
 SECORE Workshop, University of Puerto Rico, La Parquera, Puerto Rico (8/06)  
 Symposium Speaker, American Physiological Society Annual Meeting, Virginia Beach (10/06)

Symposium Speaker, Society for Cryobiology (7/07)  
Invited Speaker, SECORE Rincon, Puerto Rico (8/07)  
Invited Speaker, Smithsonian Marine Station (8/07)  
Invited Speaker, Smithsonian Marine Station (2/08)  
Invited Speaker, SECORE Rincon, Puerto Rico (8/08)  
Invited Speaker, MAF, Denver, CO (11/08)  
LSU-NIH Workshop Speaker, LSU, Baton Rouge, LA (2/09)  
Acroporid Workshop Organizer and Speaker, Smithsonian Marine Station, Fort Pierce  
Florida (2/09)  
Invited Speaker, MAF, Denver, CO (11/09)  
Acroporid Workshop Organizer, NOAA, Washington, DC (10/09)  
LSU-NIH Workshop Speaker, Eugene, OR (2/10)  
Invited Speaker, SECORE Singapore (3/10)  
Invited Speaker, Marine GEO Smithsonian (6/10)  
Invited Speaker, 10<sup>th</sup> Northwestern Hawaiian Islands Meeting, Jan. 24 to 25<sup>th</sup>, 2011,  
University of Hawaii.  
Invited Speaker, Australian Institute of Marine Science, Nov, 2011

### **External Services:**

Editorial Board, Journal of Cryobiology (1-2 manuscripts/month)  
Guest Editor: Journals: Aquaculture, Zebrafish, Theriogenology, Journal of  
Comparative Physiology, Biology of Reproduction (2 manuscript/month)  
Guest Reviewer of Grants: NSF, USDA, NIH (1-2 grants/year)  
Member of USDA's Aquatic Committee for the National Animal Germplasm Program  
Office of Fellowship and Grants: Scientific Reviewer for Post-doctoral Awards  
Smithsonian Associate's Program Guest Lecturer: Galapagos (2003), Panama (2004),  
Amazon (2005, 2006)  
Science outreach at Autumn Conservation Festival (families; yearly event)  
Science outreach at FONZ Zoo Nights June (most years)  
Science outreach at Zoofari (many years)  
Tours to Visiting Scientists and Guests  
FONZ Class (2008)  
Outreach "Scientist is In" at NMNH (2008, 2009)  
Outreach Nä Pua No'eau science program for gifted Native Hawaiian students  
SECORE Training Workshops (2006 to 2011)  
Reef Recovery Initiative (2011) [www.reefrecovery.org](http://www.reefrecovery.org)

### **Current Annual Funding**

#### ***Active Grants***

**Agency:** Smithsonian Marine Network, PI

**Annual Direct Costs:** \$14,800

**Title:** Coral Conservation in Belize

**Goal:** To support coral banking of the endangered species, *Acropora cervicornis*

**Agency:** Australian Institute of Marine Sciences

**Annual Direct Costs:** \$10,000

**Title:** Coral Conservation in Australia  
**Goal:** To support coral banking of two Acroporid species.

**Agency:** NSF, Consultant  
**Direct Costs:** \$222,500  
**Title:** Cryopreserving Zebrafish Oocytes  
**Goal:** To provide consulting on zebrafish oocyte cryopreservation.

*New Grant Proposals (pending)*

**Agency:** NIH, PI R21  
**Annual Direct Costs:** \$175,000  
**Title:** Cryopreservation and Transplantation of Zebrafish Spermatogonial Stem Cells  
**Goal:** To cryopreserve spermatogonial stem cells in fish.

**Agency:** Smithsonian Scholarly Studies Program, Co-PI  
**Annual Direct Costs:** \$69,707  
**Title:** Do toxins in Montiporid corals play a role in competition and survival on the reef?  
**Goals:** To support an understanding of coral reproduction and natural products chemistry.

**Agency:** Smithsonian Woman's Committee, PI  
**Annual Direct Costs:** \$22,500  
**Title:** Enhanced Training Opportunities at the Smithsonian National Zoo's Department of Reproductive Sciences  
**Goal:** To provide mentorship training programs in conservation

**Agency:** Rolex Award for Endeavor  
**Annual Direct Costs:** \$100,000  
**Title:** Freezing The Great Barrier Reef  
**Goal:** To provide training program in conservation for Australian professionals.