

CURRICULUM VITAE

CHARLES YARISH

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PERSONAL

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EDUCATION

B.S.	1970	Brooklyn College (City University of New York)
M.A.	1972	University of Texas (Austin)
Ph.D.	1976	Rutgers - The State University (New Brunswick)

EXPERIENCE

<u>FROM/TO</u>	<u>Position/Institution</u>
1970-1976	U.S. Army Reserves (grade E-6)
1971-1972	Teaching Assistant/University of Texas
1973-1976	Teaching Assistant/Rutgers University
1973-1974	Head Teaching Assistant/Rutgers University
1974	Course Coordinator/Rutgers University
1975	Summer session lecture and laboratory
1976	Assistant Professor of Biology, University of Connecticut at Stamford
1982	Associate Professor of Biology, University of Connecticut at Stamford
1983-1984	Visiting Professor of Marine Biology, University of Groningen, The Netherlands
1984	Associate Professor of Biology, University of Connecticut at Stamford
1985	Visiting Scientist Biologische Anstalt Helgoland, Federal Republic of Germany
1988-2019	Professor of Biology, University of Connecticut
1990-1994	Associate Director of Stamford Campus, University of Connecticut
1990-1994	Adjunct Professor, Marine Sciences Research Center, SUNY at Stony Brook
2001-2012	Graduate Professor, University of Porto, Portugal
2002-2007	Guest Professor, Shanghai Ocean University of China, Shanghai, PR China
2009-2010	Visiting Sea Grant Scholar, Rhode Island Sea Grant College Program
2019-present	Professor Emeritus, University of Connecticut
2021-present	Visiting Scientist, AOPE, Woods Hole Oceanographic Institution
2022-present	Chief Scientist, GREENWAVE ORG.
2023-present	CTO, MacroBreed, LLC.

C. Yarish

PROFESSIONAL SOCIETIES (Active)

International Phycological Society
Phycological Society of America
American Institute of Biological Sciences
Sigma Xi, The Scientific Research Society of North America
Northeast Algal Society
World Aquaculture Society
Connecticut Academy of Science & Engineering
Algal Biomass Organization

HONORS AND DISTINCTIONS

New Jersey State Scholarship, 1975
Sigma Xi, 1976
University of Connecticut Research Foundation Grant, 1976
University of Connecticut Faculty Summer Fellowship, 1977
University of Connecticut Research Foundation Grant, 1980
University of Connecticut Research Foundation Grant, 1982
University of Connecticut Research Foundation Grant, 1988
University of Connecticut Research Foundation Grant, 1989
University of Connecticut Research Foundation Grant, 1990
University of Connecticut Research Foundation Grant, 1992
Who's Who in the East, 1982 Office of Water Research and Technology Award, 1982-1983
The Netherlands National Science Foundation Award (Z.W.O.), 1983-1984
Connecticut Sea Grant Program, 1984-1985
Biologische Anstalt Helgoland (Zentrale) Visiting Prof. Award, 1985
Biologische Anstalt Helgoland Visiting Scientist Award, 1986 to attend the Third International Seaweed Biogeography Workshop
Invited Associate to the Columbia University Seminar on Pollution and Water Resources, 1988-present
Appointed to the Graduate Faculty of the University of Maine, 1987- 1992; 2004-present
Appointed to the Graduate Faculty of the University of Porto, Portugal; 2002-present
International Executive Service Corps Aquaculture Project in Kenya, 1988
Irish/American Aquaculture Program, 1989, 2004
Connecticut Sea Grant Program, 1985-1986, 1986-1987, 1987-1988, 1988-1990, 1990-1991, 1995-1998, 1990-1991, 1995-1998, 1998-1999, 2000-2003, 2006-2008, 2010-2013, 2012-2015

C. Yarish

HONORS AND DISTINCTIONS (continued)

National Sea Grant College Program, 1995-1998

National Sea Grant College Program, 2001-2004

NOAA's National Undersea Research Program, 1989-1990

Delegation Leader to China for the Citizen Ambassador Program, 1990

Organizing Committee for the Vth International Phycological Congress, Qingdao, China, 1994

National Research Council of Canada Advisory Board, 1990-1996

Osborne Marine Laboratory of the N.Y. Aquarium Advisory Board, 1990-1995

Delegate and Panelist for the joint coordination panels for International Division of the Office of Oceanic and Atmospheric Research, NOAA for Aquaculture and Living Resources, for People's Republic of China, 1991-1997; for South Korea (2001-2012); and Japan (2002; 2004)

Delegate to the 10th and subsequent Joint Working Group Meetings of the US/PRC Protocol on Marine and Fishery Science and Technology, 1991 and 1997

Delegate to the Third U.S.-China Living Marine Resources Joint Coordination Panel, March 11-14, 1997, Silver Springs, Maryland

Organizing Committee and Secretariat for the Vth International Phycological Congress, Qingdao, PRC, June 26-July 2, 1994

Science Technical Advisory Committee, member and elected Co-chairman, for the Long Island Sound EPA Study, April 28, 1992 – present as a member and retired as co-chair, Feb., 2010;

1st Prize, MARINALG Award, XIVth International Seaweed Symposium, Brittany, France, August 1992

Secretary of the Phycological Society of America (term from 1994-1996)

Executive Committee for the Phycological Society of America (1994-1996; 2000-2002)

National Lecturer for the Phycological Society of America (1993-1995)

Member of Model Evaluation Group for the Peconic Estuary Program, Riverhead, NY, January, 1996-2000

Senior Organizer and Session Chair of an invited symposium on "Macroalgal Cultivation" for the Triennial Meeting of the World Aquaculture Society's Aquaculture '98 meetings, Las Vegas, Nevada. Feb. 16-19, 1998.

Member of the Scientific Advisory Board of Coastal Plantations International and PhycoGen, Inc. Portland, Maine, 1998-1999.

Aquaculture 2002 the international meetings of the World Aquaculture Society. Apr. 25, 2002.

Vice President/President Elect of the Phycological Society of America (2000)

President of the Phycological Society of America (2001)

Past President of the Phycological Society of America (2002)

Member at Large, Northeast Algal Society (1999-2002)

Member of the Executive Committee of the Northeast Algal Society (2002-2005) and a Co-convener for 2004 meetings

C. Yarish

HONORS AND DISTINCTIONS (continued)

Co-convenor of an invited symposium on “Integrated Aquaculture” for the Third Asia-Pacific Phycological Forum, Tsukuba, Japan, July 22, 2002.

Science Co-Chair for the 31st Meetings of the United States-Japan Cooperative Program in Natural Resource (UJNR) Panel, Yokohama and northeast Honshu, Japan, Oct. 16-25, 2002.

Honorary Guest Professor, Shanghai Fisheries University, Shanghai, China, Nov. 2, 2002.

Member of the International Organizing Committee for The Fifth Asia-Pacific Conference on Algal Biotechnology. Oct. 18-21, 2003; invited keynote speaker at these meetings and

Co-convenor and organizer for the mini symposium “Use of algae in environmental management.”

Invited plenary speaker to the Congress of the Chinese Phycological Society, Nov. 2-7, 2003, Suzhou, China.

Senior Organizer and Session Co-Chair of an invited symposium “Seaweed Culture and Integrated Aquaculture Developments” at “Aquaculture – An Ecologically Sustainable and Profitable Venture for the Meetings of the World Aquaculture Society's Aquaculture 2004 meetings, Honolulu, Hawaii, March 1-5, 2004.

Invited speaker to the symposium entitled “Pharmacological Aquaculture” at “Aquaculture – An Ecologically Sustainable and Profitable Venture for The Meetings of the World Aquaculture Society's Aquaculture 2004 meetings, Honolulu, Hawaii, March 1-5, 2004.

First E-academe Professor at Shanghai Ocean University, Shanghai, PR China, April, 2004.

Invited participant to the 2004 Aquaculture Biotech workshop sponsored by the Martin Ryan Institute, National University of Ireland, Galway and the RI/CT Sea Grant College Programs where he gave a presentation entitled “Seaweed cultivation and biotechnology: Opportunities for integrating seaweeds in aquaculture systems for bioremediation and industry diversification.”

Senior organizer and co-convenor a symposium on “Marine plant aquaculture in the Northeast” for the 2004 Northeast Conference and Exposition (NACE).

Member of the Advisory Committee of the International Conference on Applied Phycology, “Algae in Biotechnology and Environment” New Delhi, India, 14-15 February 2006, of the Advisory Committee.

Invited workshop leader for The International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) to the workshop entitled “MARINE ALGAE CULTURE: TECHNIQUES, USES AND DEVELOPMENT PERSPECTIVES,” 22-26 May 2006, Zaragoza, Spain

Member (2006-2012) of the Oversight Committee for the Center of Globalization and Commerce, University of Connecticut, Stamford, CT.

Member (2006-2011) of a national panel called the “Sustainable Seafood Forum”, Aquarium of the Pacific, Marine Conservation Research Institute, Long Beach, California.

Invited participant to the California World Oceans 2006 meetings (Sept. 17-20, 2006, Long Beach, California) where I presented a paper in the session “Got Aquaculture? Why Not? My paper was entitled “The use of economically and ecologically important seaweeds in integrated multi-trophic aquaculture: a guide for sustainable development of marine farms in the 21st century.”

Invited participant in the mini symposium, entitled “Sustainable Management of Seaweed Resources,” at the International Conference in honor of the 20th Anniversary of the Korean Society of Phycology, Seoul, South Korea, October 16-19, 2006. My paper was entitled

C. Yarish

HONORS AND DISTINCTIONS (continued)

“Cultivation of Economically Important Seaweeds in Integrated Multi-Trophic Aquaculture Systems: A Global Approach for Sustainable Fish Production.”

Invited participant in the mini symposium, entitled “Integrated Aquaculture: Essential Role of Seaweed Cultivation (Global Expansion of Mariculture),” at the XIXth International Seaweed Symposium, Kobe, Japan, March 26-31, 2007. My paper was entitled “Cultivation of seaweeds in integrated multi-trophic aquaculture systems: New opportunities for the marine farmer in the global seafood industry.”

Received The 2007 Faculty Recognition Award, which recognizes sustained outstanding achievements in teaching, research and services benefiting UConn Stamford (August 22, 2007).

Elected to the Connecticut Academy of Science and Engineering (May 21, 2008).

Recipient of the 2012 University of Connecticut Provost’s Award for Excellence in Public Engagement.

2013 Gold CQIA Innovation Prize, from The Connecticut Quality Improvement Award

Partnership, Inc. Connecticut’s Malcolm Baldrige National Quality Award. Dr. Jang K. Kim for “Development of Seaweed Culture System Technologies to Support Nutrient Bioextraction and Sea Vegetable Aquaculture.” June 12, 2013, Portland, CT, shared with Dr. J.K. Kim.

Invited participant in the Mini symposium at the 10th International Phycological Congress (6 Aug. 2013), Orlando, Florida USA, entitled “Trends in Applied Phycology: Moving into the 21st Century.” My paper was entitled “Seaweed aquaculture for nutrient bioextraction in Long Island Sound and the Urbanized Bronx River Estuaries.”

Invited chair at the 10th International Phycological Congress (6 Aug. 2013), Orlando, Florida USA, for the contributed paper session (CS-12) entitled “Aquaculture.”

Connecticut Society of Cosmetic Chemists Speaker of the Year Award (March 18, 2014)

http://www.ctscc.org/files/September_2013_Newsletter.pdf;

<http://www.ctscc.org/2013highlights.htm>)

Fernald Award (May 2, 2014) for the best paper published in *Rhodora* during 2013 (Nettleton et al.).

Keynote address to the 2014 Long Island Sound Educator’s Conference (April 25, 2014), Norwalk, CT.

Invited Public Science Speaker (May 7, 2014) to the “Ocean Lecture Series” at Harbor Branch Oceanographic Institute (Florida Atlantic University,

<http://www.fau.edu/hboi/community/osls.php>) for a presentation entitled “Cultivation of Seaweeds in Northeast America for Food, Feeds, and Fertilizer.”

Invited Distinguished Professorship at the Centro de Investigacion y de Estudios Avanzados del IPN by Mexicana Academia de Ciencias & La Fundacion Mexico-Estados Unidos para la Ciencia (FUMEC) (March 5-12, 2016)

Invited Member of the Science Advisory Board for the Sustainable Ecological Aquaculture Network (SEANET) research project at the University of Maine under the NSF/EPSCoR program (Feb. 12, 2016).

C. Yarish

HONORS AND DISTINCTIONS (continued)

Keynote address to the University of Maine NSF EPSCOR SEANET All Hands Meeting (April 29, 2016), “Cultivation of Economically and Ecologically Important Macroalgae in Northeast America for Ecosystem Services, Food, Feeds, Fertilizers and Biofuels.”

Sea Grant Association's Research to Application Group Award, Oct. 13, 2016. Connecticut Sea Grant, along with the Maine and New Hampshire Sea Grant programs, jointly received the Sea Grant Association's Research to Application Group Award for their work to advance seaweed aquaculture. The award was presented during the National Sea Grant Week conference in Newport, R.I. It recognized the group for its research paving the way for a new sea vegetable industry in New England, Connecticut Sea Grant, which is based at the Avery Point campus of the University of Connecticut, said in a news release. Selected by a panel of judges from 17 total group nominations, this research has developed viable mass-scalable seaweed aquaculture for domestic markets. Outreach programs continue to expand these markets with active seaweed harvesters and diversified products. New processing methods and product forms are being evaluated and tested in all three states. Seed banks and nurseries were also established to assist growers. Connecticut participants named in the award nomination include: **Charles Yarish**, Professor of Evolutionary Biology at the University of Connecticut's Stamford Campus; Jang Kim, former UConn assistant research professor of marine sciences and currently assistant professor at Incheon National University in Korea; John Curtis of the Bridgeport Regional Aquaculture Science and Technology Education Center; Anoushka Concepcion of Connecticut Sea Grant and UConn Extension and Peg Van Patten of Connecticut Sea Grant.

Interviewed & assisted CBS News' 60 Minutes, April 29, 2018 with a production on seaweed, https://archive.org/details/KPIX_20180430_020000_60_Minutes/start/2400/end/2460 .

Recipient of the 2019 Phycological Society of America's Award of Excellence.

Plenary speaker to The University of Haifa's 7th Conference on The Mediterranean Sea Research, January 15-16, 2020, “Food from the Sea -Towards 2050 and beyond.”

Plenary speaker at National Sea Grant Seaweed Symposium (March 2, 2020).

Keynote speaker at the Sekura First International Advanced Macro-Algae Summit (February 24, 2021; Sekura, Israel).

Invited speaker, University wide lecture series on Environment Sciences, Connecticut College (April 12, 2022).

Plenary speaker at Wando International Seaweed Symposium (May 5-7. 2022; Wando, South Korea).

Invited speaker, New York State Clean Water Symposium (June 17, 2022; Stony Brook, NY).

Gold Innovation Award at SeagrassUSA, September 2022 (with S. Lindell of WHOI and S. Nuzhdin (USC).

Keynote speaker, 61st Northeast Algal Society meetings (April 16, 2023, Mystic, CT).

Keynote speaker, **2023 The Presidential Committee on Agriculture, Fisheries Rural Policy (PCAFRP), the Korea Maritime Institute (KMI) and the Korean Nutrition Society (KNS) Joint Symposium on 'Blue Foods & Health'** (May 2, 2023, Seoul, South Korea).

C. Yarish

PROFESSIONAL ACTIVITIES

Manuscript Reviewer and Editorial Board:

Phycologia (Editorial Board, 2015-2020); Journal of Phycology; Hydrobiologia, Arch. Environ. Contam. & Toxicol.; Marine Biology, Rhodora; Am. J. Botany; Canadian J. of Botany; Helgoländer Meeresunter.; British Phycological Journal; European Phycological Journal; Aquaculture; Aquaculture Interactions; Botanica Marina; World Aquaculture Magazine (Associate Editor); Algae; Northeast Naturalist; J. of Applied Phycol.

Grant Reviewer:

Sea Grant Programs of Alaska, Florida, Maryland, Massachusetts, New Hampshire/Maine, New York, Oregon & Rhode Island; Reviewer for Marine and Estuarine Management Div. of NOAA/NOS/ORM; National Sea Grant Program; New Hampshire Agricultural Expt. Station; Maine Agricultural Expt. Station; Gulf of Maine Regional Marine Research Program; National Science Foundation; National Oceanic and Atmospheric Administration; Saltonstall-Kennedy Grants Program; and National Science Foundation; NOAA and Dept. of Agriculture's Small Business Innovation Research (SBIR) Programs of the National Research Initiative Competitive Grants Office.

Other Professional Activities:

Member of the State of Connecticut Extension Council, 1982-1983; Connecticut Science Fair Association, 1979-1983; Education advisor for the Oceanic Society, 1976-1980; Fairfield County Agricultural Extension Council, Inc., Bethel, CT, 1981-1983; Member of the Board of Directors of the Friends of the White Memorial Conservation Foundation, Litchfield, CT, 1980-1982; Member of the State of Connecticut Soil and Water Conservation Council (Vice-chairman, 1985-1986; Treasurer 1983- 1984); Member of the Environmental Advisory Panel to 5th District Congressman William Ratchford, 1982-1984; Assisted with the organization and final communication of a King's Mark Environmental Review Team Report on Holly Pond to the Town of Darien and the City of Stamford, 1984-1985; Co-convener of the 21st Northeast Algal Symposium, May, 1982 at Woods Hole, Massachusetts; Co-convener of Lake Restoration Workshop, April, 1983 at Cooperative Extension Center, Bethel, Connecticut; Co-convener of the Connecticut Sea Grant Symposium on "Economically Important Marine Plants of the Atlantic: Their Biology and Cultivation, October, 1988 at Groton, Connecticut; Editorial Board: Phycologia (1986-1989); Journal of Phycology (1989-1991); Bull. Environ. Contam. and Toxicol., (1991-1995); Chair, Nominating Committee of the Northeast Algal Society 1988-89); Co-convener of the sessions on "Seaweed Cultivation and Economically Important Seaweeds", August, 1989, at the 13th Int. Seaweed Symposium, Vancouver, British Columbia; Invited Participant to the Irish/American Aquaculture Workshop, September, 1989 Galway, Ireland; Election Committee of the Phycological Society of America (1990-1993), Chairperson 1991-1992; Ad hoc Committee to explore the Advisability of Creating an Executive Secretariat for the Phycological Society of America, 1988-1989; Invited Symposium Speaker to Symposium on "Seaweed Aquaculture in North America", at the World Aquaculture Society Annual Meetings, June 1990, Halifax, Nova Scotia; formerly a member of Long Island Sound Study Management Committee and co-chair of

C. Yarish

Other Professional Activities (continued):

the Science Technology Advisory Committee of The US EPA's Long Island Study (1992-2020) as well as several work groups including Point and Nonpoint Source Work Group, The Living Marine Resources Work Group, Pathogens Work Group, Floatables Work Group, Data Management Work Group, Land Use Work Group, Monitoring Work Group, LIS Writing team, Modeling Evaluation Group, Toxics Work Group; Convener of a contributed papers symposium at the Vth International Phycological Congress, Qingdao, PRC, June 6- July 2, 1994; Co-Convener, moderator and member of the Organizing Committee for a US EPA Long Island Sound Study & England Interstate Environmental Training Center Workshop entitled: "Hypoxia in Long Island Sound: Integrating Modeling, Monitoring, and Research," May 1-2, 1997, at the Marine Sciences Research Center, State University of New York at Stony Brook, Stony Brook, NY; Organizer of an invited symposium on Seaweed Aquaculture for The Triennial Meeting of the World Aquaculture Society's Aquaculture '98 meetings held Feb.16-19, 1998, Las Vegas, Nevada; external reviewer for the South African FRD Core Programs, SNO Kernprogram. Also, a member of the Organizing Committee for the Workshop entitled: "Marine Aquaculture: Emerging Technologies and Global Opportunities, June 26-27, 1998, at the University of Connecticut at Stamford; a member of the organizing committee for a symposium on "Integrated Aquaculture" held during the Annual Meetings of the Phycological Society of America, June 24-28, 2001. Co-convener of an invited symposium on "Integrated Aquaculture" for the Third Asia-Pacific Phycological Forum, Tsukuba, Japan, July 22, 2002; Science Co-Chair for the 31st Meetings of the United States-Japan Cooperative Program in Natural Resource (UJNR) Panel, Yokohama and northeast Honshu, Japan, Oct. 16-25, 2002; Member of the International Organizing Committee for The Fifth Asia-Pacific Conference on Algal Biotechnology. Oct. 18-21, 2003; invited keynote speaker at these meetings and co-convener and organizer for the mini-symposium "Use of algae in environmental management;" Senior Organizer and Session Co-Chair of an invited symposium "Seaweed Culture and integrated Aquaculture Developments" at "Aquaculture – An Ecologically Sustainable and Profitable Venture for The Meetings of the World Aquaculture Society's Aquaculture 2004 meetings, Honolulu, Hawaii, March 1-5, 2004; Co-convener of the 43rd Northeast Algal Symposium, April, 2004, Groton, Connecticut; Invited participant to the 2004 Aquaculture Biotech workshop sponsored by the Martin Ryan Institute, National University of Ireland, Galway and the RI/CT Sea Grant College Programs where he gave a presentation entitled "Seaweed cultivation and biotechnology: Opportunities for integrating seaweeds in aquaculture systems for bioremediation and industry diversification;" Senior organizer and co-convener a symposium on "Marine plant aquaculture in the Northeast" for the 2004 Northeast Conference and Exposition (NACE). Invited workshop leader for The International Centre for Advanced Mediterranean Agronomic Studies (CIHEAM) to the workshop entitled "Marine Algae Culture: Techniques, Uses and Development Perspectives (2005)." Stamford, CT; 22-26 May 2006, Zaragoza, Spain; Invited to a workshop for on Integrated Multi-Trophic; Aquaculture for Canadian & American researchers (Nanaimo, British Columbia, Canada); Invited member of the Working Group on the Environmental Impacts of Mariculture (WGEIM) for ICES (International Council for the Exploration of the Sea)/PICES (Pacific International Council for Exploration of the Seas; Victoria, British Columbia, Canada); invited by the Environmental Defense Fund (EDF) to be a one of a select group of American and

C. Yarish

Other Professional Activities (continued):

Canadian scientists that participated in the 1st Taller Internacional Energia del Mar, Plaza Amèrica 2008 (OTEC in Cuba) or 1st Deep Ocean Thermal Energy Workshop in Varadero, Cuba (April 23-27, 2008). Invited member of the New Haven Harbor Watershed environmental Monitoring Program; Science Advisory Committee (SAC) (Sept. 2006-2007); Member of the Organizing Committee and invited participant for the “The Ecology of Marine Wind Farms: Perspectives on Impact Mitigation, Siting, and Future Uses.” 8th Annual Ronald C. Baird Sea Grant Science Symposium” 8th Annual Ronald C. Baird Sea Grant Science Symposium, Rhode Island Sea Grant College Program, November 2 - 4, 2009, Newport, Rhode Island; International Delegate to the Mexican Organizing Committee. As such, I assisted with the design of the meetings and the website of the XXth International Seaweed Symposium, *XX International Seaweed Symposium*, February 22 - 26, 2010, Ensenada, Baja California, MÉXICO; Member of the Extractive Technologies Committee of the U.S. EPA Long Island Sound Study’s “International Workshop on Bioextractive Technologies for Nutrient Remediation,” US EPA Long Island Sound Study, Dec. 3-4, 2009, Invited member (2006-present) of the State of Connecticut DEP Ad Hoc Steering Committee for the creation of a National Estuarine Research Reserve for Connecticut and also an invited member (2006-2019) of the State of Connecticut DEEP Seagrass Steering and Sentinel Site Committees of the Office of Long Island Sound Programs. I am a founding member of the Advisory Board for the City of Bridgeport's Regional Aquaculture Science & Technology Educational Center (1993-present) and had been on the Advisory Board for the City of New Haven's Sound School. Most recently, member of the Algal Biomass Organization's Steering Committee for the Algae Center of Excellence and a member of the Algae Foundation's Algae Technology Educational Consortium, which developed The Algal Cultivation Extension Short course (ACES). Part 1 covers Macroalgae & is designed for those seeking to learn the basic skills to grow seaweeds from USA & around the world (2017-present). An invited Science Advisor to the GreenWave Organization (New Haven, CT), the World Wildlife Fund (Washington, D.C.; 2021-present), Blue Evolution (California; 2021-present) and Australian Seaweed Institute (2020-present).

Invited Associate Advisor to Ph.D. students at the State University of New York at Stony Brook; University of Massachusetts at Amherst; University of Maine at Orono; Dalhousie University, Halifax, NS, Canada; University of Cape Town, South Africa; Lehman College of the City University of New York, Bronx, New York; Institute of Oceanology, Chinese Academy of Sciences, Qingdao, PRC; The Autonomous Universidade de Baja California, Ensenada, Mexico; University of Porto, Porto, Portugal. **Invited Associate MS Advisor** to Southern Connecticut State University.

FIELD OF SPECIALIZATION

Marine Phycology, Ecophysiology, Ecology, Integrated Multi-Trophic Aquaculture (IMTA), Nutrient Bioextraction, Systematics, and Applied Genomics

C. Yarish

RESEARCH INTERESTS

I am interested in the ecology, systematics, genetics, and phylogeography of economically important marine macroalgae and marine angiosperms, including studies on eutrophication, primary productivity, nutrient relationships, autecology, ecophysiology, and invasive species. I am particularly interested in the aquaculture of marine plants and the development of new technologies for the nutrient removal from aquaculture systems (IMTA) and nutrient bioextraction. I am a certified SCUBA diver (NAUI and PADI) with over 50 years of experience.

PUBLICATIONS

Books and Monograph

Yarish, C. 1976. A Field and cultural Investigation of the Seasonal and Horizontal Distribution of Estuarine Red Algae of New Jersey. Doctoral Dissertation. Rutgers University. 124 pp.

Schneider, C. W., M. M. Suyemoto and C. Yarish. 1980. An annotated checklist of Connecticut Seaweeds. Connecticut Geological and Natural History Survey. Bulletin 108. 20 pp.

Yarish, C., C.A. Penniman, and M. van Patten (Editors). 1990. Economically Important Marine Plants of the Atlantic: Their Biology and Cultivation. The Connecticut Sea Grant College Program, Groton, CT, 158 pp.

Lüning, K. 1990. Seaweeds - Their Environment, Biogeography, and Ecophysiology, IN: Yarish, C. and H. Kirkman (Editors) Edited Translation of the German language edition Meeresbotanik: Verbreitung, Okophysologie und Nutzung der marinen Makroalgen by Klaus Lüning. John Wiley and Sons, Inc. New York, 527 pp.

Yarish, C. 1991. Journal of the Citizen Ambassador Program Seaweed Aquaculture Delegation To The People's Republic of China. May 24-June 6, 1990. People to People International, Inc. Spokane, Washington, 66 pp.

Latimer, J.S., M. Tedesco, R.L. Swanson, C. Yarish, P. Stacey and C. Garza. 2014. *Long Island Sound: Prospects for the Urban Sea*. Springer Science+Business Media, NY. 558pp.

C. Yarish

Technical Reports & Miscellaneous Publications

Yarish, C. 1984. Dissolved organics released by estuarine benthic algae as carriers of metal to filter feeding zooplankton. Research Proj. Tech. Completion Report, U.S. Department of Interior.

Yarish, C. 1984. A lab manual for general botany (Bio 110) and principles of biology (Bio 108). UConn COOP., Storrs, CT. 179 pp.

Baillie, P.W. and C. Yarish. 1987. The intertidal algal flora of sand and mud flats, Stamford Harbor, West Branch, Stamford, CT. A management plan submitted to The Stamford Environmental Protection Board, Stamford, CT and Coastal Area Management Program, Hartford, CT.

Yarish, C. 1988. Seaweed Farming in Kenya. A feasibility study submitted to the International Executive Service Corps, Nairobi, Kenya and Stamford, Connecticut. Project No. 16234.

Yarish, C. and P.W. Baillie. 1989. Ecological Study of an Impounded Estuary, Holly Pond, Stamford, CT. Submitted to the Stamford Environmental Protection Board, Stamford, CT and the Coastal Area Management Program, Hartford, CT, 117p. and Appendices.

Yarish, C., J.A. Kilar, and J.E. Merrill. 1991. The Management of Eutrophication Through Aquaculture and Natural Beds of Marine Algae. In: Hinga, K.R., D.W. Stanley, C.J. Klein, D.T. Lucid, and M.J. Katz (Editors). 1991. The National Estuarine Eutrophication Project: Workshop Proceedings, Rockville, MD: National Oceanic and Atmospheric Administration and the University of Rhode Island Graduate School of Oceanography, pp. 40-41.

Merrill, J., J.A. Kilar, X. Huang, C. Yarish. 1992. Aquaculture methods for use in managing eutrophicated waters. In: Schubel, J.R. The Second Phase of an Assessment of Alternatives to Biological Nutrient Removal at Sewage Treatment Plants for Alleviating Hypoxia in Western Long Island Sound. Report of the Long Island Sound Study Alternative Technologies Workshop for the U.S. Environmental Protection Agency on 21-22 November 1991 Working Paper 56, Reference No. 91-19. 19p.

Van Patten, M.S. and C. Yarish. 1993. Effects of temperature on reproduction in an Atlantic Kelp, *Laminaria longicruris*, in the North Atlantic Ocean. In: Van Patten, M.S. Irish-American Technical Exchange on the Aquaculture of Abalone, Sea Urchins, Lobsters and Kelp. An International Workshop sponsored by the Sea Grant College Programs of the Northeastern United States. Connecticut Sea Grant College Program. Publ. CT-SG-93-05. Pp. 50-51.

Koch, E.W., C. Yarish, S. Beer, R. Troy, G. Capriulo, R. Linden, J. Rehnberg. 1995. Environmental monitoring, seagrass mapping and biotechnology as means of fisheries habitat enhancement along the Connecticut coast: A report for July 1993 to December 1994. December 1994. 42 pp. +

C. Yarish

Technical Reports & Miscellaneous Publications (continued)

Appendices. Submitted to Office of Long Island Sound Programs, CT Department of Environmental Protection.

G. Capriulo, C. Yarish, G. Wikfors, R. Troy and B. Welsh. 1997. "Alteration of the Planktonic Food Web of Long Island Sound Due to Eutrophication." Final Report to Office of Long Island Sound Programs, CT Department of Environmental Protection.

Chopin, T. and C. Yarish. 1998. Nitrogen and phosphorous concentrations in Porphyra in relation to salmonid aquaculture in Cobscook Bay, Maine. Rpt to Coastal Plantations International, Inc. 5p.

Yarish, C., A.E. Sperr, R. Wilkes, X.G. Fei, A.C. Mathieson, and I. Levine. "Developing a Commercially Viable Seaweed Industry in New England." for Nori Research Project (September, 1996 through February 1998). Quarterly Technical Reports to researchers and directors from the Connecticut, Massachusetts, New Hampshire/Maine Sea Grant Programs for a National Sea Grant College Funded Project.

Yarish, C. TIES PROJECT UABC and UConn Trip Report DATES: December 7-12, 2004. 3p. submitted to the UConn Office of International Affairs to support the U.S.-Mexico Training, Internships, Exchanges and Scholarships (TIES). January 3, 2005. see http://www.oia.uconn.edu/PDF/oia_newsletter.pdf, p. 3.

Babb, I.G., C. Yarish, J. Zertuche, and B. Bravo-Ureta. 2005. Using Underwater Technologies to Address Coastal Resource Issues: Mapping the Invasive Kelp, *Undaria* with a Remotely Operated Vehicle. 9p. Report Presented to the UConn Office of International Affairs to support the U.S.-Mexico Training, Internships, Exchanges and Scholarships (TIES). May 2, 2005. Information on the TIES program see <http://www.oia.uconn.edu/ties/index.html>.

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C. Yarish

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Song, Hye, S. Han, J. Park, Y. Kim, C. Jeong, C. Yarish, J.K. Kim. 2022. In Dark treatment effect on the carrageenan characterization in a red alga, *Chondrus crispus*. Algal Research 68:102889, <https://doi.org/10.1016/j.algal.2022.102889>.

Han S., Song H-I., J-S. Park, Y-J. Kim, S. Umanzor, C. Yarish and J.K. Kim. 2023. *Sargassum horneri* and *Ascophyllum nodosum* extracts enhance thermal tolerance and antioxidant activity of *Neopyropia yezoensis*. J. Appl. Phycol. 35: 201-207. <https://doi.org/10.1007/s10811-022-02870-4>

Bao M., Q. Xing, J-S. Park, P. He, J.H Zhang, C. Yarish and J.K. Kim. 2023. Temperature and high nutrients enhance hypo-salinity tolerance of the bloom forming green alga, *Ulva prolifera*. Harmful Algae. 123:102402

Bao M., Q. Xing, J-S. Park, P. He, J.H. Zhang, C. Yarish and J.K. Kim. 2023. Population specific responses to temperature and nutrients in the bloom forming *Ulva prolifera*. Journal of Applied Phycology. 36: 459-470. <https://doi.org/10.1007/s10811-023-03143-4>

Huang, M, K.R Robbins, Y. Li., S. Umanzor, M. Marty-Rivera, D. Bailey, M. Aydlett, J. Schmutz, J. Grimwood, C. Yarish, S. Lindell, J.L. & Jannink. 2023. Genomic selection in organisms with biphasic lifecycles: a *Saccharina latissima* (sugar kelp) case study. Frontiers in Marine Science, section Marine Fisheries, Aquaculture and Living Resources, 10:1040979 DOI: [10.3389/fmars.2023.1040979](https://doi.org/10.3389/fmars.2023.1040979).

Xing, Q., S. Han, J-S. Park, C. Yarish, & J.K. Kim. 2023. Comparative transcriptome analysis reveals the molecular mechanism of heat-tolerance in *Neopyropia yezoensis* induced by *Sargassum horneri* extract. Frontiers in Marine Science 10:1142483. [10.3389/fmars.2023.1142483](https://doi.org/10.3389/fmars.2023.1142483), <https://doi.org/10.3389/fmars.2023.1142483>.

Xing, Q. Y.W. Kim, J.S. Park, Y.S. Han, C. Yarish, H.I. Yoo, & J.K. Kim. 2023. Effects of triazine herbicide terbutryn on physiological responses and gene expression in *Alexandrium catenella*. Journal of Applied Phycology (2023) 35:1663–1671 (<https://doi.org/10.1007/s10811-023-02991-4>).

Lee, Ho-Hyeon, Q. Xing, J. Park, H. Lee, C. Yarish, & J.K. Kim. 2023. Effects of different artificial photosynthetically active radiation (PAR) sources and intensity on the growth and nutrient uptake in *Ulva prolifera* and *Neopyropia yezoensis*. 92 (May), <https://doi.org/10.1016/j.algal.2023.103151>.

Jung, J.W., Q. Xing, J-S. Park, Y-J. Kim, C. Yarish & J.K. Kim. 2023. Physiological effects of micro-plastics on the red algae, *Grateloupia turuturu* and *Chondrus* sp. Aquatic Toxicology 261 <https://doi.org/10.1016/j.aquatox.2023.106609> or <https://authors.elsevier.com/c/1hEpS,3oDQuOaE>

C. Yarish

Refereed Journal / Book Articles (continued)

Wasson, D.E. H. Stefenoni, S. F. Cueva, C. Lage, S. E. Räisänen, A. Melgar, M. Fetter, M. Hennessy, K. Narayan, N. Indugu, D. Pitta, C. Yarish & A. N. Hristov. 2023. Screening macroalgae for mitigation of enteric methane in vitro. *Scientific Reports* 13:9835
<https://doi.org/10.1038/s41598-023-36359-y>

Fujita, R. S. Augyte, J. Bender, P. Brittingham, A.H. Buschmann, M. Chalfin, J. Collins, K.A. Davis, J.B. Gallagher, R. Gentry, R.L. Gruby, K. Kleisner, M. Moritsch, N. Price, L. Roberson, J. Taylor & C. Yarish, 2023. Seaweed blue carbon: Ready? Or Not? *Marine Policy* 155,
<https://doi.org/10.1016/j.marpol.2023.105747>.

Augyte, S., S.R. Dudgeon, C. Yarish, M. Marty-Rivera, C. A. Ng, J. E. Kübler. 2023. Thermal characteristics of early life stages of *Laminaria farlowii*, a deep-water kelp from Southern and Central California. *J Appl Phycol* 35, 2543–2553. <https://doi.org/10.1007/s10811-023-03064-2>.

Pereira, R., C. Yarish & A. Critchley. 2024. Seaweed aquaculture for human foods in land based and IMTA systems. Pp. 77-99. In: Heeft and Oluwaseun-Adetunji (eds). *Applications of Seaweeds in Food and Nutrition*, 319 pp. Elsevier, Amsterdam, Netherlands.

Roberson L, Grebe GS, Arzeno-Soltero I, Bailey D, Chan S, Davis, K, Goudey CA, Kite-Powell H, Lindell S, Manganelli D, Marty-Rivera M, Ng C, Ticona Rollano F, Saenz B, Van Cise AM, Waters T, Yang Z, and Yarish C. 2024. “Developing cultivation systems and better management practices for Caribbean tropical seaweeds in US waters” in “Tropical Phyconomy Coalition Development,” Ed: Anicia Q. Hurtado, Alan T. Critchley, Iain Neish. Springer Books.

Jung, J.W., R. Pereira, C. Yarish and J.K. Kim. 2024. Seaweed Aquaculture: from cultivars to cultivation technologies to applications. *Aquaculture and Living Resource Management*, Volume 2 Editor Rui Pereira. A Volume in the Aquatic Sciences Series, Edited by Leonel Pereira” 2024 CRC Press (Taylor & Francis Group), Boca Raton, FL, USA. ISBN 978-1-032-34632-8.

Chopin, T., B. Costa-Pierce, S. Backman, A. Buschmann, M. Costello, R. Cuhel, C. Duarte, F. Grondahl, K. Heasman, R. Haroun, C. Hurd, J. Johansen, A. Jueterbock, M. Lench, S. Lindell, H. Pavia, A. Ricart, K. Sundell, M. Troell, C. Yarish. Deep-ocean seaweed dumping for carbon sequestration: questionable, risky and not the best use of valuable biomass. *One Earth* (Published online, 2/08/24). <https://authors.elsevier.com/c/1iZS~9C~Iu3z5a>.

Shin, S.K., Q. Xing, J.S. Park, C. Yarish, F. Kong & J.K. Kim. 2024. Effects of biostimulants, AMPEP and Kelpak on the growth and asexual reproduction of *Pyropia yezoensis* (Bangiales, Rhodophyta) at different temperatures. *Algae* 39(1): 31-41
<https://doi.org/10.4490/algae.2024.39.3.11>.

C. Yarish

Refereed Journal / Book Articles (continued)

Yarish, C. S. Pang, S. Lu & S.H. Brawley. 2024. Obituary of Xiugeng Fei (1932–2022). *Journal of Applied Phycology*, 36:1073–1080. <https://doi.org/10.1007/s10811-023-03171-0>, Published online 14 March 2024. Available at: <https://rdcu.be/dBgGi>.

Indugu, N, K. Narayan, H. Stefenoni, M. Hennessy, B. Vecchiarelli, J. Bender, R. Shah, G. Dai, S. Garapati, C. Yarish, S. Welchez, S. Raesaenen, D. Wasson, C. Lage, A. Melgar, A. Hristov, and D. Pitta. 2024. Microbiome-informed study of the mechanistic basis of methane inhibition by *Asparagopsis taxiformis* in dairy cattle. *American Society for Microbiology, Microbial Ecology*. mBio, <http://doi.org/10.1128/mbio.00782-24> (Published 7/02/2024).

Lee, N.Y., Xing, Q., Park, JS, Park, Y.C., Yarish, C. and J.K. Kim. 2024. Effects of Microbubbles and Temperature on the Germination of the Saltmarsh Plant, *Suaeda Malacosperma*. *Wetlands* **44**, 73. <https://doi.org/10.1007/s13157-024-01826-3>.

Stekoll, M., A. Pryor, A. Meyer, Kite-Powell, H., Bailey, Barbery, K. Goudey, C.A., S. Lindell, L. Roberson & C. Yarish. 2024. Optimizing Seaweed Biomass Production - A Two Kelp Solution. *J Appl Phycol.*, <https://doi.org/10.1007/s10811-024-03296-w>.

Stephens, T.; Li, Y.; Yarish, C.; Rogers, M.C.; Umanzor, S. Does Seawater Nitrogen Better Predict the Baseline Farmed Yield for Sugar Kelp (*Saccharina latissima*) Rather than the Final Yield? *Phycology* **2024**, 4 (3), [10.3390/phycolgy4030020](https://doi.org/10.3390/phycolgy4030020).

Woo, J.J., Q. Xing, Y.W. Kim, N.Y. Lee, J.S. Park, C. Yarish, S. Lindell, J.S. Heo, J.K. Kim. Effects of temperature and light on early sporophyte development of *Saccharina japonica* and *Saccharina latissima* (Phaeophyta). *J. of World Aquaculture Society*, <http://doi.org/10.1111/jwas.13115>.

Xing, Q., S. Kim & C. Yarish. 2024. Environmental DNA detection in marine macrophyte ecosystems as potential blue carbon source in sediments. *Coasts* 2024, 4(4), 687-696; <https://doi.org/10.3390/coasts4040036>.

C. Yarish

MANUSCRIPTS SUBMITTED

Gonzalez, S.T., Y. Li, M. Aydlett, D. Bailey, H. Kerr, M. Doall, C. Gobler, M. Chambers, J-L. Jannink, C. Yarish & S. Lindell. Evaluation of six sugar kelp crosses selected for high yield at three Northeastern US farms. *Aquaculture* (Submitted 9-30-24).

Stekoll M, Lindell S, Goudey CA, Kite-Powell HL, Bailey D, Barbery K, Roberson L, Peoples T, Mangini N, Pryor A, Meyer A, Yarish C. (DATE) Development of Scalable Coastal and Offshore Kelp Farming for Marine Biomass Production. Submitted to *Journal of the World Aquaculture Association* (10-06-24)

Xing, Q., J.H. Hwang, J.W. Jung, J-S Park, C. Yarish, N. Clough, & J.K. Kim. Effects of different seedstrings on the nursery of *Pyropia yezoensis*. *Journal of the World Aquaculture Society* (submitted 10-17-2024).

MANUSCRIPTS IN REVISION

Roberson L, Grebe GS, Arzeno-Soltero I, Bailey D, Chan S, Davis, K, Goudey CA, Kite-Powell H, Lindell S, Manganelli D, Marty-Rivera M, Ng C, Ticona Rollano F, Saenz B, Van Cise AM, Waters T, Yang Z, Yarish C, Under revision, "Developing precision phyconomy systems and better management practices for Caribbean seaweeds" *Journal of Applied Phycology*.

C. Yarish

Patents and Licensing Agreements

1. Licensing Agreement for use of my *Porphyra* strains to Coastal Plantations International-PhycoGen, Inc. Portland, Maine, January 1998–2000 between the University of Connecticut and The Company.
2. Material Transfer and Evaluation Agreement (including a license agreement to transfer my *Porphyra*=nori culture collection from the Atlantic Ocean) between myself, The University of Connecticut and Acadian Seaplants, LLC (Dartmouth, Nova Scotia, Canada), July 20, 2009.
3. Approval of patent application to Korean Patent Office. Yoo M.S., Kim J.K. and C. Yarish. “Tide Simulating Apparatus for Intertidal Sessile Organisms” Korea Patent No. 2008-6128 (http://eng.kipris.or.kr/eng/main/main_eng.jsp and type 10-2008-0006128).
4. Material Transfer Agreement between the University of Connecticut (c/o Center for Science and Technology Commercialization) and Marine Biological Laboratory, Woods Hole, MA, May 15, 2012.
5. Material Transfer Agreement between the University of Connecticut and BASF Corporation and its subsidiary SVP Care Chemicals for access to *Gracilaria tikvahiae* biomass from the UCONN Seedstock Nursery, July 27, 2015.
6. Revenue sharing agreement between the University of Connecticut and the Bridgeport Regional Aquaculture Science and Technology Education Center for *Gracilaria tikvahiae* access and sale of UCONN cultures at BRASTECH. July 29, 2016, updated Feb. 2, 2018.
7. Material Transfer Agreement between the University of Connecticut and Marine Biology Labs, University of Chicago for access to *Gracilaria tikvahiae* and *Gracilaria vermiculophylla* cultures, June 8, 2017.

8. Material Transfer Agreement between the University of Connecticut and The University of New Hampshire for four isolates of *Wildmania amplissima*, April 5, 2018.
9. Material Transfer Agreement between the University of Connecticut, Incheon National University and Woods Hole Oceanographic Institution for kelp cultures, April 16, 2021.
10. Material Transfer Agreement between the University of Connecticut and the Max Planck Institute for Developmental Biology, Tübingen, Germany, May 12, 2021.
11. Material License Agreement for Biological Materials between the University of Connecticut and Bigelow Laboratory for Ocean Sciences, November 29, 2021.

C. Yarish

12. Material Transfer Agreement between the University of Connecticut, Woods Hole Oceanographic Institution and The Board of Regents of the University of Wisconsin System on behalf of the University of Wisconsin-Milwaukee, December 6, 2021.
13. Material Transfer and Licensing Kelp Germplasm Agreement between the University of Connecticut, Woods Hole Oceanographic Institution and Bigelow Laboratory for Ocean Sciences, May 17, 2022.
14. WHOI's Office of for Technology for Technology Transfer filed a provision patent application describing genetically selected, high performing infertile kelp strains on behalf of S. Lindell, C. Yarish (UCONN) and S. Nuzhdin (USC). "Improved Strains of Algae and Uses Thereof", U.S. Provisional Patent Application No. 63/318,475.
15. Patent Pending: Molano G, Nuzhdin S., Alberto, F., Yarish C., Deweese K., Lindell S, 2023. Development of genetics-based selection for sporeless kelp. Provisional Application Nos. 63/543,798 filed October 12, 2023, and 63/463,978 filed May 4, 2023. Non-provisional to be filed April 2024.

C. Yarish

GRANTS AND CONTRACTS RECEIVED AS PRINCIPAL OR CO-PRINCIPAL INVESTIGATOR

1. "Salinity and Temperature Effects on Photosynthesis and Organic Carbon Release Rates by Selected Benthic Macroalgae." Awarded by U.S. Dept. of Interior, Office of Water Research and Technology for the period March 1982 - September 1983 (Award: \$20,260).
2. "Biogeography of Endemic North American Marine Algae." Awarded by the Netherlands National Science Foundation (Z.W.O.) for the period August 1983- August 1984 (Award: \$17,500).
3. "Strain selection in *Laminaria longicuris* (Brown Seaweed) for Development of Maximum Biomass: Awarded by Connecticut Sea Grant for the period July 1984 - June 1985 (Award: \$16,880).
4. "Temperature resistance and temperature adaptation in marine algae." Awarded by the Biologische Anstalt Helgoland for the period June 1985 - September 1985 (Award: DM 6,942).
5. "Strain selection in *Laminaria longicuris* (Brown Seaweed) for Development of Maximum Biomass." Awarded by Connecticut Sea Grant for the period July 1985 - June 1986 (Award: \$37,954).
6. "Strain selection in *Laminaria longicuris* (Brown Seaweed) for Development of Maximum Biomass." Awarded by Connecticut Sea Grant for the period July 1986 - June 1987 (Award: \$42,649; CT Sea Grant R/A-3).
7. "The effects of nutrient enrichment on a rocky subtidal marine macrophyte community." Awarded by Connecticut Sea Grant for the period July 1987 - June 1988 (Award: \$40,969). Co-principal investigator, Dr. C. Penniman, University of New Hampshire.
8. "A study of a deep-water population of the brown alga *Laminaria saccharina* recently discovered off the coast of New Jersey." Awarded by the National Undersea Research Program for the period October 1989 - August 1990 (Award: Submersible time and support). Co-principal investigator, Dr. D. Hanisak, Harbor Branch Oceanographic Institution.
9. "Genetics of morphology and growth in *Laminaria* from the North Atlantic Ocean." Awarded by Connecticut Sea Grant for the period July 1988 - February 1991 (Award: \$71,983 with \$52,226 direct costs & \$19,757 indirect costs). Co-principal investigator, Dr. B. Brinkhuis (deceased), SUNY-at Stony Brook (NOAA Grant No. NA85AA-D-SG101; R/A-6).

C. Yarish

GRANTS AND CONTRACTS RECEIVED AS PRINCIPAL OR CO-PRINCIPAL INVESTIGATOR (continued)

10. "Seaweed Aquaculture in People's Republic of China." Delegation Leader for scientific delegation to PRC, May 20 - June 9, 1990. (Award: \$5000).
11. Sea Grant (Connecticut) "Aquaculture Applications of Biochemical Genetics to the Economic Kelps, *Laminaria saccharina* and *Laminaria longicruris*" for July 1, 1990-June 30, 1991 funding cycle, R/A-6CT, \$24,273, with direct costs \$17,980 & an IDC of \$6293 (with C. Neefus, A.C. Mathieson and R.T. Eckert of the University of New Hampshire, \$21,008); UCONN Project # 1171-000-22-00230-45-092 (FRS 529673).
12. Sea Grant (New Hampshire/Maine) "Biochemical Genetics Studies to Enhance Aquaculture of the Kelps, *Laminaria saccharina* and *Laminaria longicruris*" for January 1, 1991 - December 31, 1992, funding cycle (with C. Neefus, A. C. Mathieson and R.T. Eckert of \$49,067 for year one and \$54,067 for year 2). This is a parallel grant proposal to the Connecticut Sea Grant College Program in Year 2.
13. NOAA International Programs. Visiting Research Scientist to my lab at Stamford Campus (August 1991-January, 1992).
14. Sea Grant (Connecticut) "The Use of *Ulva* as a Model System in Critical Nitrogen Determination" for July 1, 1991 - June 30, 1992, for \$6,729 (with J.A. Kilar).
15. State of Connecticut Department of Environmental Protection "Alteration of the Planktonic Food Web Structure of Long Island Sound: Possible Enhancement of the Microbial Loop Due to Eutrophication" for July 1, 1993-June 30, 1995, for \$208,480 (Co-PI with G. Capriulo [PI], R. Troy, G. Wikfors, and B. Welsh).
16. State of Connecticut Department of Environmental Protection "Environmental Monitoring, Seagrass Mapping and Biotechnology as Means of Fisheries Habitat Enhancement Along the Connecticut Coast" for July 1, 1993-June 30, 1995, for \$188,244 (with S. Beer and E.W. Koch).
17. Connecticut Sea Grant College Program travel grant to attend the Vth International Phycological Congress in Qingdao, People's Republic of China and to work at the Experimental Marine Biology Laboratory for a week following. \$1,400 (funded June 1995-July 1995).
18. NOAA's International Programs Office. Visiting Research Scientist to my lab at the Stamford Campus (August 1995-January 1996), Prof. X.G. Fei, Director, Experimental Marine Biology Laboratory, Institute of Oceanology, Chinese Academy of Sciences, Qingdao, People's Republic of China.

C. Yarish

GRANTS AND CONTRACTS RECEIVED AS PRINCIPAL OR CO-PRINCIPAL INVESTIGATOR (continued)

19. National Sea Grant College Program "Developing a commercially viable seaweed aquaculture industry in New England" with D. Cheney (Northeastern University), I. Davison (University of Maine), D. Dow (University of New Hampshire), I. Levine (Plantations International, Inc.) A. Mathieson (Univ. of New Hampshire), S. Minocha (Univ. of New Hampshire), C. Neefus (Univ. of New Hampshire) and A. Klein (Univ. of New Hampshire). My sub-proposal for "Field and Culture Evaluations" (with co-PI's, A.C. Mathieson, and I. Levine) has been funded from the National Sea Grant Program through the Connecticut Sea Grant College Program for \$225,404 (direct costs \$162,012; indirect costs \$67,726) beginning August 1, 1995 - July 31, 1998. I was also a co-PI on other sections of the regional proposal (NOAA Grant NA46RG0433).
20. Connecticut and National Sea Grant College Programs "Exchange of seedstock biotechnology for the developmental control of *Porphyra* (nori) and the design of an integrated aquaculture system for stripping nutrients from seawater." \$8,000 from the Connecticut Sea Grant College Program that included travel to the People's Republic of China (Oct.-Nov. 1997) and the participation of a Visiting Scientist at my laboratory (February-June 1998), Dr. S. Lu, Experimental Marine Biology Labs, Institute of Oceanology, Chinese Academy of Sciences, Qingdao, PRC, in a cooperative research program.
21. Grant from General Reinsurance Faculty Development Fund at the Stamford Campus "Field And Culture Studies for the Development of a Commercially Viable Nori Aquaculture Industry for New England." My proposal was awarded \$1,100 to fund undergraduate student involvement in my research program beginning June 1, 1996 - May 31, 1997.
22. Grant from General Reinsurance Faculty Development Fund at the Stamford Campus to attend Perkin Elmer, Applied Biosystems' PCR workshop ("Methods in PCR"), January 27-29, 1997. My grant was for \$900 to cover the tuition charges.
23. Grant from General Reinsurance Programmatic Development Fund at the Stamford Campus entitled "The Stamford Campus Young Scholars-in-Residence Program for Minority Students in Science." The proposal (\$11,400) developed a model outreach program for the Stamford Campus within the context of an urban setting and developed a center of excellence for qualified minority students in the biological and marine sciences (October 1, 1997-September 30, 1998).
24. Connecticut and National Sea Grant College "Nori Aquaculture in Cobscook Bay and Selected Sites in the Gulf of Maine." Connecticut Sea Grant College Program for \$13,860 beginning May 1, 1998 – February 28, 1999.

C. Yarish

GRANTS AND CONTRACTS RECEIVED AS PRINCIPAL OR CO-PRINCIPAL INVESTIGATOR (continued)

25. A Co-PI on a Critical Technologies Grant with Co-PIs R. Cooper and T. Chen entitled: "Research and Development of Marine Plant (Nori) Aquaculture in Connecticut Waters: Selective Breeding/Transgenic Development Support of Commercial Aquaculture Operation." \$296,896 with \$225,000 matching funds from the Mohegan Tribal Nation, and \$250,000 of "in-kind" support from the Mohegan Tribal Nation, Phycogen, Inc. and Spectrogram, Inc., 4/01/1999-12/31/2002.
26. Senior PI for a Regional Project funded by the Connecticut, New Hampshire-Maine and New York, Sea Grant College Programs entitled "Bioremediation of finfish aquaculture effluent via polyculture with *Porphyra* (nori): culture, mesocosm, and field studies. "My Year Two Year Grant from the Connecticut Sea Grant College Program was for \$139,510 (\$102,111 direct costs; \$37,398 indirect costs); beginning Mar. 1, 2000 – Feb. February 28, 2003.
27. Senior PI for a Regional Project funded by the NOAA OAR's National Marine Aquaculture Initiative. "Development of an Integrated Recirculating Aquaculture System for Nutrient Bioremediation in Urban Aquaculture." C. Yarish, C.D. Neefus, G.P. Kraemer, T. Chopin, G. Nardi and J. Curtis. Total funding for two years is \$451,835 (9/01/01 – 8/31/04).
28. Co-PI on a proposal to the Maine Sea Grant College Program (with Susan Brawley, University of Maine) entitled "Enhanced spore production for seeding of New England *Porphyra* for integrated finfish/seaweed aquaculture." Total funding was \$21,105 (subcontract; 2/01/2003-1/31/2006) of a three-year project.
29. PI on a proposal to the Connecticut Sea Grant College Program (with R.B. Whitlatch, G.P. Kraemer and S. Lin) entitled "Impacts and Spread of the Non-indigenous Rhodophycean Alga, *Grateloupia turuturu*, on Long Island Sound with total funding for a 2 yr project (6/1/2006 – 2/28/2010) of \$230,657 with direct costs of \$159,166 [Award/Contract # NA06OAR4170072].
30. PI on a proposal to the US EPA Long Island Sound Research Grant Competition (with R.B. Whitlatch, G.P. Kraemer and S. Lin) entitled "Multi-component Evaluation to Minimize the Spread of Aquatic Invasive Seaweeds, Harmful Algal Bloom Microalgae, and Invertebrates via the Live Bait Vector in Long Island Sound." (6/1/2006–12/31/2008) of \$101,756 with direct costs of \$68,754 [EPA Grant Number: No: LI-97149601]. In addition, Connecticut Sea Grant College Program also contributed an additional \$7,898.

C. Yarish

GRANTS AND CONTRACTS RECEIVED AS PRINCIPAL OR CO-PRINCIPAL INVESTIGATOR (continued)

31. Co-PI on a proposal to the Packard Foundation (with Barry Costa-Pierce, University of Rhode Island and Jose Zertuche, Universidad Autonoma de Baja California, MX) entitled “Sustainability Assessment of Capture-Based Tuna Aquaculture in Mexico.” The UConn subcontract to the Graduate School of Oceanography, University of Rhode Island was \$18,355 (with direct costs \$15,961 and indirect \$2,394; Contract No. AG070149, FRS #633928). Total award from Packard to the project was \$156,221 (8/27/2006-2/28/2008).
32. PI on a proposal to the Connecticut Sea Grant College Program (with C.D. Neefus of the University of New Hampshire) entitled “Development of Seaweed Culture System Technologies to Support Integrated Multi-Trophic Aquaculture and Sea Vegetable Aquaculture in New England.” Project start date 2/1/2010 until 1/31/2012 for \$99,675 with direct costs of \$65,147; Grant No. NA10OAR4170095; CT Sea Grant R/A-38, KFS#5603520.
33. PI on a subcontract to Gas Technology Institute (Des Plaines, Illinois) entitled “Macroalgae for CO₂ Capture and Renewable Energy: A Pilot-Commercial Demonstration Project” Phase I (Department of Energy’s NETL Program, FOA# 0000015. Project start date 1-15-2010 until 9-30-2010 for \$91,085 with direct costs of \$59,533 (with B.G. Mitchell, D. Mendola and C. Yarish).
34. PI on a subcontract to Ocean Approved, LLC (Portland, Maine) entitled “Development of Native Kelp Culture System Technologies to Support Sea Vegetable Aquaculture in New England Coastal Waters” (NOAA-SBIR Phase I, for \$29,885 with direct costs of \$20,693). Received notice on 5-11-2010 that grant will receive NOAA funding. Project start date July 1, 2010, until Dec. 31, 2010 (Contract #AG100206; FRS# 525630).
35. Co-Principal Investigator project entitled “Development and application of a Long Island Sound GIS-based eelgrass habitat suitability index model” funded by: Long Island Sound Study and NEIWPC (Principal investigator J. Vaudrey); Feb. 1, 2010, to Jan. 31, 2013 (\$40,652). Cornell Cooperative Extension prime on EPA contract #AG101024; KFS#525848.
36. PI on project entitled “Seaweed Aquaculture for Bioextraction of Nutrients from LIS” funded by The National Fish and Wildlife Foundation – Long Island Sound Futures Fund (\$123,999.00; PI); 3 Jan. 2011 to 1 July April 2012(KFS #5258280; Direct Costs \$107,825 and Indirect Costs of \$16,174). NFWF contract 2010-071-25 decreased with direct costs of \$95,835 and was extended to 7-01-2012, (KFS#5258280).

C. Yarish

GRANTS AND CONTRACTS RECEIVED AS PRINCIPAL OR CO-PRINCIPAL INVESTIGATOR (continued)

37. Associate Investigator on project entitled “Comparative analysis of eutrophic condition and habitat status in Connecticut and New York embayments of Long Island Sound” funded by Long Island Sound Research Fund (NY and CT Sea Grant College Programs) \$199,998; 1 March 2011 – 28 February 2013 (Principal Investigator J. Vaudrey). EPA Long Island Sound Office LI-96113701.
38. PI on a subcontract to Ocean Approved, LLC (Portland, Maine) entitled “Development of Native Kelp Culture System Technologies to Support Sea Vegetable Aquaculture in New England Coastal Waters” (NOAA-SBIR Phase II, for Year I being \$41,999 with direct costs of \$27,450; Year II being 29,029 with direct costs of \$18,973; Total of 2-year grant \$71,028 with direct costs of \$46,423). Received notice on 10-13-2011 that grant will receive NOAA funding. Project start date Sept. 20, 2011, until Sept. 13, 2013, Award/Contract #: AG110895; WC133R10CN0221 (KFS #5614010).
39. PI on a proposal to the Connecticut Sea Grant College Program entitled “Seaweed Aquaculture from Bioextraction of Nutrients from Long Island Sound.” Project start date 2/1/2012 until 1/31/2014 for Year I being \$64,962 with direct costs of \$41,377 (indirects costs of \$23,585); Year II being \$65,141 with direct costs of \$41,400; Total of 2-year grant \$129,754 with direct costs of \$82,798. The end date of the CT Sea Grant R/A-39 Award is 1-31-2015, (KFS #5608350).
40. Co-PI (with S. Lindell, PI) on a proposal to the Woods Hole Sea Grant/NOAA (as a sub award through the Marine Biological Laboratory) entitled “Multi-cropping Shellfish and Macroalgae for Business and Bioextraction.” Project start dates 2/1/2012 until 1/31/2014 but has been extended to 1-31-2015. Subcontract from MBL for Year I being \$31,852 with direct costs of \$20,818; Year II being \$29,116 with direct costs of \$19,030; Total of 2-year subcontract \$60,967 with direct costs of \$39,848. Total Grant: \$155,014 (without match), (NOAA/WHOI Contract 44035; KFS #5615800).
41. Co-PI (with J. Vaudrey, PI) on a proposal The Long Island Sound Study & New England Interstate Water Pollution Control Commission (prime contractor Maritime Aquarium) entitled “Evaluation of Current Citizen Monitoring Efforts and Recommendations for Developing a Cohesive Network of Support for Monitoring Long Island Sound Embayments.” 2011-2012, Direct Costs of \$13,417.00 (KFS #6359500).

C. Yarish

GRANTS AND CONTRACTS RECEIVED AS PRINCIPAL OR CO-PRINCIPAL INVESTIGATOR (continued)

42. PI on a proposal to Rocking the Boat and The National Fish & Wildlife Foundation entitled “Development of Seaweed Aquaculture for Bioextraction of Inorganic Nutrients from the Bronx River Estuary.” April 5-2012 to Feb. 4, 2013. An award was made of \$45,506 to UConn from the original award by NFWF to Rocking the Boat for \$55,370. Direct costs for the Award are \$35,970.
43. PI on a proposal to The EPA Long Island Sound Futures Fund and The National Fish and Wildlife Foundation entitled “Nutrient Bioextraction by kelp in LIS & Bronx River estuary.” The grant was recently (Sept. 27, 2012) approved for \$157,447.67 to the University of Connecticut to support our Nutrient Bioextraction in Long Island Sound (CT, NY) project. This grant is provided on the condition that these funds will be matched by \$286,143 in non-federal contributions raised by the University of Connecticut. This grant has Direct Costs of \$111,317 in year one and in Year two the Direct costs are \$19,094. The total direct costs for the 15-month grant decreased because of federal budget cuts and is \$136,911. End date of the grant is now 7-14-2014, (KFS# 5617390).
44. Co-PI (with J. Vaudrey, PI) funded by Long Island Sound Research Fund (NY and CT Sea Grant College Programs). “Comparative analysis and model development for determining the susceptibility to eutrophication of Long Island Sound embayments.” Year 1, \$200,000; Year 2, \$200,000. Total for 2-year award is \$400,000 (Total Award to UCONN- direct costs \$288,748) 1 March 2013 – 31 December 2015, (KFS# 5618680).
45. PI (with J.K. Kim) on a proposal entitled “The use of aquaculture effluents in spray culture for the production of high protein macroalgae in shrimp-aqua feeds.” UCONN is a subcontract to B.G. Mitchell of Scripps Institution of Oceanography, UCSD, as the project is funded by the BARD (US-Israel Binational Agriculture Research & Development Fund, Proj. ID, US-4599-13R) for an Award of \$330,000, which was a 20% reduction in our original proposal (May 22, 2013). The three-year award for the UConn subcontract before the 20% reduction was for \$92,497 but with reduction, it is \$74,000. Year 1 of the proposal was for \$39,160 (indirects of \$7,840), Year 2 was for \$14,170 (indirects of \$2,830) and Year 3 will be \$8,330 (indirects of \$1,670). The end date of the grant is 9-30-16, (KFS# 6363230).
46. PI on a proposal to The EPA Long Island Sound Futures Fund and The National Fish and Wildlife Foundation entitled “Kelp Production System for Nutrient Bioextraction & Education.” The grant was approved and signed on January 13, 2014, even though the project had a start date on Oct. 1, 2013, until Dec. 31, 2014. The NFWF award was for \$88,340 to the University of Connecticut. This grant had Direct Costs of \$76,818 in year one and in Indirect costs of \$11,522. The matching Direct costs was \$23,200 and

C. Yarish

GRANTS AND CONTRACTS RECEIVED AS PRINCIPAL OR CO-PRINCIPAL INVESTIGATOR (continued)

- indirects on the match was \$3,480. The total project cost for the 15-month grant was \$115,020, Proj. #1401.13.039525 (KFS# 5612580).
47. PI on a proposal to the USDA/National Institute of Food and Agriculture (NIFA) entitled “Developing an environmentally and economically sustainable sugar kelp aquaculture industry in southern New England: from seed to market.” The 2-year grant approved on September 24, 2014, with a start date of Sept. 1, 2014, through August 31, 2017, for \$313,739.00 with direct costs of \$223,741.00 (Project Award # 2014-70007-22546; KFS #5631770). The final report in its entirety can be found at http://opencommons.uconn.edu/marine_sci/4.
 48. PI on a proposal to the Maine Aquaculture Innovation Center Research Grant (#15-11) program entitled “Development of a cultivation program for a morphologically distinct strain of the sugar kelp, *Saccharina latissima* forma *angustissima* from southern Maine.” This one year approved on September 16, 2014, with a start date of Oct. 1, 2014, for \$25,000 with direct costs of \$20,121. Project end date was 6-30-2016. KFS# 6365480 UCONN Matching Funds of 33,021. UCONN Proposal Log #150024.
 49. PI on NOAA-MOF Joint Project Agreement Project Proposal Joint Coordination Panel for Aquaculture Cooperation entitled Integrated Multi-Trophic Aquaculture: Sustainability, Ecosystem services, and Economy support (SEE) (2015-2017). Project expenses (travel for all PIs and co-PIs) over the three-year period were \$110,000, which were provided by NOAA.
 50. PI on a contract from GreenWave entitled “The development of a seedstock for GreenWave.” This 6 mos. Contract begins on Sept.1, 2016 through Feb. 28, 2018, for \$20,000 with direct costs of \$16,667; KFS#6369840; UCONN AG161556).
 51. PI (with PI S. Lindell, WHOI) on a 2016 NOAA Sea Grant Aquaculture Research Competition entitled “Integrating Mussel and Kelp Longline Culture Structures and Management.” Total budget \$40,410 with direct costs of \$25,576. Start date, Sept. 1, 2016, through Aug. 31, 2019; KFS #5638510; UCONN 161265; NOAA Sea Grant NA14OAR4170074.
 52. PI on a Cornell Cooperative Extension of Suffolk County and University of Connecticut “Collaboration on Kelp Growth Trials in the Peconic Estuary, Long Island, New York.” Total budget \$14,000 with direct costs of \$12,174. Start date, Sept. 1, 2016, through August 31, 2017; KFS #6201130; UCONN AG170358.

C. Yarish

GRANTS AND CONTRACTS RECEIVED AS PRINCIPAL OR CO-PRINCIPAL INVESTIGATOR (continued)

53. PI (with PI S. Lindell, WHOI) on a 2018 ARPA-E – Macroalgae Research Inspiring Novel Energy Resources entitled *Integrated Seaweed Hatchery and Selective Breeding Technologies for Scalable Offshore Seaweed Farming* \$3,704,276; UCONN portion of the federal funds will be \$1,816,547. 01/01/18 – 06/14/2024. **SPS# 171261 / KFS 5644900; DE-AR0000915.**
54. PI (with PI M. Stekoll, University of Alaska, Fairbanks) on a 2018 ARPA-E - Macroalgae Research Inspiring Novel Energy Resources entitled *Development of Scalable Coastal and Offshore Macroalgal Farming* (Cat. 1 \$500,000; 1 Yr.). UCONN award is \$45,502 with a cost-share of \$5,015. **SPS# 171269 / 5645440; DE-AR0000911.**
55. PI (with PI L. Roberson, Marine Biology Laboratory, University of Chicago) on a 2018 ARPA-E - Macroalgae Research Inspiring Novel Energy Resources entitled *The Development of Techniques for Tropical Seaweed Cultivation and Harvesting* (Cat. 1 \$500,000; 1 Yr.). UCONN award is \$49,172 with a cost-share of \$5,464. **SPS# 171266 / 5645300; DE-AR0000912.**
56. PI (with PI A. Hristov, Animal Science Dept., Pennsylvania State University) on a 2018 grant from USDA/National Institute of Food and Agriculture/Pennsylvania State University for your project *Deciphering the Crosstalk between Bacteria-Archaea Interactions in the Rumen and Methane-Yield Phenotype of Dairy Cows*. Yr. 1 (5-01-2018 to 4-30-2019) \$16,170.00 with \$11,319.00 direct costs and \$4,851.00 indirect costs. Yr. 2 (5-01-2018 to 4-30-2020) \$ 16,907.00 with \$11,835.00 direct costs and \$5,072.00. Total Award \$33,077. **SPS# 181299/KFS 5649650.**
57. Co-PI (with PI S. Umanzor, UCONN) on a 2020-2021 grant from ARPA-E - Macroalgae Research Inspiring Novel Energy Resources entitled “Assessing Kelp Nutrient Bioextraction in US Aquaculture Farms With implications for Conservation and Management.” Year 1 and 2 total direct costs are \$95,902 and 90,440,400 respectively. Year 1 and 2 indirects are \$ \$58,498 and \$55,144, respectively. Total award **\$299,944** with total directs \$186,302 and total indirects \$113,642. **SPS# 191259 / KFS 5657750; DE-AR0001172.**
58. PI (with PI Roberson at MBL, University of Chicago). 2020. ARPA-E - Macroalgae Research Inspiring Novel Energy Resources entitled “*The Development of Techniques for Tropical Seaweed Cultivation and Harvesting.*” \$142,101.00; 03/01/18 - 04/30/23 **(DE-AR0000912; KFS 5645300).**

C. Yarish

**GRANTS AND CONTRACTS RECEIVED AS PRINCIPAL OR CO-PRINCIPAL
INVESTIGATOR (continued)**

59. PI (with M. Stekoll at University of Alaska) on 2020 2020 ARPA-E - Macroalgae Research Inspiring Novel Energy Resources entitled “*Development of Scalable Coastal and Offshore Macroalgal Farming.*” \$279,325.00; 03/02/20 - 03/01/23. **(KFS 5645440; DE-AR0000911).**
60. PI (with J. Kübler at California State University Northridge) on DOC/NOAA/National Oceanic and Atmospheric Administration entitled “*Laminaria farlowii, a New Species for Sustainable Aquaculture in California: Nursery Methods, Climate Change Resilience and Preliminary Market Assessment with Outreach through the California Seaweed Fair.*” \$20,946.00; 02/01/20 - 06/01/21 **(KFS #5661920).**
61. PI for General Services Agreement with W.L. GORE & Associates, 10/23/2020-10/22/2021 **(KFS #6212170).**