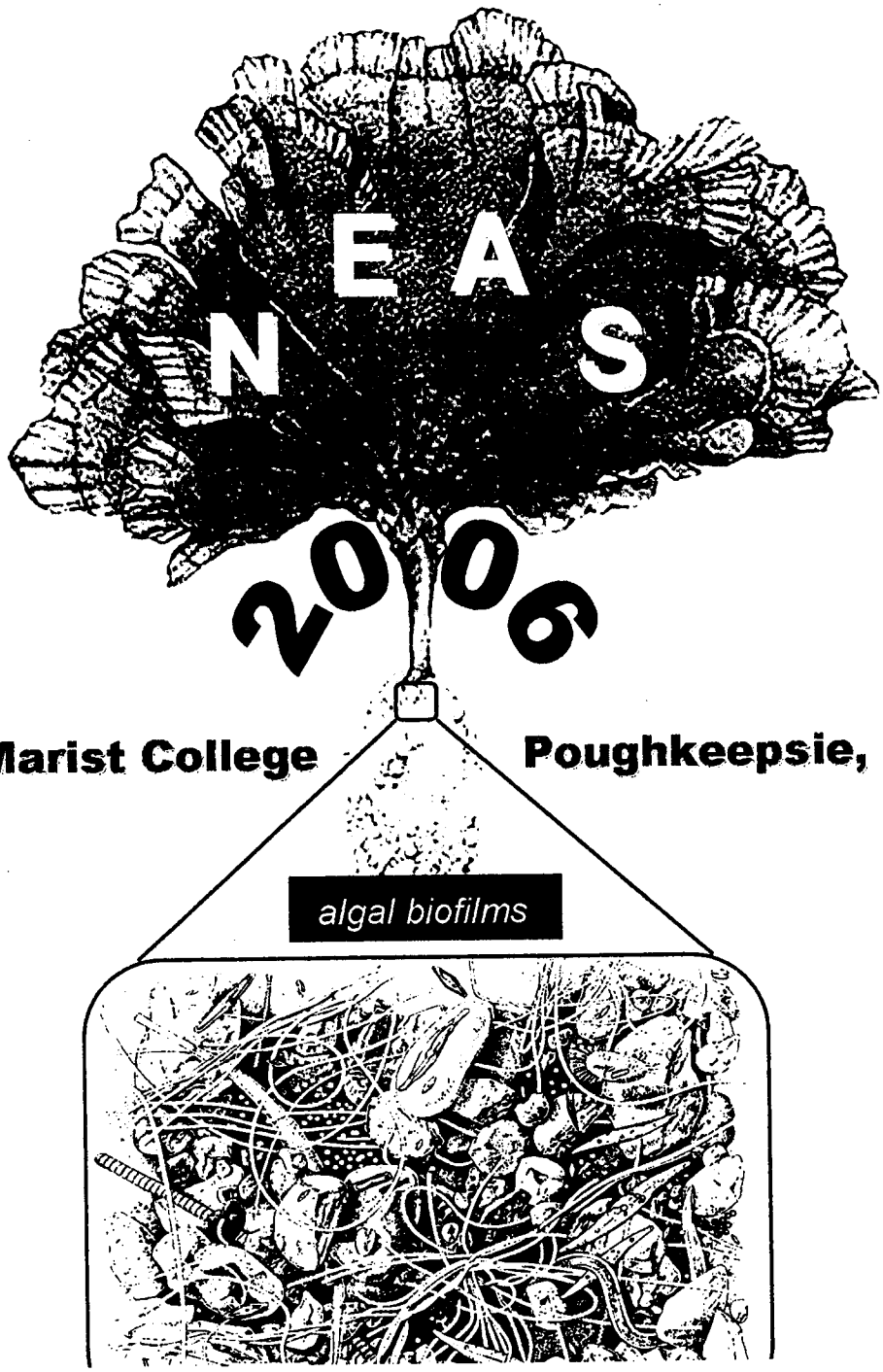
PROGRAM AND ABSTRACTS



Marist College **Poughkeepsie, NY**

21-23 April, 2006

Welcome to the 45th Northeast Algal Symposium, NEAS 2006!

It is our pleasure to welcome you to Marist College in New York's beautiful Hudson River Valley. We will do our best to make this a gratifying meeting and to facilitate the exchange of algological information between meeting attendees. Our goal is to provide you with a solid, cutting-edge scientific program organized to provide a comfortable and supportive atmosphere for students—both graduate and undergraduate—to present the results of their research.

Many of you may not be familiar with Marist College. We hope that you will have an opportunity to learn more about the college during your time here. The hosting of NEAS 2006 is indicative of Marist's commitment to improving the reputation of its programs in the Natural Sciences and we are very happy to be hosting this years meeting.

Perhaps this is your first visit to the Hudson Valley. This area along the middle stretch of the Hudson River boasts world-renowned natural beauty, several sites of historic interest, and a variety of other fun places to visit. We hope you will have an opportunity to take some time, look around, and enjoy some activities in addition to the great symposium we have in store for you.

Best wishes for a scientifically-productive and enjoyable symposium,

Ray Kepner, Marist College
David Domozych, Skidmore College
John Heimke, Russell Sage College
NEAS 2006 Co-Convenors

45th Northeast Algal Symposium

Honorary Chair

H. William "Bill" Johansen

NEAS Chairman 1987-1992

"One fine phycologist, one exceptional human...a true professional, a teacher, colleague and friend to many.

He continues to study and willingly shares his knowledge of the algae and the oceans.

Go well good friend"

Bob T. Wilce

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Activities and Locations

Registration:	Friday at the Courtyard by Marriott. Saturday in the breezeway between Marist College Student Center and Champagnat Hall.
Opening Mixer:	Friday 6-9pm Courtyard by Marriott.
Breakfast:	The Marriott serves a complete breakfast (hot) that is free for registered NEAS attendees staying at the Courtyard.
Program & Oral Presentations:	Student Center (SC) Room 349
Posters:	Posters will be displayed in SC 346 (The Performing Arts Room), SC 348 and their adjoining Hallway.
Saturday Lunch and Banquet:	Student Center Cabaret. Lunch from 12-1:30 Pre-banquet mixer 6:30-7:30, Banquet 7:30-9:30
Executive Comm. Lunch:	Saturday 12-1:30, President's Dining Room A in SC
Vendor Display:	Saturday Rm 348 SC
Break Time:	Hot & cold beverages and light snacks will be available in hallway outside of room 348
Sunday Lunch:	Box lunches will be available following the General Business Meeting outside SC 348.

General Program: 45th Northeast Algal Symposium

Friday, April 21, 2006

6:00 – 9:00pm **Registration and mixer at Courtyard by Marriott**

Saturday, April 22, 2006

Opening remarks (and presentations, Student Center, Marist College)

8:15 – 8:30am **Welcome and Opening Remarks – Raymond Kepner**

SESSION 1 Student Presentations Moderator: Chris Lane

8:30 – 8:45am Wilce Award Candidate
MOLECULAR ANALYSIS OF SPECIES LIMITS OF THE BROWN ALGAL GENUS *FUCUS* IN THE NORTHEAST PACIFIC. **Hana Kucera** and Gary W. Saunders. Centre for Environmental & Molecular Algal Research, Department of Biology, University of New Brunswick, Fredericton, New Brunswick, E3B 6E1, Canada.

8:45 – 9:00am Wilce Award Candidate
EXAMINING ALGAL VIRUS RECEPTORS USING CONFOCAL LASER MICROSCOPY. **Paesani, V.I.**[1],Lawrence, J.E.[1] [1]University of New Brunswick, Fredericton, New Brunswick, E3B 6E4, Canada.

9:00 – 9:15am Wilce Award Candidate
RESURRECTING THE GENUS *GRANIA* FOR *GRANIA EFFLORESCENS* **Susan L. Clayden** and Gary W. Saunders. Centre for Environmental and Molecular Algal Research, Department of Biology, University of New Brunswick, Fredericton, N.B., E3B 6E1, Canada

9:15 – 9:30am Wilce Award Candidate
CHARACTERIZATION OF GROUP IA INTRONS IN THE CHLOROPLAST *RBC*L GENE OF FIVE *PEDIASTRUM* AND TWO *BRACTEACOCCUS* ISOLATES (SPHAEROPLEALES, CHLOROPHYCEAE). **Hilary A. McManus**[1] and Louise A. Lewis[1]. Department of Ecology and Evolutionary Biology, University of Connecticut, Storrs, Connecticut, 06269, USA.

9:30 – 9:45am Wilce Award Candidate
COMPARISON OF DIATOM AND MACROINVERTEBRATE INDICES IN ACID MINE DRAINAGE IMPACTED STREAMS. **Jason T. Zalack** and Morgan L. Vis Department of Environmental and Plant Biology, Ohio University. Athens, OH 45701.

9:45 – 10:00am Wilce Award Candidate
TEMPORAL DYNAMICS OF EPS PRODUCTION, LOSS AND COMPOSITION FOR BIOFILMS WITHIN THE COLNE ESTUARY, U.K. **Brent Bellinger**[1], Graham Underwood[2], and Michael Gretz[1]. [1]Department of Biological Sciences. Michigan Tech University, Houghton, MI 49931 USA
[2]Department of Biological Sciences. University of Essex, Colechester, CO4 3SQ U.K.

10:00 – 10:30am **Break**

SESSION 2 Student Presentations Moderator: Craig Schneider

10:30 – 10:45am Wilce Award Candidate
DESICCATION EFFECTS ON GROWTH RATE AND NITRATE UPTAKE OF *PORPHYRA* SPP. IN RELATION TO TIDAL ELEVATION. **Jang K. Kim**[1,3], George P. Kraemer[2], and Charles Yarish[1] [1]Department of Ecology & Evolutionary Biology, University of Connecticut, Stamford, CT, 06901, USA. [2] Departments of Biology & Environmental Studies, Purchase College, State University of New York, Purchase, NY, 10577, USA. [3]Department of Ecology & Evolutionary Biology, University of Connecticut, Groton, CT, 06340, USA.

10:45 – 11:00am Wilce Award Candidate
MOLECULAR AND ANATOMICAL ANALYSIS OF CRYPTIC SPECIES IDENTIFIED AS *RHODYMENIA* IN AUSTRALIA. **Brian McDonald** & Gary W. Saunders. Department of Biology, University of New Brunswick, Fredericton, N.B., E3B 6E1 Canada.

11:00 – 11:15am Wilce Award Candidate
A MOLECULAR GENETIC INVESTIGATION OF HETEROTROPHIC BACTERIA ASSOCIATED WITH *Aureococcus anophagefferens* (CCMP 1708). **Kristopher M. Baker**[1] and Jackie L. Collier[1]. [1]Marine Science Research Center, Stony Brook University, Stony Brook, NY 11794-5000

11:15 – 11:30am Wilce Award Candidate
PHYLOGENETIC AFFINITIES OF AUSTRALASIAN SPECIMENS OF *BATRACHOSPERMUM* (BATRACHOSPERMALES, RHODOPHYTA) INFERRED FROM MOLECULAR AND MORPHOLOGICAL DATA.
Sarah A. Stewart[1], Morgan L. Vis[1] and Timothy J. Entwisle[2]
[1]Department of Environmental and Plant Biology, Ohio University, Athens, OH 45701, USA. [2]Royal Botanic Gardens and Domain Trust, Mrs. Macquaries Road, Sydney, NSW 2000, Australia.

11:30 – 11:45am President's Award Candidate
AN INVESTIGATION OF THE FACTORS CONTROLLING THE GROWTH OF *GLOEOTRICHIA ECHINULATA* IN AN OLIGOTROPHIC LAKE.
Cayelan C. Carey[1], Kathleen C. Weathers[2], Kathryn L. Cottingham[1], and James F. Haney[3]. [1]Department of Biology, Dartmouth College, Hanover, New Hampshire, 03755, USA. [2]Institute of Ecosystem Studies, Millbrook, New York, 12545, USA. [3]Department of Zoology, University of New Hampshire, Durham, New Hampshire, 03824, USA.

12:00 – 1:30pm **Lunch**
1:30 – 1:45pm **Buffer**

SESSION 3 — Student and Professional Presentations
Moderator: Don Cheney

1:45 – 2:00pm President's Award Candidate
ADHESION STRUCTURES AND MECHANISMS IN THE DESMID, *PLEUROTAENIUM TRABECULA*: BIOFILM DYNAMICS.
Leah E. Elliott and David S. Domozych, Department of Biology, Skidmore College, Saratoga Springs, NY 12866

2:00 – 2:15pm President's Award Candidate
THERMAL STRESS INTENSIFIES PATHOGENIC EFFECTS OF *VIBRIO* BACTERIA ON CLADE SUBSPECIES OF *SYMBIODINIUM* IN REEF BUILDING CORALS.
J.M. Cervino1, **J.M. McClanahan2**, E.A . Lorence3, A. Perovic4, A. Skritnik5, T.J. Goreau6 , R.L. Hayes7

2:15 – 2:30pm Contributed Paper
THE NUCLEOMORPH GENOME OF THE CRYPTOMONAD *HEMISELMIS RUFESCENS* CCMP644 **Christopher E. Lane**[1], Catherine Kozera[2], Sharen Bowman[2], Bruce Curtis[2] and John M. Archibald[1]
[1]Department of Biochemistry and Molecular Biology, Dalhousie University, Halifax, NS, Canada [2] The Atlantic Genome Centre, Institute for Marine Biosciences, Halifax, NS, Canada

2:30 – 2:45pm Contributed Paper
WHOLE-LAKE INORGANIC ^{13}C ADDITIONS AND COMPARATIVE STUDIES REVEAL DIFFICULTIES IN PREDICTING ALGAL ISOTOPE SIGNATURES IN LAKES **Darren L. Bade**[1], Michael L. Pace[1], Jonathan J. Cole[1], and Stephen R. Carpenter[2] [1]Institute of Ecosystem Studies, Millbrook, NY, USA. [2]Center for Limnology, University of Wisconsin-Madison, USA.

2:45 – 3:00pm Contributed Paper
DNA BARCODING: A POWERFUL MOLECULAR TOOL TO UNCOVER DIVERSITY IN THE CANADIAN RED ALGAL FLORA
Line Le Gall and Gary W. Saunders,CEMAR, Dept of Biology, University of New Brunswick, Fredericton, NB, E3B 6E1, CANADA legall@unb.ca

3:00 – 3:15pm Contributed Paper

SESSION 4 **Poster Presentations**

3:15 – 5:00pm

5:00 – 6:00pm

Distinguished Speaker Presentation:
Dr. Graham J. C. Underwood,
Department of Biological Sciences, University of Essex, U.K.
with introduction by David Domozych

Life in Estuarine Biofilms: Small-Scale Complexicity and Large-Scale Importance

6:30 – 7:30pm **Pre-Banquet Mixer**

7:30 – 9:30pm **Banquet, Awards and Auction**

Sunday, April 23, 2006

9:00 – 9:30am **Coffee Break**

SESSION 5 **Mini-symposium: Life on a Surface: Algae and Biofilms**
Moderator: John Heimke

9:30 – 10:15am **D. Domozych,** DESMIDS: THE STORY OF BIOFILM EUKARYOTES OF NORTHERN WETLANDS. Dept of Biology, Skidmore College, Saratoga Springs, NY 12866, USA.

10:15 – 11:00am **R. Jan Stevenson,** BENTHIC ALGAE ARE EVERYWHERE, IMPORTANT. WE NEED TO KNOW MORE! Dept of Zoology, Center for Water Science, Michigan State University, East Lansing, Michigan 48864

11:00 – 11:45am **Z. Lewandowski,** STRUCTURE AND ACTIVITY OF BACTERIAL BIOFILMS, Center for Biofilm Engineering, Montana State University. Bozeman, MT 59717. USA

11:45am – 12:00 **Buffer**

12:00 – 1:00pm **Lunch and General Business Meeting**

1:00 – 1:15pm **Closing Remarks**

Judges:

President's Award (oral and poster presentations)
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Wilce Award (oral presentations)
Jack Holt, Alison Roberts, Darren Bade

Wilce Award (poster presentations)
Jim Foertch, Eric Roberts, Andy Ryder

POSTER PRESENTATION SUMMARY

Undergraduate (President's Category) Presentations

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IDENTIFICATION OF FLAGELLA CAP PROTEINS FROM *CHLAMYDOMONAS REINHARDTII* MUTANTS USING DIFFERENTIAL FLUORESCENT LABELING. Adel Abdo, Lisa Kortfelt, James Hampton, Mike Adams, Biology Dept, Eastern Connecticut State University, Willimantic, CT 06226

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MORPHOLOGICAL VARIABILITY WITHIN THE GENUS *STENOPTEROBIA* IN NORTH CAROLINA BAYS. Lee Camfield and Peter A. Siver. Department of Botany, Connecticut College, New London, CT, 06320, USA.

§§

SEARCH FOR CHAPERONE FLAGELLAR PROTEIN COMPLEXES DURING REFLAGELLATION IN *CHLAMYDOMONAS REINHARDTII*. James Hampton, Lisa Kortfelt, Adel Abdo, Mike Adams. , Biology Dept, Eastern Connecticut State University, Willimantic, CT 06226

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STRUCTURE AND DYNAMICS OF WETLAND BIOFILMS: *COSMARIUM* SPECIES AS MAJOR DESMID RESIDENTS. S. Hocine and David S. Domozych, Department of Biology, Skidmore College, Saratoga Springs, NY 12866, USA.

§§

THE EFFECT OF FLAGELLA LENGTH AND NUMBER ON THE KINETICS OF REFLAGELLATION IN *CHLAMYDOMONAS REINHARDTII*. Lisa Kortfelt, James Hampton, Adel Abdo, Mike Adams., Biology Dept, Eastern Connecticut State University, Willimantic, CT 06226

§§

ALTERATION OF CELL DIVISION PROCESSES IN THE DESMID, *PENIUM MARGARITACEUM*: LONG TERM EFFECTS OF BREFELDIN A AND CYTOCHALASINS. Rachel Lay and David S. Domozych, Department of Biology, Skidmore College, Saratoga Springs, NY 12866, USA.

§§

THE EFFECTS OF EXTENDED PERIODS OF ANOXIA ON *VAUCHERIA* PROPAGULES IN CONNECTICUT RIPARAN SEDIMENTS. Alison A. Parpal[1] and Craig W. Schneider[1].
[1]Department of Biology, Trinity College, 300 Summit Street, Hartford, CT 06106-3100, USA.

§§

PROPHAGE: HARMLESS HITCHHIKERS OR CYANOBACTERICIDAL MANIACS?
Alexander Ruck[1] and Raymond Kepner[2]
[1]Department of Microbiology, Marist College, Poughkeepsie, New York 12601, USA
[2]Department of Microbiology, Marist College, Poughkeepsie, New York 12601, USA

§§

ASYMMETRIC CELL WALL DEVELOPMENT IN "SYMMETRIC" DESMIDS.
Ashley A. Serfis and David S. Domozych, Department of Biology, Skidmore College, Saratoga Springs, NY 12866, USA

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IN-STREAM AND RIPARIAN CHARACTERIZATION OF FOUR NEW ZEALAND STREAM SEGMENTS CONTAINING *BATRACHOSPERMUM* SPECIES (RHODOPHYTA).
Katherine F Snyder, Kim J. Brown and Morgan L. Vis. Department of Environmental and Plant Biology, Ohio University, Athens, Ohio, 45701, USA

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THE GOLGI APPARATUS AND EPS SECRETORY MACHINERY OF THE DESMID, *NETRIUM INTERRUPTUM*. Anne L. Thomae and David S. Domozych, Department of Biology, Skidmore College, Saratoga Springs, New York, 12866, USA.

§§

THE EXTRACELLULAR MATRIX OF *COSMARIUM RENIFORME*, A UNIQUE DESMID FOUND IN ADIRONDACK WETLAND BIOFILMS. Richard Wilson, Christine Chang, Catherine E. Domozych and David S. Domozych, Department of Biology, Skidmore College, Saratoga Springs, NY 12866, USA.

Graduate (Wilce Category) Presentations

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WHOLE CELL IMMUNOLOCALIZATION OF THE HEPATOTOXIN MICROCYSTIN IN FRESHWATER CYANOBACTERIA. Heidi Langer Atkinson and Ellen Braun-Howland, University at Albany, School of Public Health, Albany, NY

§§

RESOLVING SPECIES DIVERSITY WITHIN THE ALGAL GENERA *CALLOPHYLLIS, PUGETIA AND EUTHORA* (KALLYMENIACEAE, RHODOPHYTA) USING MOLECULAR TOOLS. Bridgette Clarkston and Gary W. Saunders. Center for Environmental & Molecular Algal Research, Department of Biology, University of New Brunswick, Fredericton, N.B., E3B 6E1, Canada.

§§

UNRAVELING THE EVOLUTIONARY HISTORY OF GLUTAMINE SYNTHETASE II IN PHOTOSYNTHETIC LINEAGES WITH AN EMPHASIS ON RHODOPHYTES. Sohini Ghoshroy, Aurélien Tartar and Deborah L. Robertson. Department of Biology, Clark University, 950 Main Street, Worcester, MA01610

§§

PROPOSED USE OF THE RED MACROALGA *PORPHYRA* AS A PROTEIN AND FATTY ACID ADDITIVE IN FISH FEEDS. Timothy Hogan, Angela Silvestro, and Donald Cheney. Biology Department, Northeastern University, Huntington Avenue, Boston, MA, 02115, USA.

§§

MICROCYSTIN PRODUCTION IN LAKE ONTARIO. Hotto, A.M., Satchwell, M.F, and Boyer, G.L., SUNY College of Environmental Science and Forestry, 1 Forestry Dr., Syracuse, NY 13210

§§

CHEMICAL CHARACTERIZATION OF DESMID (ZYGNEMATALES) EXTRACELLULAR POLYMERIC SUBSTANCES. IMPLICATIONS FOR EUKARYOTIC EPS FUNCTION IN FRESHWATER BIOFILMS. Sarah N. Kiemle[1], David S. Domozych[2], and Michael R. Gretz[1]
[1]Department of Biological Sciences, Michigan Technological University, Houghton, MI 49931
[2]Department of Biology, Skidmore College, Saratoga Springs, NY 12866

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DESICCATION TOLERANCE IN *PORPHYRA* SPECIES. Yen-Chun Liu[1] and Donald Cheney[2]. [1]Northeastern University, 360 Huntington Avenue, Boston, MA, 02115, USA

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ASSESSING SPECIES RICHNESS AND PHYLOGENETIC RELATIONSHIPS OF THE BROWN ALGAL (PHAEOPHYCEAE) FLORA OF CANADA. Daniel McDevit and Gary Saunders. University of New Brunswick, Fredericton, NB, Canada.

§§

DISTRIBUTION AND RECRUITMENT ECOLOGY OF THE INVASIVE SEAWEED *CODIUM FRAGILE* SSP. *TOMENTOSOIDES* IN MASSACHUSETTS EELGRASS COMMUNITIES. Chris McHan and Donald P. Cheney. Biology Department, Northeastern University, Huntington Avenue, Boston, MA, 02115, USA.

§§

COMPARISON OF TWO ALGAL INDICES FOR USE IN BIOMONITORING OF SOUTHEASTERN OHIO STREAMS. Nathan J. Smucker[1], Emily K. Hollingsworth[1], Robert G. Verb[2] and Morgan L. Vis[1]. [1]Department of Environmental and Plant Biology, Ohio University, Athens, Ohio, 45701, USA.[2]Department of Biological & Allied Health Sciences, Ohio Northern University, Ada, Ohio, 45810, USA.

§§

A BASELINE STUDY USING PERIPHYTON COMMUNITIES IN SHAMOKIN CREEK, AN ACID MINE IMPACTED STREAM IN NORTHUMBERLAND COUNTY, PENNSYLVANIA Laura Wirpsza, Nicole Sweeney, and Jack R. Holt. Department of Biology, Susquehanna University, Selinsgrove, PA 17870, USA.

Professional Poster Presentations

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SEAWEED UPTAKE, CONCENTRATION & DETOXIFICATION OF MARINE POLLUTANTS. Don Cheney[1], Tavi Cruz-Uribe[2], Carrie Fraga[1], and Greg Rorrer[2] [1]Biology Dept., Northeastern University, Boston, MA;[2]Dept. Chem. Engineering, Oregon State University, Corvalis, OR.

§§

MICROBIOTA OF CRANBERRY BOGS: EASTERN MASSACHUSETTS, USA. Aimlee D. Laderman and Angela Allen, Marine Biological Laboratory, Woods Hole MA 02543.

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AN INVENTORY OF SCALED CHRYSOPHYTES FROM THE MID-ATLANTIC COASTAL PLAIN REGIONS OF MARYLAND AND NEW JERSEY, USA, AND THEIR RELATIONSHIPS TO ENVIRONMENTAL VARIABLES. Anne M. Lott and Peter A. Siver. Department of Botany, Connecticut College, New London, CT, 06320, USA.

§§

UTILIZING ALTERNATE WAVELENGTHS TO INCREASE LEVELS OF THE OMEGA-6 ARACHIDONIC ACID. Audrie-Jo L. M^{c}Conkey and Dr. Catherine T. Enright. Nova Scotia Agricultural College, Department of Plant and Animal Sciences, Truro, NS, B2N 5E3. Canada.

§§

A STUDY OF FRESHWATER SPECIES OF *SYNEDRA* EHRENBERG (BACILLARIOPHYTA) FROM NORTH AMERICAN STREAMS. Eduardo A. Morales, Sarah Hamsher, Erin Hagan & Daniel Mellott. Patrick Center for Environmental Research, The Academy of Natural Sciences, 1900 Benjamin Franklin Parkway, Philadelphia, PA 19130-1195, USA.

§§

A NEW FRESHWATER SPECIES OF *ENCYONOPSIS* KRAMMER (BACILLARIOPHYCEAE) FROM STREAMS IN THE SOUTHERN UNITED STATES. Eduardo A. Morales[1] & Kalina M. Manoylov[2]. [1]Patrick Center for Environmental Research, The Academy of Natural Sciences, 1900 Benjamin Franklin Parkway, Philadelphia, PA 19130-1195, USA. [2]Department of Zoology, Michigan State University, East Lansing, MI 48824, USA.

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ACHNANTHIDIUM SPECIES IN FLOWING WATERS OF THE APPALACHIAN MOUNTAINS. Karin C. Ponader[1] and Marina G. Potapova[2]. [1]Harvard University Herbaria, 22 Divinity Avenue, Cambridge, MA, 02138, USA. [2]Patrick Center for Environmental Research, The Academy of Natural Sciences, Philadelphia, PA, 19103, USA.

§§

MERHAB – LOWER GREAT LAKES - MONITORING FOR HARMFUL ALGAL BLOOMS IN OUR INLAND SEAS. Mike Satchwell, Amber Hotto, Xingye Yang, Elizabeth Konopko, Steven Ragonese, Karen Howard and Gregory Boyer. State University of New York, College of Environmental Science and Forestry, 1 Forestry Dr, 121 Jahn Lab, Syracuse, New York 13210

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DISCRIMINATING AMONG CRYPTIC SPECIES OF *PLOCAMIUM* IN THE SOUTHERN HEMISPHERE USING DNA BARCODING Gary W. Saunders and Tanya Moore
Centre for Environmental & Molecular Algal Research Department of Biology,
University of New Brunswick Fredericton, NB, Canada E3B 6E1

ABSTRACTS

(Alphabetical by First Author)

45th Northeast Algal Symposium

Marist College, Poughkeepsie, NY
April 21-23, 2006

IDENTIFICATION OF FLAGELLA CAP PROTEINS FROM *CHLAMYDOMONAS REINHARDTII* MUTANTS USING DIFFERENTIAL FLUORESCENT LABELING. Adel Abdo, Lisa Kortfelt, James Hampton, Mike Adams, Biology Dept, Eastern Connecticut State University, Willimantic, CT 06226

There eukaryotic flagellum contains over 300 different proteins, most of which are part of the repeating structure of the axoneme and therefore are present in thousands of copies. However, there is a unique structure at the tip of the flagellum, the cap, where the proteins will be present in single, or few copies. So far there are no reports as to which of the observed proteins might belong to this structure. In order to try and identify the cap proteins two flagella length mutants of *Chlamydomonas reinhardtii* mutants have been used. The long flagella mutant (CC-2287) has flagella three times the length of the short flagella mutant (CC-3663) so the ratio of cap:axonemal proteins should be three times greater in the short. Equal masses of both types are purified and the proteins are labeled with different Alexafluor fluorescent dyes. The short is labeled with a dye fluorescing at 488 nm and the long at 617nm. The two samples are mixed, run on SDS-PAGE, and then examined under UV light. Protein bands showing a pronounced shift to the 488nm end are potential cap proteins and will be examined further.

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WHOLE CELL IMMUNOLOCALIZATION OF THE HEPATOTOXIN MICROCYSTIN IN FRESHWATER CYANOBACTERIA. Heidi Langer Atkinson and Ellen Braun-Howland, University at Albany, School of Public Health, Albany, NY

The cyanobacterial hepatotoxin microcystin has been implicated in numerous poisonings and deaths of humans, livestock and domestic animals worldwide. Microcystin-producing cyanobacteria, such as *Microcystis* and *Anabaena*, are ubiquitous freshwater organisms easily identified by traditional microscopic methods. However, toxicity cannot be established on the basis of morphology. Therefore, additional time-consuming and costly laboratory tests must be performed once a potential toxin-producer is identified in a water supply or recreational water body. In order to enable a one-step approach to the detection of microcystin-producing cyanobacteria, we have initiated the development of a detection method for microcystin based on

the whole-cell immunolabeling of this small, seven-residue, peptide. Whole-cell immunolocalization will permit direct examination of toxin production in field samples and will be a useful tool for studies of toxin segregation within cyanobacterial colonies. To date, whole-cell immunolocalization of microcystin and the constitutively expressed RubisCO enzyme has been evaluated in laboratory cultures of known toxigenicity. Initial results suggest microcystin can be successfully labeled in toxic cyanobacterial species. Microcystin has been labeled in five toxic strains of *Microcystis aeruginosa*, while two non-toxic *M. aeruginosa* strains did not label. RubisCO labeling ensured cells were permeabilized, thus avoiding false negatives. All results were confirmed with the enzyme-linked immunosorbant assay for microcystin (ELISA). Clearly, for environmental samples, this method will combine the specificity of immunological labeling with the certainty of microscopic confirmation. Furthermore, *in situ* detection of toxic cells will supply water management and public health officials with another tool for detection and assessment of ecosystems prone to toxic bloom formation.

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WHOLE-LAKE INORGANIC ^{13}C ADDITIONS AND COMPARATIVE STUDIES REVEAL DIFFICULTIES IN PREDICTING ALGAL ISOTOPE SIGNATURES IN LAKES Darren L. Bade[1], Michael L. Pace[1], Jonathan J. Cole[1], and Stephen R. Carpenter[2]
[1]Institute of Ecosystem Studies, Millbrook, NY, USA. [2]Center for Limnology, University of Wisconsin-Madison, USA.

Determining carbon stable isotope values of algae is a crucial for studies ranging from food web interactions to paleolimnology However, algal carbon isotope signatures are variable within and among lakes because of difference in sources of inorganic carbon and differential isotope fractionation during photosynthesis. Several physiological models have been proposed to explain algal photosynthetic fractionation factors (ε_p). These models generally consider CO_2 concentration, growth rate, or cell morphometry, and have been supported by empirical evidence from laboratory cultures. Using comparative studies and several whole-lake inorganic ^{13}C additions, we explored methods of quantifying algal isotope signatures and tested the applicability of the physiological models to a broad range of lakes with mixed phytoplankton communities. In our largest comparative study, values of $\delta^{13}C$-POC (particulate organic carbon) ranged from -35.1‰ to -21.3‰. Results from the isotope addition demonstrated that algal isotopes signatures can differ substantially form $\delta^{13}C$-POC. Using several methods to estimate algal isotopic signatures, we found high variability in fractionation among lakes. There was no relationship between ε_p and one of the most important predictors in existing models, pCO_2. Measurements and a statistical model from the isotope addition revealed that algal frantionation was often lower (0 - 15‰) than expectations from prior student (ε_p > 20‰). Our work reveals the need for better methods for measuring algal isotope signatures.

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A MOLECULAR GENETIC INVESTIGATION OF HETEROTROPHIC BACTERIA ASSOCIATED WITH *AUREOCOCCUS ANOPHAGEFFERENS* (CCMP 1708). Kristopher M. Baker[1] and Jackie L. Collier[1]. [1]Marine Science Research Center, Stony Brook University, Stony Brook, NY 11794-5000

Aureococcus anophagefferens is a eukaryotic picophytoplankton that forms brown tides in the coastal waters of Long Island, NY, causing the cessation of feeding by bivalves. 17 of the 18 cultures of *Aureococcus* are not axenic, and the one that is axenic is difficult to maintain, suggesting that the prokaryotic contaminants are beneficial to *Aureococcus* growth. We have used universal primers to amplify a ~540 base-pair fragment of the *ureC* gene, encoding the enzyme urease, to examine the bacteria associated with cultures of *Aureococcus anophagefferens*. Total DNA was purified from two nonaxenic CCMP 1708 cultures (one obtained in 2000 from Horn Point Lab, MD, and the other obtained in 2004 from MSRC, NY) and PCR amplified. Thirty-four amplicons were screened and sequenced. Phylogenetic analysis revealed four separate clusters (each with 100% bootstrap support) of virtually identical bacterial sequences were found in both the 2000 and 2004 cultures (a total of 12 sequences). Two other clusters with weaker bootstrap support (56%) also contain an additional 6 sequences found in both cultures. The remaining 16 sequences were unique to one culture or the other. The similarity in bacterial complements is striking considering that these two cultures came from different sources nearly five years apart, and suggests there may be some specific relationship between *Aureococcus* and these bacteria. As expected, only *Aureococcus* sequences were recovered from an axenic *Aureococcus* culture (CCMP1984). Further work will be needed to correctly identify each bacterial species and how it interacts with the eukaryote.

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TEMPORAL DYNAMICS OF EPS PRODUCTION, LOSS AND COMPOSITION FOR BIOFILMS WITHIN THE COLNE ESTUARY, U.K. Brent Bellinger[1], Graham Underwood[2], and Michael Gretz[1].
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The development of surface biofilms during low tides is significant in terms of estuarine primary production and also for sediment stabilization. The composition and content of extracellular polymeric substances (EPS) are crucial for the cohesive properties exhibited by these surface biofilms and are primarily the result of diatom production. Hot water soluble (HW) carbohydrates, composed predominately of the intracellular storage polysaccharide chrysolaminarin, showed rapid accumulation during low tide periods (1.92 μg glucose equivalents μg Chl a^{-1} h^{-1}) with the relative abundance of glucose in the extract increasing during photosynthetic periods and declining during tidal cover or during darkness. Tracking carbon flow using ^{13}C-enrichment revealed that recently incorporated carbon was accumulated into the HW fraction rapidly and the label remained for days. Concentrations of labile colloidal carbohydrates, rich in glucose and galactose, were correlated with algal biomass. These carbohydrates were rapidly produced (2.03 μg glucose equivalents μg Chl a^{-1} h^{-1}) by biofilms

during low tide periods, but equally quickly lost (up to 60%) within 2 h of tidal cover. Short and long-term ^{13}C-enrichment of the colloidal fraction indicated this fraction not only served as an immediate carbon overflow, but was later produced from intracellular reserves. The more refractive hot bicarbonate soluble (HB) and hot alkali soluble (HA) polymers showed almost no net accumulation or loss of content over tidal cycles. Cycling of C through the HB and HA fractions was evident from isotopic enrichment, suggesting continuous production and rapid utilization, presumably by heterotrophic bacteria. Compositional analysis and isotopic labeling similarities between the colloidal and HB fraction indicate that degradation of the HB fraction could be contributing to the colloidal carbohydrate pool.

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MORPHOLOGICAL VARIABILITY WITHIN THE GENUS *STENOPTEROBIA* IN NORTH CAROLINA BAYS. Lee Camfield and Peter A. Siver. Department of Botany, Connecticut College, New London, CT, 06320, USA.

Stenopterobia Brébisson is a freshwater diatom genus contained within the Family Surirellaceae in the Phylum Bacillariophyta. Members of this genus have long slender frustules that are either straight or sigmoid-shaped in valve view and possess raphes that encircle the valve and are contained within a keel. During an investigation of Carolina bays situated along the Atlantic Coastal Plain of North Carolina, straight forms of *Stenopterobia* were found to be common, especially in the more acidic localities. The purpose of this study was to examine and characterize populations within this genus using light and scanning electron microscopy (SEM), and to more fully document the valve ultrastructure within this diatom genus. Based on initial results, there appear to be at least four different species, several of which may represent new taxa. The most common species in these habitats are *S. delicatissima* and *S. cuspidata*, however, the true ultrastructure of these species based on the literature and type material is not entirely clear. As a result, we are in the process of attempting to examine either type material or material from the type locality for each of these species with SEM. There apparently is no type material of *S. delicatissima* available for SEM observation. We therefore secured a sediment core from the type locality, Saco Pond in New Hampshire, and plan to examine specimens that date to approximately the point in time that Lewis made the original description of *S. delicatissima* in 1863. We have also secured a small amount of original material for *S. cuspidata* from the Hustedt collection in the hopes of examining the ultrastructure of this organism with SEM.

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AN INVESTIGATION OF THE FACTORS CONTROLLING THE GROWTH OF *GLOEOTRICHIA ECHINULATA* IN AN OLIGOTROPHIC LAKE. Cayelan C. Carey[1], Kathleen C. Weathers[2], Kathryn L. Cottingham[1], and James F. Haney[3].
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Gloeotrichia echinulata is an N-fixing cyanobacterium that is well-known for blooming in eutrophic lakes in northern Europe. Intriguingly, *G. echinulata* has recently started colonizing

oligotrophic lakes across the northeastern United States. *G. echinulata* is likely able to colonize an oligotrophic system because it depends on phosphorus in the lake sediment, not in the water column, to bloom. To quantify the temporal and spatial heterogeneity in *G. echinulata* abundance and to explore possible causes of bloom formation, we measured sediment total phosphorus and *G. echinulata* recruitment and surface abundance at 16 sites within an oligotrophic lake in New Hampshire from June-September 2005. *G. echinulata* recruited into the water column throughout the sampling period, with peak recruitment on 12-September. We found that the sediment had high levels of phosphorus in comparison to water column phosphorus concentrations, and that recruitment from shallow (but not deep) sediments substantially contributed to the surface population. *G. echinulata* recruitment did not appear to be related to weather. We also performed ELISA analyses on *G. echinulata* colonies harvested during bloom pulses and confirmed that *G. echinulata* contains the toxin microcystin. *G. echinulata*'s toxicity and ability to colonize low-nutrient systems that historically have had minimal algal populations indicate that this species may have important implications for oligotrophic lake management.

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SEAWEED UPTAKE, CONCENTRATION & DETOXIFICATION OF MARINE POLLUTANTS. Don Cheney[1], Tavi Cruz-Uribe[2], Carrie Fraga[1], and Greg Rorrer[2]
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According to a recent report by the EPA on the condition of our nation's coastline, 27% of the Northeast's estuaries have sediments contaminated with PCBs and PAHs at concentrations that can cause harmful ecological effects. Current methods for eliminating PAHs and PCBs from contaminated waters and sediments require sediment dredging and disposal. We are developing a new approach for the removal of such compounds - the use of "phycoremediating" seaweeds. In our initial work, we were able to demonstrate that seaweeds are capable of taking up and metabolizing the explosive compound 2,4,6-triitrotoluene (TNT). We examined two red seaweeds, *Porphyra yezoensis* and *Porteria hornemannii*, and one green *Acrosiphonia coalita*. At a biomass density of 1.2 g/L and an initial TNT conc. of 10 mg/L, both *Porteria hornemannii* and *Porphyra yezoensis* removed 100% of the TNT in just 72 hrs, and reduced TNT to 2-amino-4,6-dinitrotoluene (2-ADNT) and 4-amino-2,6-dinitrotoluene (4-ADNT). In current work, we are investigating the ability of seaweeds to take up and concentrate or metabolize phenanthrene, a three-ringed model compound for PAHs. As a first step, we are testing several seaweeds for their ability to tolerate phenanthrene at concentrations from 0.3 - 1.2 mg/L. So far, the red seaweed *Porteria hormemannii* and the green *Enteromorpha linza* have shown the greatest tolerance; ie. 0.9 mg/L phenathrene for 14 days. Preliminary uptake experiments suggest that *Porteria hormemannii* is able to take up and concentrate 88% of the phenathrene (0.9 mg/L starting conc.) in approximately 100 hrs. The fate of the phenathrene taken up is still being determined.This research was supported by grants from the Office of Naval Research Biotechnology and Environmental Research Program and the USDA Aquaculture Program.

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RESOLVING SPECIES DIVERSITY WITHIN THE ALGAL GENERA *CALLOPHYLLIS, PUGETIA AND EUTHORA* (KALLYMENIACEAE, RHODOPHYTA) USING MOLECULAR TOOLS. Bridgette Clarkston and Gary W. Saunders. Center for Environmental & Molecular Algal Research, Department of Biology, University of New Brunswick, Fredericton, N.B., E3B 6E1, Canada.

Traditional taxonomy of the red algae (Rhodophyta) has emphasized morphological and anatomical traits. Whereas this approach has generally worked well for resolving species within many genera, taxonomy of the genus *Callophyllis* (Kallymeniaceae) in the Northeast Pacific has proved challenging due to high morphological variability. In addition, members of the genera *Pugetia* (*Pugetia firma* and *P.* chilensis; Norris, 1957) and *Euthora* have been variously included in *Callophyllis* (Hooper and South, 1974). A previous study by Harper and Saunders using nuclear large-subunit ribosomal DNA (LSU) successfully established the generic limits between *Callophyllis*, *Pugetia* and *Euthora*. That study both supported *Euthora* as a viable genus and re-established *P. firma* and *P. chilensis* as members of *Pugetia*, but left unresolved the phylogenetic relationships and diversity of species remaining in *Callophyllis*. The objectives of the current study are to: 1) determine unequivocally the relationships and diversity of species in the genera *Callophyllis*, *Pugetia* and *Euthora* in British Columbia, Canada, using the DNA Barcode marker as an assessment tool; 2) determine which morphological and/or anatomical characteristics are taxonomically viable at the species level in these genera; and 3) resolve the phylogenetic affinities of Kallymeniaceae found in B.C. relative to other genera of this family from other geographical regions using nuclear large-subunit ribosomal DNA (LSU).

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RESURRECTING THE GENUS *GRANIA* FOR *GRANIA EFFLORESCENS* Susan L. Clayden and Gary W. Saunders. Centre for Environmental and Molecular Algal Research, Department of Biology, University of New Brunswick, Fredericton, N.B., E3B 6E1, Canada

Grania efflorescens is a diminutive marine red alga currently classified in the order Acrochaetiales. The phylogenetic relationship of this alga to other acrochaetes remains in question. Its generic assignment has undergone several changes since it was first described by Agardh as *Callithamnion efflorescens* in 1851. In the most recent NEAS key it is listed as *Audouinella efflorescens*, whereas in "AlgaeBase" it is recorded as *Acrochaetium efflorescens*. It is distinguished by its pale red filaments of long narrow cells with spiral shaped plastids, which by current taxonomic thinking excludes it from both the previous genera and is reminiscent of some species in the related red algal order Colaconematales. The triphasic life history of *Grania* is found in some members of both the Acrochaetiales and Colaconematales. To our knowledge there have been no molecular sequences published for this taxon. We present a phylogeny based on large subunit ribosomal DNA (LSU) sequences clearly resolving *G. efflorescens* within the Acrochaetiales. Within the family Acrochaetiaceae it has a unique molecular signature suggesting it differs from and requires separate generic status from other acrochaetes. We propose reinstatement of the available genus *Grania*.