

## **CURRICULUM VITAE**

PATRICK JAMES NEALE

Primary Research Interests: Effects of Light on Living Organisms, especially responses to UV of Phytoplankton and other Aquatic Microbes, UV in the Environment - Long Term Variation of Incident UV, UV Optics of Natural Waters, particularly dynamics of Chromophoric Dissolved Organic Matter (CDOM)

### **EDUCATION**

Ph.D. Aquatic Ecology, 1985, University of California, Davis

M.A. Statistics, 1981, Columbia University

B.A. Environmental Science (with Honors), 1976, State Univ. of New York, Purchase

### **DISSERTATION**

Title: "The Diel Variation of Phytoplankton Photosynthesis in Tropical, Alpine Lake Titicaca"

### **PROFESSIONAL POSITIONS**

1999-present Supervisory Research Photobiologist, Smithsonian Environmental Research Center

1993-1999 Research Photobiologist, Smithsonian Environmental Research Center

1992-1993 Research Associate, Lawrence Berkeley Laboratory, (Energy and Environment Division) and Univ. Calif. Davis, (Division of Environmental Studies).

1990-1993 Adjunct Scientist, Bigelow Laboratory for Ocean Sciences, Maine.

1988-1993 Research Fellow, Dept. of Plant Biol., Univ. Calif. at Berkeley (w/ Prof. A. Melis).

1987-1988 Research Scientist, Dept. of Botany, Univ. Calif. at Berkeley, Prof. Z. Cande, supervisor.

1985-1987 Research Scientist, Div. of Molecular Plant Biol., Univ. Calif., Berkeley. Prof. A. Melis, supervisor.

1981-1984 Research Assistant, Div. Environmental Studies, Univ. Calif., Davis. Profs. P.J. Richerson and T.M. Powell, supervisors.

1977-1980 Senior Research Assistant, Lamont-Doherty Geological Observatory, Dept. of Marine Biology, Palisades, New York. Drs. T. Malone and J. Marra, supervisors.

1975-1976 Research Assistant, State Univ. of New York, Purchase. Prof. J. Utter, supervisor.

### **OTHER RESEARCH EXPERIENCE**

1993-2005 Chief Scientist, Research Cruises on R/V Laurence M. Gould and RVI/B Nathaniel B. Palmer, Southern Ocean

- 1997 Adjunct Faculty Member, MEES program, University of Maryland, College Park
- 1986, 1988 Visiting Research Scientist, Freshwater Biological Assoc., U.K., Dr. J. Talling, host.
- PATENT:** Hayes, D. R., Jr., V. R. Goodrich, W. R. Brinley, Jr., P. J. Neale. US Patent 60/039,339 (pending) "A Cosine Corrected Pathway of a Spectral Radiometer"

### PROFESSIONAL AFFILIATIONS

American Society of Limnology and Oceanography, American Association for Advancement of Science, Phycological Society of America, American Geophysical Union, American Society of Photobiology (Council Member)

### RECENT GRANTS AND CONTRACTS

- 2009-2012 \$146,896, NSF- Polar Programs, *Impact of Langmuir Circulation on Gas Transfer and Photosynthesis in the Southern Ocean: A Large Eddy Simulation Study*. (**PI**, Collaborative with Andrés E. Tejada-Martínez, Dept Civil and Environmental Engineering, University of South Florida)
- 2009-2014 \$3,066,569, NOAA-COP. *Predicting Impacts of Stressors at the Land-Water Interface*, (co-PI)
- 2009-2012 \$321,749, NASA-Astrobiology Program, *Astrophysical Ionizing Photon Events and Primary Productivity of Earth's Oceans*. (**PI**, collaborative with Washburn Univ and Univ. Kansas)
- 2009-2012 \$1,690,423, NSF, Research Infrastructure, *Smithsonian's Global Change Research Facilities for Large-Scale Ecological Forecasting* (co-PI)
- 2014-2017 \$146,515 (SERC), NASA-Carbon Cycle Program, *Tidal wetlands as sources and sinks of carbon in a changing world: Remote Sensing, Measurements and Modeling of Wetland-Ocean-Atmosphere Interactions* (co-PI, collaborative with City University of NY, VA Institute of Mar Sci, and Univ. Maryland)

### RECENT PROFESSIONAL SERVICE

*Session Chair*, "Carbon Cycling in Coastal Watersheds and Estuaries: Terrestrial and Aquatic Linkages and Integration of Observations With Predictive Models", AGU Ocean Sciences, Portland, 2010. "UV in Antarctica: ecosystem effects and interactions with climate change", SCAR Open Sci. Conf, Buenos Aires, 2010. "UV in Coastal Waters" Coastal and Estuarine Research Foundation Meeting, Mar del Plata, 2012. "Interactive effects of Global Change Environmental Drivers on Phytoplankton and Bacterioplankton in Coastal Waters", ASLO Aquatic Sciences, Granada, 2015.

*Experimental Group Leader*, VII GAP meeting, Zurich, (September 1999), X GAP meeting Malaga, (September 2012).

*Committees and Working Groups*, SI representative to Subcommittee on US Global Change Research, Committee on Environment and Natural Resources (1997-2010), US Interagency UV working group of the SGCR (1994 – 2000, Co-chair 2001 -2009), Assessment reviewer Scientific Assessment of Ozone Depletion, (Biennial) United Nations Environment Program, Group Aquatic Primary Productivity Executive Committee (2000 - present)

*Professional Societies*: Elected American Society for Photobiology Council (2004-2007), Candidate for President ASP, (2006), Chair Membership Committee, (2006)

*Reviewer*, Aquatic Microbial Ecology, Aquatic Sciences, Canadian J. Aquatic Sci., Deep Sea Research,

Ecosystems, Estuarine Coastal Shelf Science, European Journal Phycology, Geophysical Res. Letters, Global Change Biology, Hydrobiologia, Limnology & Oceanography, Limnology Oceanography Methods, J. Geophysical Res., J. Photochemistry Photobiol., J. Phycology, Marine Biology, Marine Ecology Progress Series, Nature, Oceanologica Acta, Photochemistry & Photobiology, Photochemistry and Photobiological Sciences, Photosynthesis Research, Polar Biology, Plant Physiology, Plant Biology, Science

*Associate Editor*, Photochemical Photobiological Sciences (2014 - present)

*Proposal reviews* for EPA, NASA, NOAA/MERHAB, NSERC (CA), NSF Earth Systems Science, Ecosystems, Ocean Sciences and Polar Programs, USDA National Research Initiative, U.K. Natural Environment Research Council, Netherlands Organization for Scientific Research, panel member for EPA, NSF Ocean Sciences, and NASA.

*Public Outreach* Annual SERC Open House (Tower tours), Moderated live call-ins for public audiences at SERC to polar research teams (2007-2009)

## RECENT COLLABORATORS

*UV and Vertical Mixing in the Southern Ocean*: Robyn Smyth (Bard), Andrés Tejada-Martinez (Univ. S. Florida), Cigdem Akan (UCLA)

*Spectral variation in UV responses of Bacterioplankton*: Wade Jeffrey (U. W. Florida)

*UV Photochemistry*: David Kieber (SUNY Syracuse), Ron Kiene (Dauphin Marine Station), Ken Mopper (Old Dominion Univ.), Michael Gonsior (UMCES)

*UV Effects on Freshwater Ecosystems*: Janet Fischer, Mark Olson (Franklin and Marshall), David Mitchell (U Texas), Robert Sanders (Temple), Donald Morris, Robert Moeller and Craig Williamson (Lehigh University)

*UV Effects Associated with Astrophysical Events*: Brian Thomas (Washburn Univ.), Adrian Melott (Univ. Kansas)

*Interaction of UV and Elevated CO<sub>2</sub> responses in phytoplankton*: Cristina Sobrino (Univ. Vigo), Maria Segovia (Univ. Malaga)

## Publications in Refereed Journals

See complete list at [http://research.serc.si.edu/researchdata/publication\\_data\\_cfm/neale\\_pub.cfm](http://research.serc.si.edu/researchdata/publication_data_cfm/neale_pub.cfm)

## Publications in Refereed Books

1. Neale, P. J. 1987. Algal photoinhibition and photosynthesis in the aquatic environment. In Kyle, D. J., Osmond, C. B. & Arntzen, C. J. (Eds.) *Photoinhibition*, Elsevier, Amsterdam, 35- 65.
2. Neale, P. J., Cullen, J. J., Lesser, M. P. & Melis, A. 1993. Physiological bases for detecting and predicting photoinhibition of aquatic photosynthesis by PAR and UV radiation. In Yamamoto, H. & Smith, C. M. (Eds.) *Photosynthetic Responses to the Environment*, American Society of Plant Physiology, 61-77.
3. Cullen, J. J. & Neale, P. J. 1993. Quantifying the effects of ultraviolet radiation on aquatic photosynthesis. In Yamamoto, H. & Smith, C. M. (Eds.) *Photosynthetic Responses to the Environment*, American Society of Plant Physiologists, Washington, D.C., 45-60.
4. Richerson, P. J., Neale, P. J., Alfaro-Tapia, R., Carney, H. J., Lazzaro, X., Vincent, W. F. & Wurtsbaugh, W. 1993. Patterns of planktonic primary production and algal biomass. In Dejoux, C. & Iltis, A. (Eds.) *Lake Titicaca: A synthesis*, Kluwer, 196-217.

5. Neale, P. J., Lesser, M. P. & Cullen, J. J. 1994. Effects of ultraviolet radiation on the photosynthesis of phytoplankton in the vicinity of McMurdo Station (78°S). In Weiler, C. S. & Penhale, P. A. (Eds.) *Ultraviolet Radiation in Antarctica: Measurements and Biological Effects*, Am. Geophysical Union, Washington, D.C., 125-142.
6. Hogan, C., Lee, A., Cande, Z. & Neale, P. 1993. The diatom central spindle as a model system for studying antiparallel microtubule interactions during spindle elongation in vitro. In Scholey, J. M. (Ed) *Motility assays for motor proteins*, Academic Press, NY,
7. Cullen, J. J. & Neale, P. J. 1997. Biological weighting functions for describing the effects of ultraviolet radiation on aquatic systems. In Häder, D.-P. (Ed) *Effects of ozone depletion on aquatic ecosystems*, R. G. Landes, Austin, 97-118.
8. Neale, P. J. & Priscu, J. P. 1998. Fluorescence quenching in phytoplankton of the McMurdo Dry Valley lakes (Antarctica): Implications for the structure and function of the photosynthetic apparatus. In Priscu, J. P. (Ed) *Ecosystem dynamics in a polar desert: The McMurdo dry valleys, Antarctica*, American Geophysical Union, Washington, 241-253.
9. Neale, P. J. 1999. Application of spectral weighting functions in assessing the effects of environmental UV radiation. In: Bauer, D. R. & Martin, J. (Eds.) *A Systems Approach to Service Life Prediction of Organic Coatings*, American Chemical Society, Washington, 45-55.
10. Neale, P. J. 2000. Spectral weighting functions for quantifying the effects of ultraviolet radiation in marine ecosystems. In: de Mora, S. J., Demers, S. & Vernet, M. (Eds.) *The effects of UV radiation on marine ecosystems*, Cambridge Univ. Press, Cambridge, 73-100.
11. Vincent, W. F. & Neale, P. J. 2000. Mechanisms of UV damage in aquatic organisms. In: de Mora, S. J., Demers, S. & Vernet, M. (Eds.) *The effects of UV radiation on marine ecosystems*, Cambridge Univ. Press, Cambridge, 149-176.
12. Neale, P. J. and D. J. Kieber. 2000. Assessing biological and chemical effects of UV in the marine environment: Spectral weighting functions, p. 61-83. In R. E. Hester and R. M. Harrison [eds.], *Causes and Environmental Implications of Increased U.V.-B. Radiation*. Royal Society of Chemistry. Issues in Environmental Science and Technology, 14.
13. Day, T. A. and P. J. Neale, 2002. Effects of UV-B radiation on terrestrial and aquatic primary producers. *Ann. Rev. Ecol. Syst.* 33: 371-96
14. Neale, P. J., E. W. Helbling and H. E. Zagarese, 2003. Modulation of UV exposure and effects by vertical mixing and advection, pp. 107-134. In: E. W. Helbling and H. E. Zagarese (eds.), *UV effects in aquatic organisms and ecosystems*. Royal Society of Chemistry.
15. Neale, P. J., V. R. Goodrich and W. R. Brinley, 2004. The Smithsonian-NIST-USDA-FPL Network for Monitoring Solar Ultraviolet Irradiance: Comparison of Radiometer Measurements and Radiative Transfer Model Calculations, In: J. W. Martin and R. Ryntz (eds.), *Proceedings of the 3rd International Symposium on Service Life Prediction*. Federation of Societies for Coatings Technology. Williamson, C.E., **Neale, P.J.**, 2008. UV radiation. In: Likens, G. (Ed.), *Encyclopedia of Inland Waters*. Elsevier, Oxford, pp. 705-714.
16. Moisan, T.A., Goes, J., **Neale, P.J.**, 2009. Mycosporine-Like Amino Acids In Phytoplankton: Biochemistry, Physiology, and Optics. In: Kersey, W.T., Munger, S.P. (Eds.), *Marine Phytoplankton*. Nova Science Publishers, Hauppauge, NY, pp. 119-143.
17. **Neale, P.J.**, Jeffrey, W.H., Sobrino, C., Pakulski, J.D., Phillips-Kress, J.D., Baldwin, A.J., Franklin, L.A., Kim, H., 2009. Inhibition of Phytoplankton and Bacterial Productivity by Solar Radiation in the Ross Sea Polynya. In: Krupnik, I., Lang, M., Miller, S. (Eds.), *Smithsonian at the Poles. Contributions to International Polar Year Science*. Smithsonian Press, Washinton, D. C., pp. 299-308.
18. Tzortziou, M., Gallegos, C.L., **Neale, P.J.**, Subramaniam, A., Herman, J.R., Harding, L.W., 2009. Bio-optical characteristics and remote sensing in the mid Chesapeake Bay through integration of

observations and radiative transfer closure. In: Yang, X. (Ed.), *Remote sensing and GIS for coastal ecosystem assessment and management: Principles and applications*. Springer, Berlin, pp. 139-168.

### Conference Proceedings and Other Reports

1. Powell, T., Kirkish, M. H., Neale, P. J. & Richerson, P. J. 1984. The diurnal cycle of stratification in Lake Titicaca: Eddy diffusion. *Verh. Internat. Verein. Limnol.*, **22**, 1237-1243.
2. Ferreyra, G.A., I.R. Schloss, S. Demers and P.J. Neale. 1994. Phytoplankton responses to natural UV irradiance during early spring in the Weddell-Scotia confluence: an experimental approach. *Antarctic Journal of the United States*. **29**: 268-270.
3. Sigleo, A. C. & Neale, P. J. 1994. Phytoplankton pigment profiles at the Weddell-Scotia Confluence during the 1993 austral spring. *Antarctic Journal of the United States*, **29**, 147-148.
4. Neale, P. J. & Spector, A. C. 1994. UV-Absorbance by diatom populations from the Weddell-Scotia Confluence. *Antarctic Journal of the United States*, **29**, 266-267.
5. Sikorski, R.S., A. C. Sigleo and P.J. Neale. 1995. Spectral measurements of Ultraviolet and Visible solar irradiance at the Weddell-Scotia confluence during 1993 austral spring. *Antarctic Journal of the United States*. **29**: 272-274.
6. Neale, P. J., Correll, D. L., Goodrich, V. R. & Hayes, D. R., Jr. 1994. UV-B optical depths at Mauna Loa: Relative Contribution of Ozone and Aerosols. In Peterson, J. T. & Rosson, R. M. (Eds.) *Summary Report 1993*, NOAA, Boulder, 132-134.
7. Cullen, J.J., P.J. Neale, and R.F. Davis. 1996. Quantifying the potential effects of ozone depletion on aquatic systems. In: Shaw, R.W. (ed.) *Science and policy implications of atmospheric issues in Atlantic Canada. Workshop Proceedings, Halifax, N.S. Occasional Report No. 6*, Environment Canada, Atlantic Region, Sackville, New Brunswick, p. 107.
8. Neale, P. J., Correll, D. L., Goodrich, V. R. & Hayes Jr., D. R. 1996. Early morning UV-B during the 1994-1995 record low ozone at Mauna Loa. In Hofmann, D. J., Peterson, J. T. & Rosson, R. M. (Eds.) *Summary Report 1994-1995*, NOAA, Boulder, 140-141.
9. Booth, C. R., Morrow, J. H., Coohill, T. P., Frederick, J. E., Häder, D.-P., Holm-Hansen, O., Jeffrey, W. H., Mitchell, D. L., Neale, P. J., Sobolev, I., van der Leun, J. & Worrest, R. C. 1997. Impacts of Solar UVR on Aquatic Microorganisms. *Photochem. Photobiol.*, **65**, 252-269.
10. Cullen, J. J., Ciotti, A. M., Davis, R. F. & Neale, P. J. 1997. The relationship between near-surface chlorophyll and solar-stimulated fluorescence: biological effects. *SPIE Ocean Optics XIII*, 272-277.
11. Neale, P. J. and J. J. Fritz. 2001. Experimental exposure of plankton suspensions to polychromatic ultraviolet radiation for determination of spectral weighting functions, pp. 291-296. In J. Slusser, J. R. Herman and W. Gao [eds.], *Ultraviolet Ground- and Space-based Measurements, Models, and Effects*. SPIE-The International Society for Optical Engineering.
12. Neale P.J. 2002. Quantifying the effects of ultraviolet radiation on phytoplankton: Comparisons between Chesapeake Bay and Antarctica (Southern Ocean). Paper presented at the UV radiation and its effects: An update (2002), Christchurch NZ.
13. Neale, P. J., 2003. Book review: "Phytoplankton productivity by Williams, Thomas and Reynolds (editors)". Newsletter, International Association of Theoretical and Applied Limnology (SILnews). **39**: 8.
14. Neale, P. J., 2004. Book Review: "Photosynthesis in Algae by Larkum, Douglas and Raven (editors)". *J. Phycol.* 2004. **40**: p. 1178.

### General Interest Publications discussing Neale Research

1. Neale, P.J. 1994. UVB Radiation: What's really going on up there? *On the Rhode* **4**: Pt.1 Spring/Summer, Pt. 2 Fall

2. Nilsson, A. 1996. *Ultraviolet Reflections: Life under a thinning ozone layer*. Wiley & Sons. N.Y. 147 p
3. Acton, P. and J. Barrat 1997. Some algae sensitive to rising UV. *The Torch* 97-7.
4. Norris, S. 1999. Marine life in the limelight. *BioScience* 49: 520-525.
5. Woodward, C. 2000. *Ocean's end: Travels through endangered seas*. Basic Books, N.Y. Neale research featured in a report in *New Scientist*, vol 171 issue 2307, 08/09/2001, p. 12.
6. "Antarctic Expedition" (Reports on Ross Sea field work, Oct-Dec 2005) SERC Quarterly Report ix winter 05-06, p. 6
7. "Minutes to Burn" (Describes SERC UV monitoring program) written by Carrie Steele, *Bay Weekly* 14:6-7, Aug. 2006
8. "Exhibition Spotlight: Change is in the air – and in the Arctic" (Describes NMNH Atmosphere exhibit, Neale, curator) written by Rita Zeidner, *The Torch* No. 06-09:5, Sep. 2006.
9. "Sun Bleaching in the Marshes", SERC Quarterly report xiv Spring 2007.