

## *CURRICULUM VITAE*

### **TODD MILAN KANA**

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#### **I. Education**

1974 B.A., Union College, Biology

1976 M.S., Syracuse University, Biology

1982 Ph.D., Harvard University, Organismic and Evolutionary Biology

#### **II. Professional Background**

1976-1977 *Instructor*, Mansfield State College, Mansfield, PA

1981-1983 *Computer Manager*, Harvard Univ. Herbaria, Cambridge, MA

1983-1984 *Visiting Lecturer*, Massachusetts Institute of Technology

1985-1986 *Visiting Investigator*, Woods Hole Oceanographic Institution

1986-1989 *Research Associate*, Horn Point Environmental Laboratory

1989-1994 *Research Assistant Professor*, Horn Point Laboratory

1994-pres. *Research Associate Professor*, Horn Point Laboratory

#### **III. Research**

##### A. Areas of professional expertise

Algal and plant physiological ecology; regulation of photosynthesis and respiration; oxygen cycling in marine systems; estuarine denitrification; applications of membrane inlet mass spectrometry

##### B. Publications (since 1995)

###### 1. Papers in refereed journals or books.

Lewitus, A.J., R.V. Jesien, T.M. Kana, J.M. Burkholder, and E. May. 1995. Discovery of the "phantom" dinoflagellate in Chesapeake Bay. *Estuaries* 18: 373-378.

Lewitus, A.J. and T.M. Kana. 1995. Light respiration in six estuarine phytoplankton species: contrasts under autotrophic and organotrophic growth conditions. *J. Phycol.* 31:754-761.

- Geider, R.J., H.L. MacIntyre, and T.M. Kana. 1996. A dynamic model of photoadaptation in phytoplankton. *Limnol. Oceanogr.* 41:1-15.
- Geider, R.J., H.L. MacIntyre, and T.M. Kana. 1997. A dynamic model of phytoplankton growth and acclimation: responses of the balanced growth rate and the chlorophyll a:carbon ratio to light, nutrient-limitation and temperature. *Mar. Ecol. Prog. Ser.* 148: 187-200.
- Kana, T.M., R.J. Geider, C. Critchley. 1997. Photosynthetic pigment regulation in microalgae by multiple environmental factors: a dynamic balance hypothesis. *New Phytol.* 137: 629-638.
- Kana, T.M., M. B. Sullivan, J.C. Cornwell and K. Groszkowski. 1998. Denitrification in estuarine sediments determined by membrane inlet mass spectrometry. *Limnol Oceanogr.* 43:334-339.
- Geider, R.J., H.L. MacIntyre, and T.M. Kana. 1998. A dynamic regulatory model of phytoplanktonic acclimation of phytoplankton to light, nutrients and temperature. *Limnol. Oceanogr.* 43:679-694.
- Hoge, F.E., C.W. Wright, T.M. Kana, R.M. Swift, and J.K. Yungel. 1998. Spatial Variability of oceanic phycoerythrin spectral types derived from airborne laser-induced fluorescence emissions. *Appl. Optics* 37: 4744-4749.
- Cornwell, J.C., W.M. Kemp, and T.M. Kana. 1999. Denitrification in coastal ecosystems: environmental controls and aspects of spatial and temporal scale. *Aquatic Ecol.* 33:41-54.
- MacIntyre, J.L., T.M. Kana, and R.J. Geider. 2000. The effect of water motion on short-term rates of photosynthesis by marine phytoplankton. *Trends Plant Sci.* 5: 12-17.
- An, S., W.S. Gardner, and T.M. Kana. 2001. Simultaneous measurement of denitrification and nitrogen fixation using isotope pairing with membrane inlet mass spectrometer (MIMS) analysis. *Appl. Env. Microbiol.* 67:1171-1178.
- Geider, R.J., DeLucia E.H., Falkowski P.G., Finze A., Grime J.P., Grace J., Kana T.M., LaRoche J., Long S.P., Osborne B.A., Platt T., Prentice I.C., Raven J.A., Sathyendranath S., Schlesinger W.H., Smetacek V., Stuart V., Thomas R.B., Vogelmann T.C., Williams P. & Woodward F.I. (2001) "Forum. Primary productivity of planet earth: biological determinants and physical constraints in terrestrial and aquatic habitats." *Global Change Biology*, 7, 849-882.
- Glibert, P.M., R.Magnien, M.W. Lomas, J. Alexander, C. Fan, E. Haramoto, M. Trice, and T.M. Kana. 2001. Harmful algal blooms in the Chesapeake and coastal bays of Maryland: comparison of 1997, 1998, and 1999 events. *Estuaries* 24: 875-883.

MacIntyre, H.L., T.M. Kana, T. Anning, and R.J. Geider. 2002. Photoacclimation of photosynthesis irradiance response curves and photosynthetic pigments in microalgae and cyanobacteria. *J. Phycol.* 38: 17-38.

Ben J. Longstaff, Tim Kildea, John W. Runcie, Anthony Cheshire, William C. Dennison, Catriona Hurd, Todd Kana, John A. Raven & Anthony W.D. Larkum. 2002. An *in situ* study of photosynthetic O<sub>2</sub> exchange and electron transport rate using the marine macroalga *Ulva lactuca* (Chlorophyta). *Photosyn. Res.* 74: 281-293.

Suggett, D.J., K Oxborough, N.R. Baker, H.L. MacIntyre, T.M. Kana, and R.J. Geider. 2003. Evaluation of Fast Repetition Rate and Pulse Amplitude Modulation fluorescence measurements for estimating photosynthetic electron transport in marine phytoplankton. *Euro. J. Phycol.* 38 (4): 371-384.

Kana, T.M. and D.L. Weiss. 2004. Comment on "Comparison of isotope pairing and N<sub>2</sub>/Ar methods for measured sediments" by B.D. Eyre, S. Rysgaard, T. Dalsgaard, and P. Bondo Christensen. 2002. *Estuaries* 25: 1077-1087. *Estuaries* 27: 157-160.

MacIntyre, H. L., M. W. Lomas, J. Cornwell, D. J. Suggett, C. J. Gobler, E. W. Koch and T. M. Kana. 2004. Mediation of benthic-pelagic coupling by microphytobenthos: An energy- and material-based model for initiation of blooms of *Aureococcus anophagefferens*. *Harmful Algae* 3: 403-437.

Lomas, M. W., T. M. Kana, H. L. MacIntyre, J. C. Cornwell. 2004. Interannual variability of *Aureococcus anophagefferens* in Quantuck Bay Long Island: Natural test of the DON hypothesis. *Harmful Algae*.3: 389-402

Kana, T M., M W. Lomas, H. L. MacIntyre, J. C. Cornwell and C. J. Gobler. 2004. Stimulation of the brown tide organism, *Aureococcus anophagefferens*, by selective nutrient additions to in situ mesocosms. *Harmful Algae*. 3:377-388.

Groffman, P.M., M.A. Altabet, J.K. Böhlke, K. Butterbach-Bahl, M. B. David, M.K. Firestone, A.E. Giblin, T.M. Kana, L.P. Nielsen and M.A. Voytek. 2006. Methods for measuring denitrification: Diverse approaches to a difficult problem. *Ecological Applications*. 16: 2091-2122.

Kana, T.M., J.C. Cornwell, L. Zhong. 2006. Determination of denitrification in the Chesapeake Bay from measurements of N<sub>2</sub> accumulation in bottom water. *Estuaries and Coasts* 29:222-231.

## 2. Web based products

Online Training module for the Denitrification Research Coordination Network: The use of membrane inlet mass spectrometry (MIMS) for the measurement of high precision N<sub>2</sub>/Ar ratios. Located at [www.denitrification.org](http://www.denitrification.org)

C. Contracts and Grants (as senior investigator except where noted)

1. Awarded (activity since 1995)

*National Science Foundation*

How do phytoplankton adapt to fluctuating light? Response of the photosynthetic apparatus to intermittent exposure to bright light. 6/1/93-5/31/96. \$96,648 (Kana's component). Co-principal investigator with R.J. Geider (U. Delaware) (15%).

The role of alternative respiration in marine phytoplankton. 12/1/93-11/30/96. \$125,378 (Kana's component). Co-principal investigator with A.J. Lewitus (Univ. So. Carolina) (10%)

Denitrification in tidal river-marsh ecosystems. 9/1/96-8/31/99. \$249,985. J. Cornwell, co-PI. (30%)

On a dynamic balance theory of photosynthetic pigment regulation in unicellular algae: tests of a novel hypothesis. 8/1/96-7/31/99. \$338,753. (40%)

Coping with darkness: The physiological responses of marine microalgae to aphotic conditions and their ecological implications. 3/15/98-3/14/01. \$264,598. Co-principal investigator with H. MacIntyre and E. Koch. (10%)

Phytoplankton Photochemical Budgets: translating optical measurements to productivity. 2/15/00-1/14/03 (awarded and anticipated period). \$387,014. T. Kana, PI. H. MacIntyre co-PI. (25%)

BioComplexity of Aquatic Microbial Systems: Relating Diversity of Microorganisms to Ecosystem Function. 4/1/00-3/31/05 \$1,863,080 approx. B. Ward (Princeton), PI. T. Kana one of 8 co-PIs. (18%)

Oxygen consumption and isotope fractionation in marine phytoplankton. 8/1/07-7/30/10. \$396,776. Principal Investigator (25%).

*Maryland Water Resources Research Center*

Direct ecosystem-integrated measurement of denitrification in a Chesapeake Bay tributary and tidal embayment. 5/1/92-4/30/93. \$23,000. (15%)

Denitrification in estuarine systems: new approaches using a rapid, high precision method for N<sub>2</sub> measurements. 5/1/93-4/30/94. \$22,500 (15%)

*US EPA*

*Multiscale Experimental Ecosystem Research Center (MEERC)*. Regulation of SAV photosynthesis by environmental stressors: evaluation of PAM fluorometry for the

measurement of primary productivity and stress effects. Principal investigator. 1/1/95-12/31/95, \$31,140. (8%)

*Multiscale Experimental Ecosystem Research Center (MEERC)*. Productivity in submersed aquatic vegetation. 1/1/96-12/31/96. ca. \$16,000. (8%)

*US Department of Agriculture*

*Northeast Regional Aquaculture Center*: Water quality and waste management in aquaculture production. (Co-principal investigator with R. Harrell, P. Glibert and J. Cornwell) 5/1/95 - 8/15/95; \$37,284. (8%)

*National Research Initiative - Competitive Grants*: Looking inside the black box: nutrient cycling in estuarine aquaculture ponds. (Co-principal investigator with P. Glibert and C. Miller) 7/1/95 - 6/30/97; ca. \$156,600. (8%)

*NOAA*

*New York Sea Grant*:

Mechanisms for nutrient and energy acquisition in low light: successful strategies of *Aureocococcus anophagefferens*. Co-PI with P. Glibert, P.I. 9/1/97-8/31/99. \$140,031. (15%)

ECO HAB: Benthic-pelagic coupling and LI brown tide. 9/1/99-8/30/02. \$587,399. T.Kana, PI. H. MacIntyre and J. Cornwell, co-PIs. (18%).

*MD Sea Grant*:

Nutrient cycling in oligohaline sediments and marshes: is denitrification a major sink for nitrogen? Co-principal investigator with J. Cornwell. 2/1/98-1/31/00. \$111,109. (15%)

Environmental Controls of Denitrification in Estuarine Sediments. 2/1/00-1/31/02. \$124,652. J. Cornwell, PI. T. Kana, co-PI.

Predicting the restoration trajectory and water quality value of benthic microalgae in shallow water Chesapeake sediments. 2/1/05-1/31/07. \$140,190. 1 mo./year. J Cornwell, PI. T. Kana, co-PI.

#### D. Conferences (Invited – last 5 years)

Workshop on Advanced Approaches to Quantify Denitrification. Woods Hole Research Center, Woods Hole, MA May 2004. Talk titled: Direct N<sub>2</sub> Quantitation: Opportunities and challenges of using direct N<sub>2</sub> measurements of denitrification.

Workshop on Respiration and Planktonic Food Webs. Vigo Spain. June 2006 Talk titled: Perspectives on the measurement of respiration in aquatic systems.

#### E. Conferences

Maryland Water Monitoring Council Annual Conference, Linthicum, MD, Nov. 2006. Kana, T.M., J. C. Cornwell, and T. R. Fisher. Applications of rapid high precision measurements of dissolved nitrogen and argon for assessment of denitrification.

ASLO, Santa Fe, Feb. 2007, Fisher, T. R., Gustafson, A. B., Sutton, A, J, Kana, T, McCarty, G. Staver, K, Jordan, T. E., Fogel, M. Groundwater denitrification of agricultural nitrate.

USEPA NCER, Kansas City, April 2007. Thomas R. Fisher, Anne B. Gustafson, Adrienne J. Sutton, Todd Kana, Thomas E. Jordan, Kenneth W. Staver, and Marilyn L. Fogel. Reduction of NO<sub>3</sub> losses from crop fields associated with controlled drainage structures in the Choptank River basin.

### Memberships in Professional Societies 1998

American Society of Limnology and Oceanography, American Geophysical Union.

### III. Teaching and Training

1987-1997 Associate member, UMCES Graduate Faculty

1997-present: Member, USM Inter-Institutional Graduate Faculty

#### A. University System of Maryland courses taught

Course no.	Title	Instit.	Semester	Enrol.	Credits	Co-instructors
MEES 608	Regulation of photosynthesis	HPL	Fall 1994	8	1	
MEES 699	Plant Physiological Ecology	HPL	Sum 1995	6	2	
MEES 698T	Methods in Photosyn: PAM Fluorometry	HPL	Spring 1997	4	1	
MEES 608K	Primary Productivity	HPL	Fall 1997	6	1	Harding
MEES 698M	Regulation of Photosynthesis and Primary Production	HPL	Fall 1999	8	3	MacIntyre, Lomas
MEES 608	Oxygen (seminar)	HPL	Spring 2004	2	1	
MEES 608J	Algal and Plant Physiology (seminar)	HPL	Spring 2006	4	1	
MEES 698B	Phytoplankton Ecological Physiology	HPL	January 2007	5	2	Glibert
MEES 698C	Phytoplankton Ecol. Phys. Laboratory	HPL	January 2007	5	1	Glibert

#### B. Graduate students supervised as major advisor:

##### Degrees completed

Scheppe, K.D.; M.S. MEES. 1997. HPL. "Light Dependent respiration in estuarine phytoplankton."

Hentschke, P.G.; M.S. MEES. 1997. HPL. "A fluorescence-based method for determining true gross photosynthesis reveals a significant photorespiratory flux in *Potamogeton perfoliatus* L.

## Graduate Student Committee Memberships

Christopher Chick	M.S.	MEES	HPL
Carina Chiscano	M.S.	MEES	HPL
Theresa Coley	M.S.	MEES	HPL
Kelly Cunningham	Ph.D.	MEES	CBL
Joyce Dewar	Ph.D.	MEES	HPL
Chung Lei Fan	Ph.D.	MEES	HPL
Rebecca Fox	Ph.D.	MEES	HPL
Eric Haberkern	M.S.	MEES	HPL
Matthew Johnson	Ph.D.	MEES	HPL
Terry Jordan	M.S.	MEES	HPL
Hugh MacIntyre	Ph.D.	Oceanography	U Delaware
Mark Monaco	Ph.D.	MEES	HPL
Michael Owens	M.S.	MEES	HPL
John Peterson	Ph.D.	MEES	HPL
Catherine Stokes	M.S.	MEES	HPL

## Outreach and Service

### A. HPL Committees (since 1994)

Library Committee 1994-1995.  
Seminar Committee 1994-1996.  
Computer Committee 1995-1996.  
Seminar Committee 1997-1998.  
Computer Committee 1998-1999.  
Library Committee 2000-2001; 2004-.

### B. Public Lectures

Shallow water: influence of the bay bottom on brown tide events. BTRI Information Symposium, NY Sea Grant. Southampton, NY. March 10, 2001