



**DOE Bioenergy Technologies Office (BETO)
2015 Project Peer Review**

**Consortium for Algal Biofuels
Commercialization (CAB-Comm)**

March 23, 2015
Biomass Program Algae Peer Review
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CAB-Comm Goal Statement

- Three research areas:
 - Crop Protection
 - Nutrient Utilization and Recycling
 - Genetic Tool Development
- Increase in biomass productivity, and creation advanced biotechnology tools to enable the biofuel and bio-product industries.
- Co-products now in development with commercial partners, EPA approved successful outdoor GM test paves way future commercial release

Quad Chart Overview

Timeline

- Project start date: April 2011
- Project end date: August 2015
- Percent complete: 90%

Barriers

- Barriers addressed
 - Crop Protection
 - Nutrient Utilization and Recycling
 - Improved Genetic Tools

Budget

	Total Costs FY 10–FY 12	FY 13 Costs	FY 14 Costs	Total Planned Funding (FY 15-Project End Date)
DOE Funded	\$4.43M	\$3.22M	\$1.61M	\$1.77M
Sapphire Share	\$845K	\$418K	\$329K	\$434K
Life Tech Share	\$459K	\$548K	\$63K	n/a

Partners

- Partners
 - Sapphire Energy (65%)
 - Life Technologies (35%)
- Other interactions/collaborations
 - Heliae
 - Triton Health & Nutrition
 - Euglena Co
 - Solazyme
 - Arctic Foam

CAB-Comm Publication Summary

Output	2014-2015	Total 2011-2015
Publications	42	82
Presentations	69	227
Patents	7	13
Disclosures	10	26

2 – Approach (Technical)

- **Overall Technical Approach**
 - In consultation with **Commercial Partners**, identify the most pressing research needs and assigned a priority status
 - Identify the research group(s) with the capabilities and expertise to address each priority
 - Identify milestones and deliverables for each specific project
 - Continuous assessment of commercial partner needs and relevance of projects *under a stage gate review process*
 - **Rapidly changing landscape has resulted in elevation of co-products**
- Demonstrate how project will advance the commercial viability of biomass:
 - Sapphire projects are directly tied to viability of first integrated algal biorefinery – started operations in 2012
 - Life Technologies products entered the market as research tools in 2012
 - Purchased by Thermo-Fisher in 2014
 - Have added two new partners Heliae and Triton Health and Nutrition
 - Both have protein co-products that could potentially enter the market in 2016 or 2017

2 – Approach (Management)

- Critical success factors to technical and commercial viability:
 - ***Integration of research projects with commercial partners***
 - Achieve milestones and deliverables on time
 - Continuous review of projects for progress and commercial relevance
- Potential challenges to overcome to achieve project results:
 - Field is moving fast - need to remain nimble; clear shift to near-term, high-value products
 - Communication between labs and commercial partners is essential
 - Life Technologies shift away from synthetic biology resulted in loss of partner
 - Added two new commercial partners, Heliae and Triton Health and Nutrition
- Structure of research projects and milestone review:
 - Majority of research projects are collaborations between multiple labs and one industrial partner
 - Milestones and deliverables are reviewed quarterly
 - Annual stage gate review held for continuation of funding
 - 2 projects failed to pass reviews and were defunded
 - Review panel includes both academic and industrial participants
 - Additional stage gate review held in conjunction with Cost Overrun request process to determine projects to receive additional funding

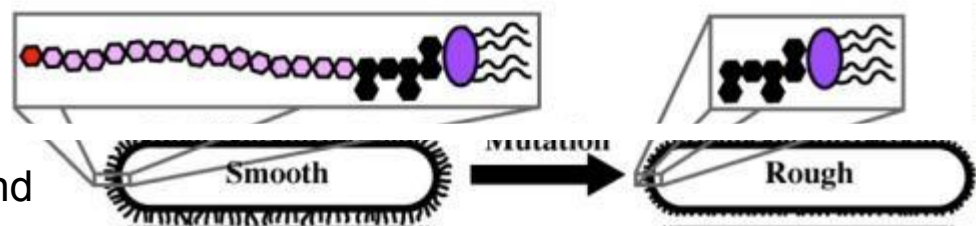
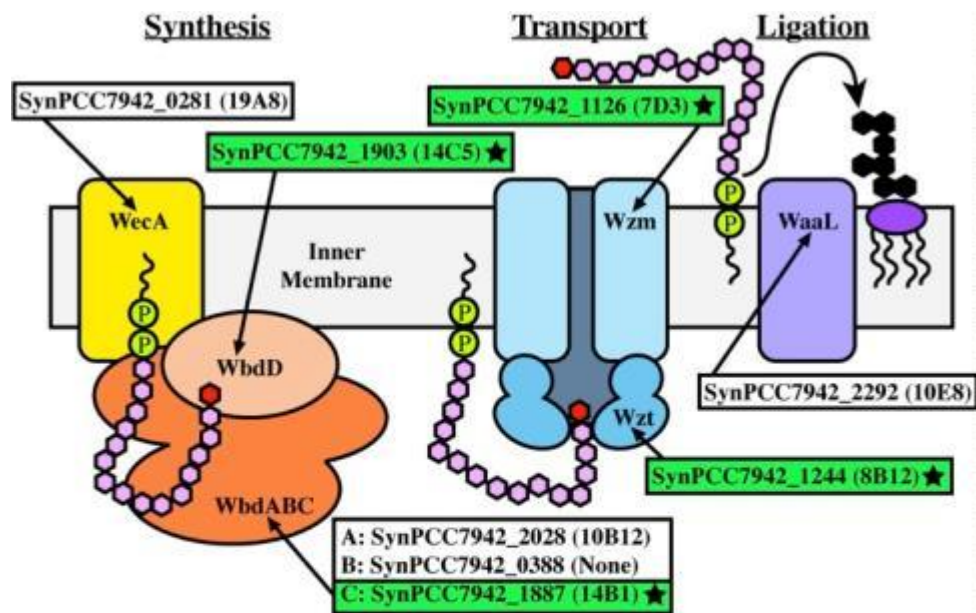
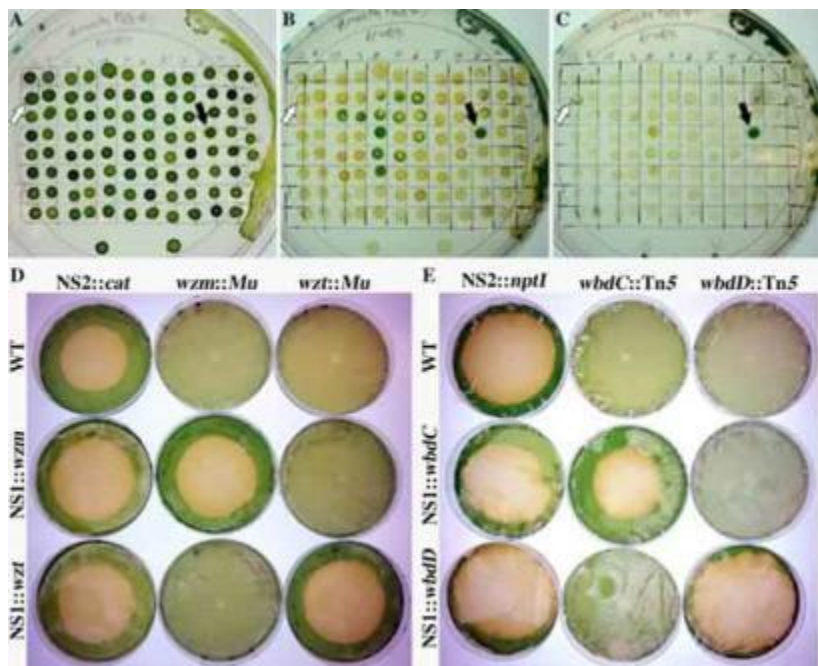
Technical Progress and Accomplishments

- SOW and budget initially approved in July 2010
- Final funding authorized April 07, 2011 - No change in SOW or overall budget during this time
- Based on CAB-Comm's Algae Program contributions and the 2013 Peer Review, BETO approved a \$2.5M 2014/15 funding:
 - more comprehensively address the tasks
 - generate more robust datasets
 - maximize continued use of and discovery from its algal growth facility, including extended outdoor field tests of GMO algae
 - enhance further the previously executed deliverables from the original award

Progress from the last 24 months will be presented

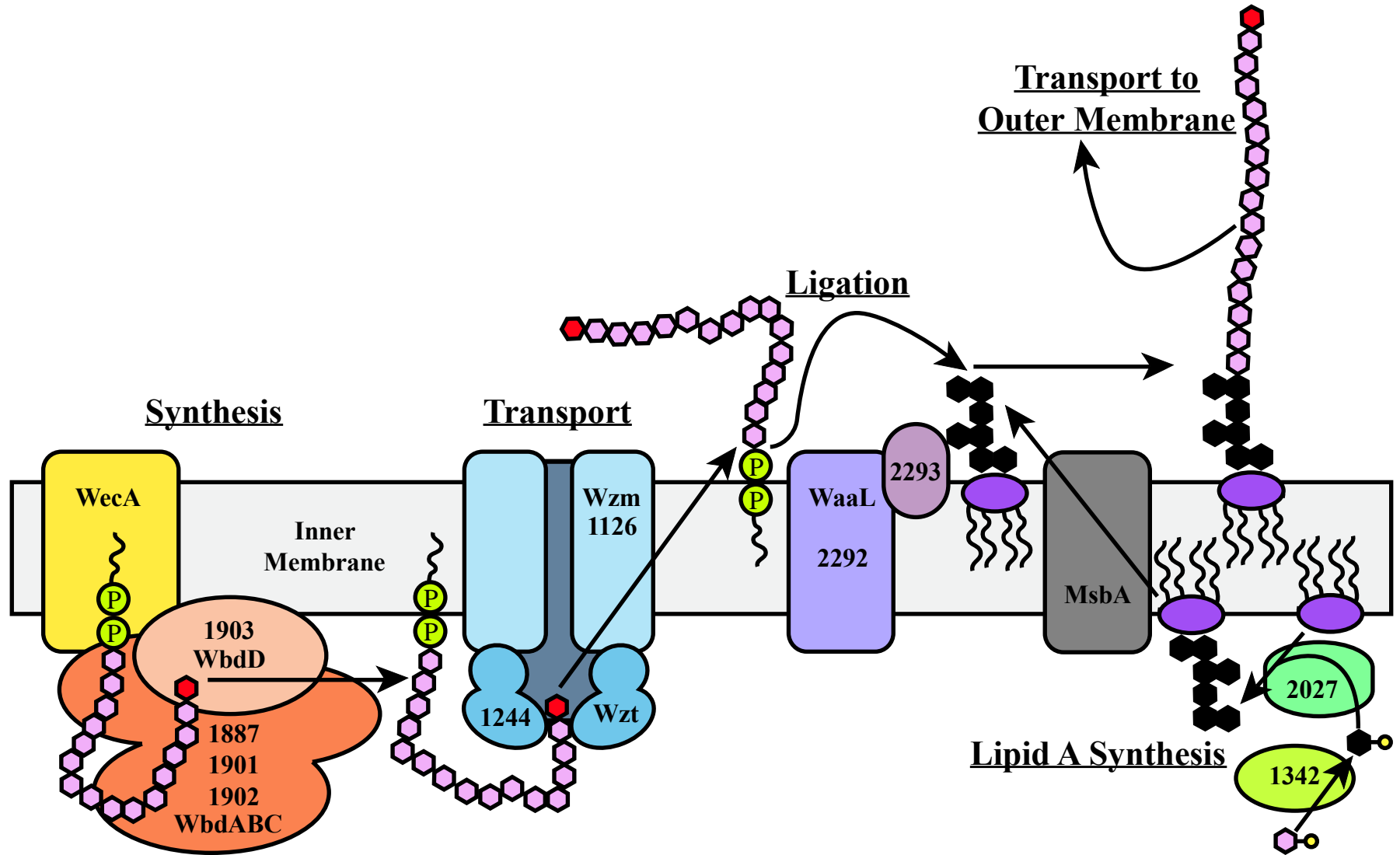
Crop Protection: Impairment of O-antigen production confers resistance to grazing

Wzm/Wzt-dependent O-antigen Maturation



Simkovsky, Daniels, Tang, Huynh, Golden, and Brahamsha. (2012) *PNAS* 109:16678-16683.

Expanded Model of LPS Synthesis & Resistance



Extended Crop Protection Results

- Expanded catalog of grazer-resistance LPS synthesis genes
- These 10 genes are well-conserved among cyanobacteria
- Determined limits of the system: 2 mutations in lipid A-core synthesis provides resistance at a significant cost
- Preliminary evidence that cells respond to O-antigen by expressing a coat – possible mechanism of resistance
- Can detect grazing-specific compounds for early detection system.

Genetic Tools: High Throughput Synthetic Biology in Cyanobacteria

- Comprehensive cyanobacterial genetic toolbox is available to the research community
 - Development of broad-host-range inducible riboswitch regulation
 - Development of an inducible off-switch
- Development of new pANS-based shuttle vectors for *Synechococcus* and *Anabaena* strains
- Demonstration of EPA fatty acid production from large 20-kb operon in *Synechococcus* and *Anabaena*
 - Refactoring of control sequences for increased expression
- Used high throughput assembly system to evaluate eleven protein co-products in 5 cyanobacteria species

Web based gene assembly platform allows for rapid Cloning - Transformation – Characterization

The screenshot shows the CYANO-VECTOR Assembly Portal interface. At the top, the browser address bar shows 'golden.ucsd.edu/CyanoVECTOR/'. The page title is 'CYANO-VECTOR assembly portal'. Navigation links include 'QUICK START GUIDE', 'HOME', 'CONTACTS & MORE', and 'ANNOTATE & UPLOAD NEW VECTORS'. The main content area is divided into several sections:

- SELECT THE MODULES/DEVICES:** This section contains four main categories:
 - Cyanobacterial replicons:** Includes options for 'Broad host range replicons' and 'Neutral sites'.
 - E. coli origins:** Includes 'E. coli origins for knock out' and 'Recombination site'.
 - Antibiotic markers:** Labeled 'Antibiotic selection markers', it lists various antibiotic resistance genes like *kanC1*, *kanA*, *ampR*, *cat*, *catB*, *catC*, *catD*, *catE*, *catF*, *catG*, *catH*, *catI*, *catJ*, *catK*, *catL*, *catM*, *catN*, *catO*, *catP*, *catQ*, *catR*, *catS*, *catT*, *catU*, *catV*, *catW*, *catX*, *catY*, *catZ*, *catA1*, *catA2*, *catA3*, *catA4*, *catA5*, *catA6*, *catA7*, *catA8*, *catA9*, *catA10*, *catA11*, *catA12*, *catA13*, *catA14*, *catA15*, *catA16*, *catA17*, *catA18*, *catA19*, *catA20*.
 - Expression cassettes:** Includes 'Rotatable-rep/rep/rep' and 'Reporter cassettes'.
- Replication / chromosomal integration devices:** A highlighted section with a large text overlay.
- Antibiotic selection markers:** A highlighted section with a large text overlay.
- Functional devices:** A highlighted section with a large text overlay.
- Construction of knockout plasmids:** A highlighted section with a large text overlay.

On the right side, there are search and filter options:

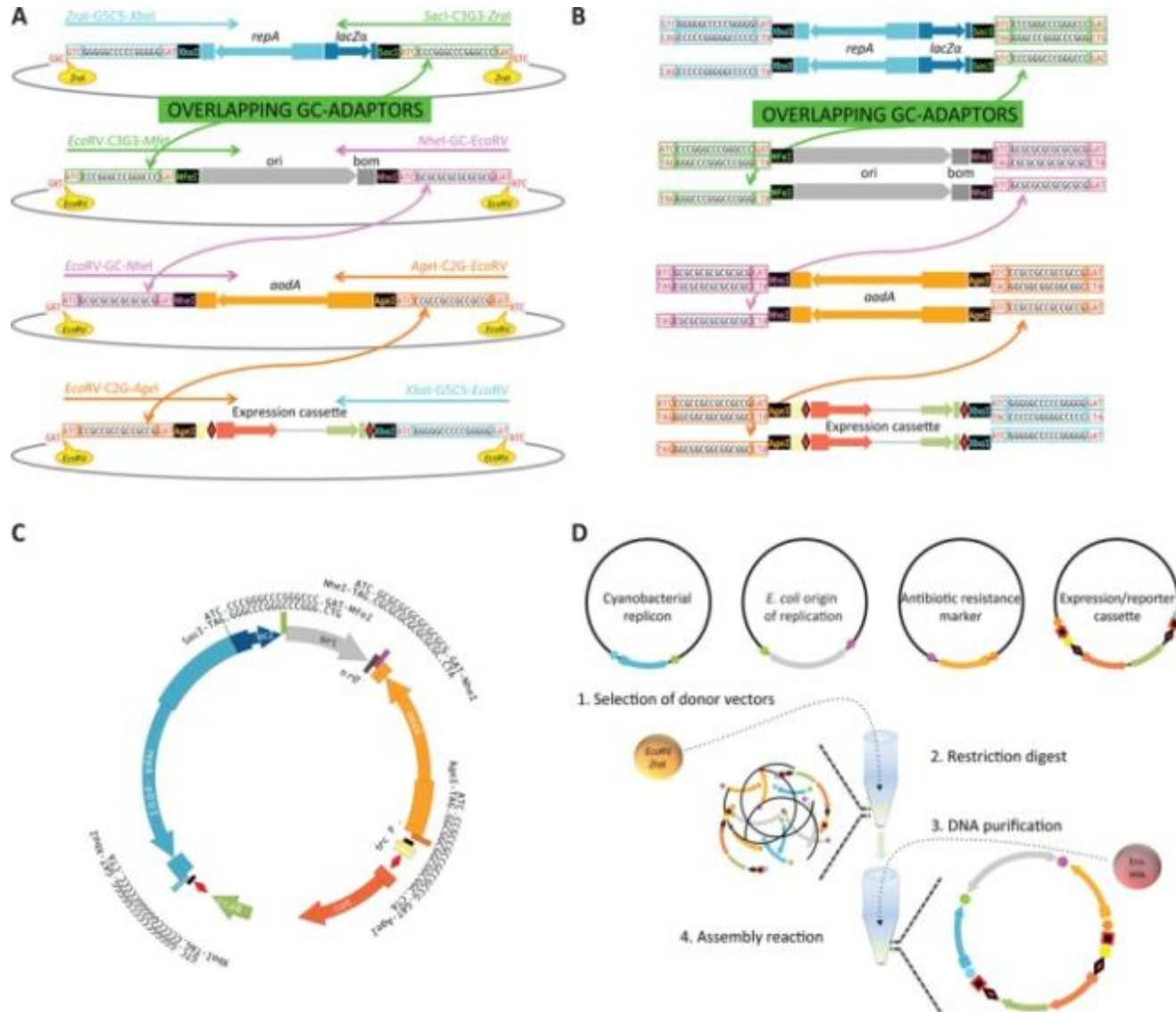
- FIND A MODULE:** A search box with a 'SHOW' button. Below it, a list of modules is shown, including 'Cyanobacterial origins' and 'E. coli origins'.
- FIND A MODULAR VECTOR:** A search box with a 'SHOW' button. Below it, a list of modular vectors is shown, including 'REP101Y2SF_AADA_PCO61-LTR86-GFP' and 'REP101Y2SF_AACC1_PCO61-LTR86-SPI'.
- SEARCH CYANOBACTERIAL GENOMES:** A search box with a 'DISPLAY_SEQUENCE' button.

At the bottom, there is a text box stating: '58 devices & 28 shuttle/destination plasmids available for the community'. Below this, there is a footer with the text: 'Last updated: January 2014', '© 2014 The Regents of the University of California. All rights reserved.', and 'Powered by BioBrick, Query, & CoView'.

Triton H&N protein co-product production in cyanobacteria - workflow

- Vector construction (assembly of individual parts)
- Chemical Transformation into E. coli
- Miniprep plasmid DNA
- Electroporation into co-culturing strain (AM1359)
- Co-culture AM 1359 with cyanobacteria
- Colonies-> Streak-> Patch-> Tube->Flask
- Cell lysis and protein extraction

Complex vector construction in a single tube

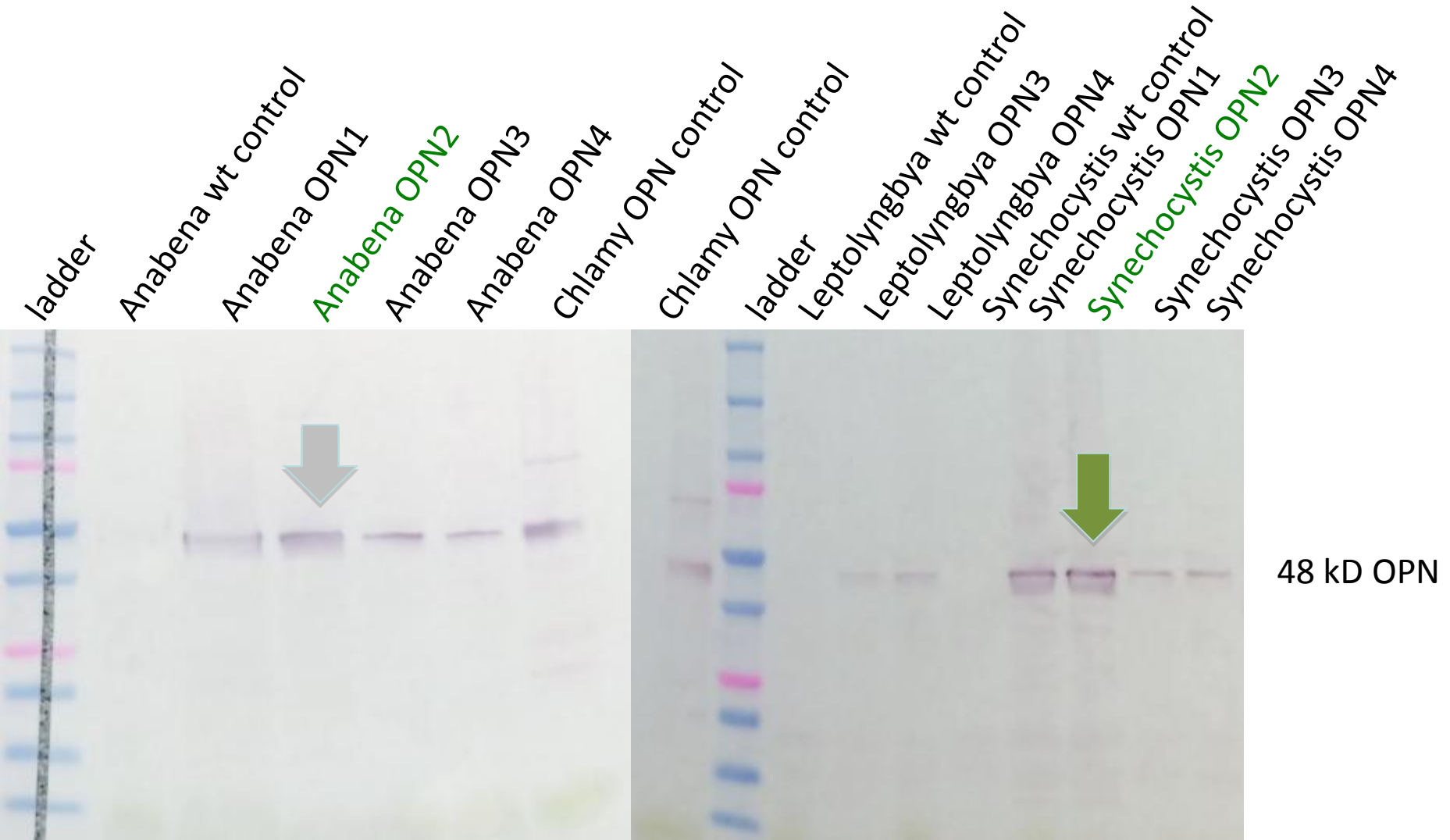


Matrix of 11 bovine MAA and Osteopontin genes in 5 different species of cyanobacteria

Replicates	Plasmid	Anabaena sp. PCC7120				Leptolyngbya sp. BL0902				Synechocystis sp. PCC6803				Synechocystis sp. WH5yn				Synechococcus elongatus PCC7942				colonies streak and patch tube flask western				
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4					
RSF1010Y25F-aphI-Ptrc20-MAA _{lac}																										
RSF1010Y25F-aphI-Ptrc20-MAA[QR] _{lac}																										
RSF1010Y25F-aphI-Ptrc20-MAA[QR]chl																										
S7942NS1-aadA-PconII-RSwF-MAA[QR] _{lac}																										
S7942NS1-aadA-PconII-RSwF-MAA[QR]chl																										
RSF1010Y25F-aphI-Ptrc20-OSTEO _{lac}																										
RSF1010Y25F-aphI-Ptrc20-OSTEOchl																										
S7942NS3-aacC1-Ptrc20-OSTEO _{lac}																										
S7942NS3-aacC1-Ptrc20-OSTEOchl																										
1010Y25F-aadA-PconII-RSwF-MAA[QR]																										
1010Y25F-aadA-PconII-RSwF-MAA[QR]																										

Not applicable
 Good
 Dead
 In progress
 Won't be made if alternatives work
 Ptrc20 = Strong constitutive promoter
 PconII-RSwF = Relatively strong promoter followed by a theophyllin riboswitch (slightly leaky but allow high expression)

Western blots for Osteopontin production in cyanobacteria- 6 weeks gene to protein



Sapphire - UCSD EPA approved outdoor GM-algae trials

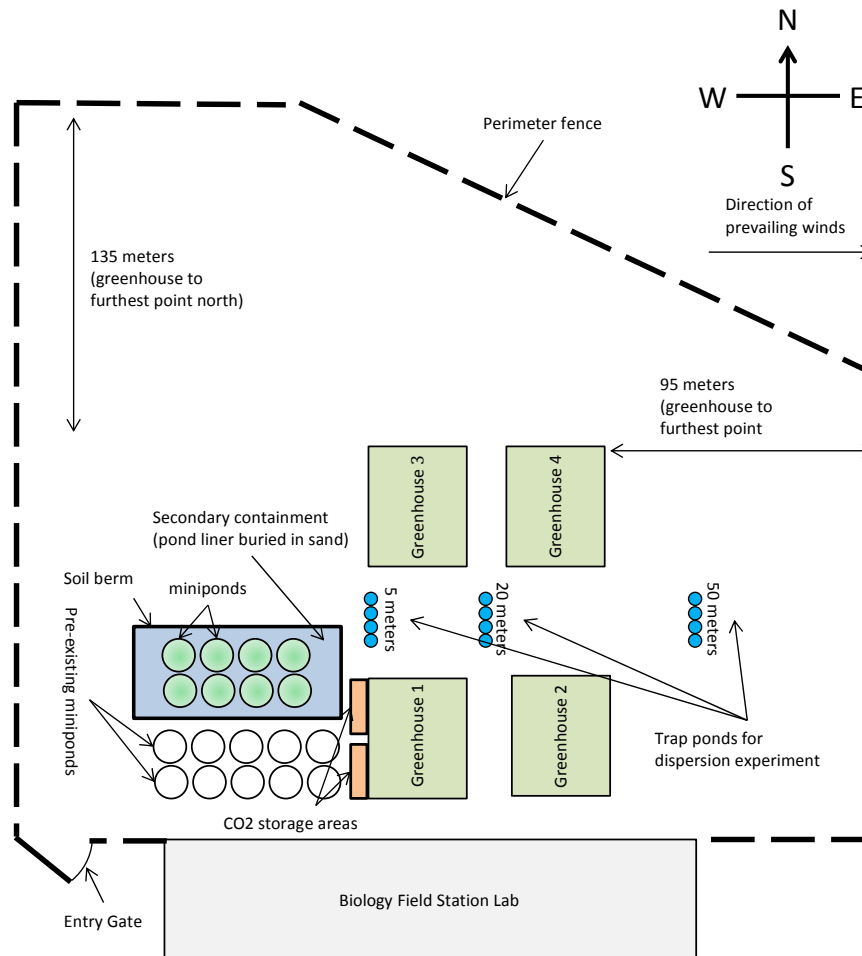
Outdoor trial were intended to measure:

- Stability of transgenes and phenotype in outdoor culture
- Dispersal – invasion – potential to displace native species
- Trial was run fall 2013 at the biology field station on the campus of UC San Diego
- Two transgenes: GFP and lipid modifying enzyme

Sapphire – UCSD GM-algae trials

Facility was on Northeast corner of UCSD Campus
4 acre biology field station with open fields, green houses, algae ponds

Figure 35: Schematic of Biology Field Station



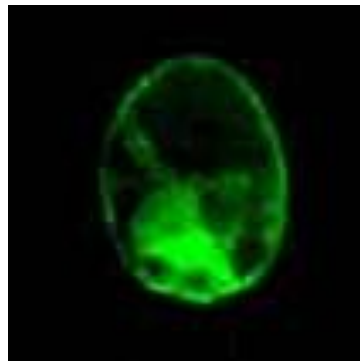
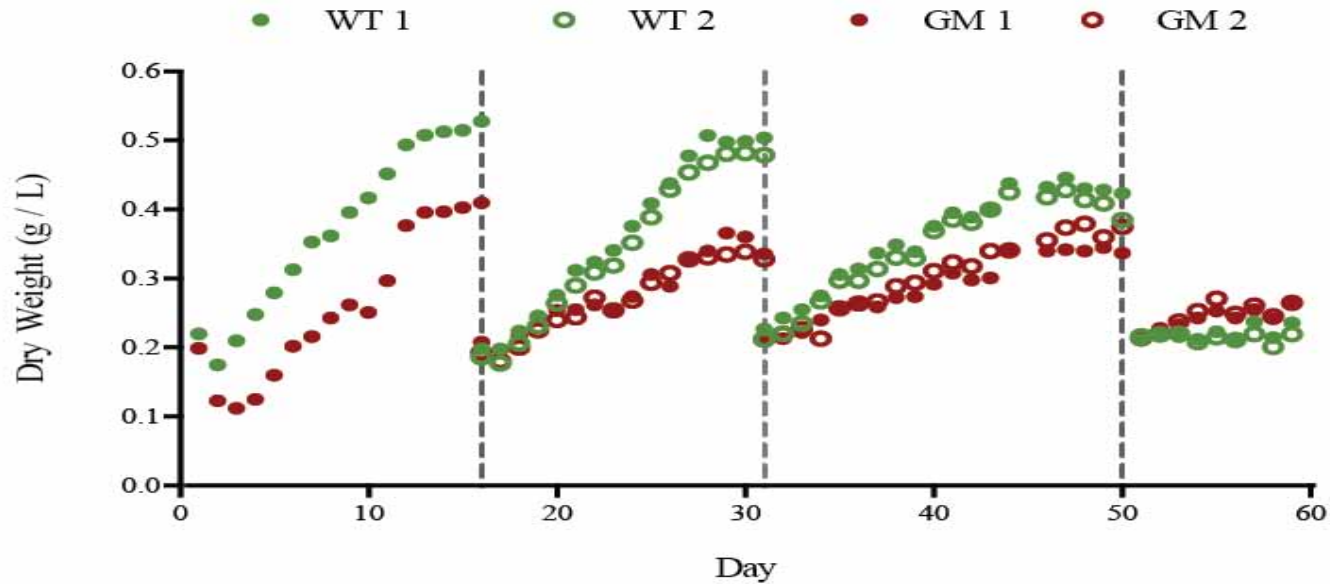
Construction of ponds for outdoor GM trial

Secondary containment features of the field test:

- 8" sand and soil berm lined with mesh-reinforced, puncture resistant, UV-resistant pond liner, covered by sand.



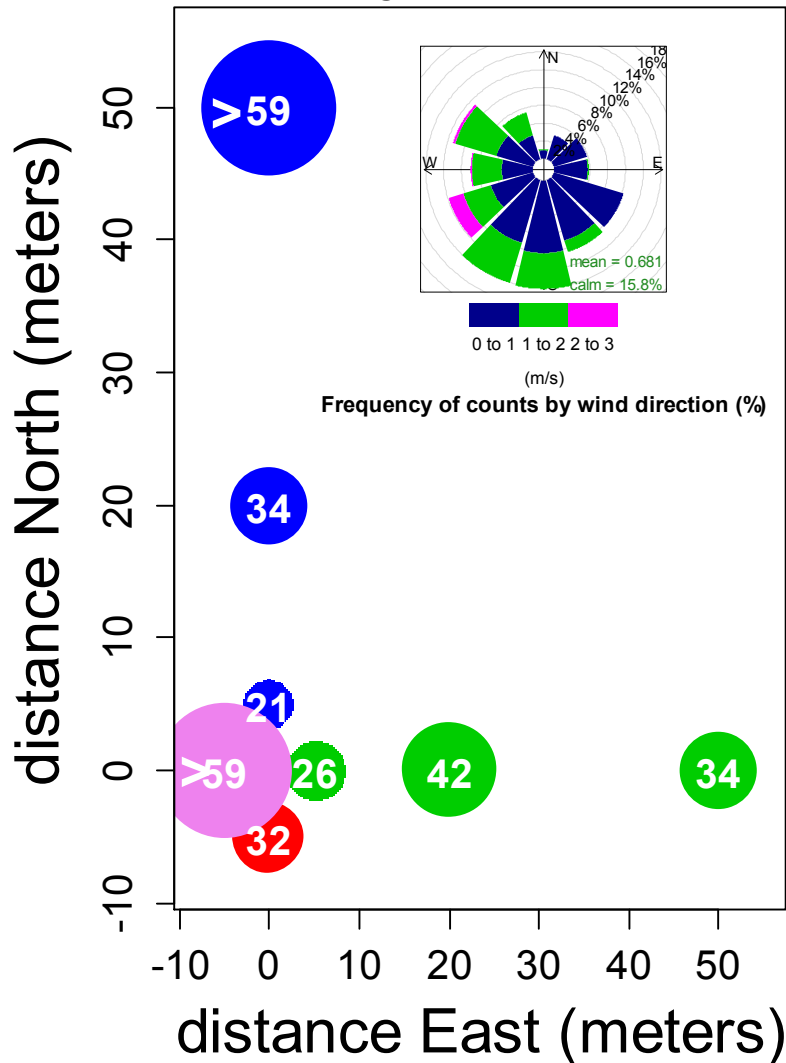
Measuring phenotype of wt and GM algae



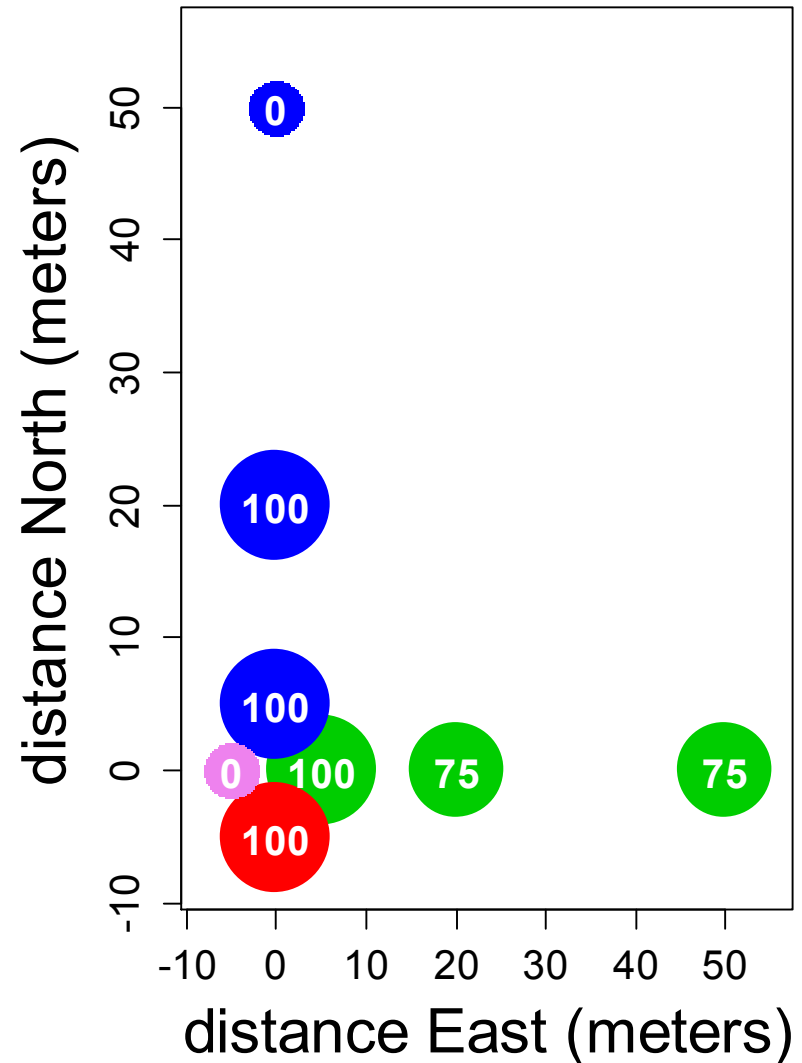
Both the GFP and modified lipid phenotype were observed throughout the test – 60 days

Measuring dispersal of GM strain

A- days to invasion

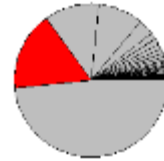
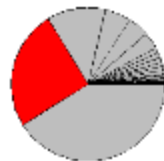
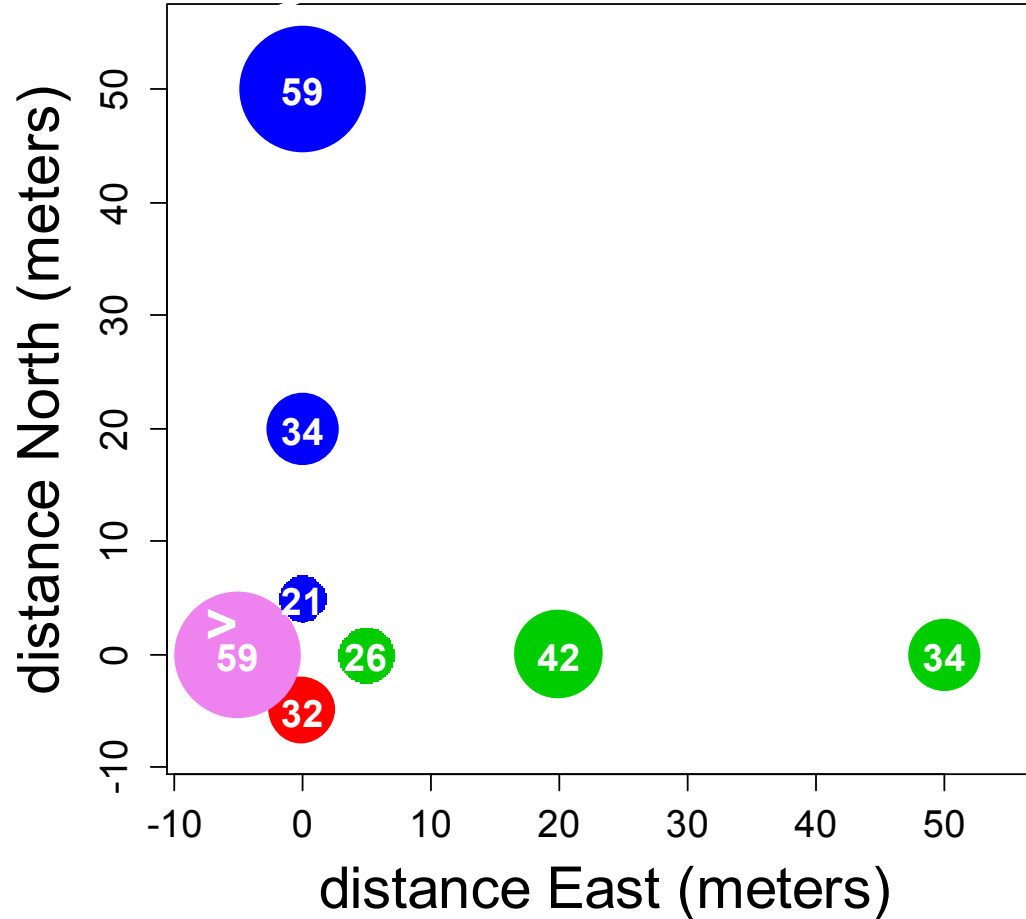
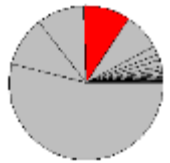


B- percent invaded

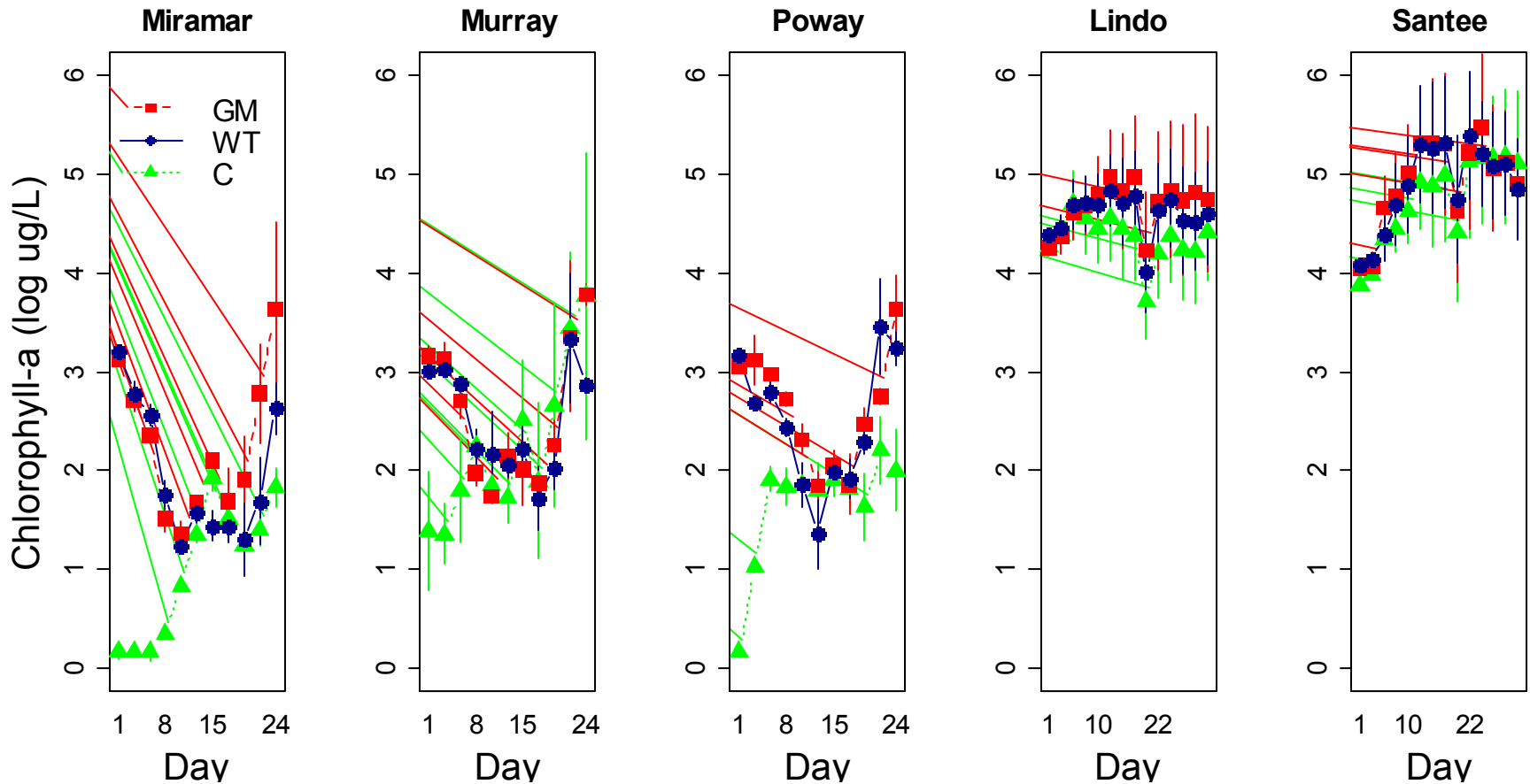


Measuring complex of species in traps

Days to invasion



No effect of GM or wt on overall algal biomass or complexity

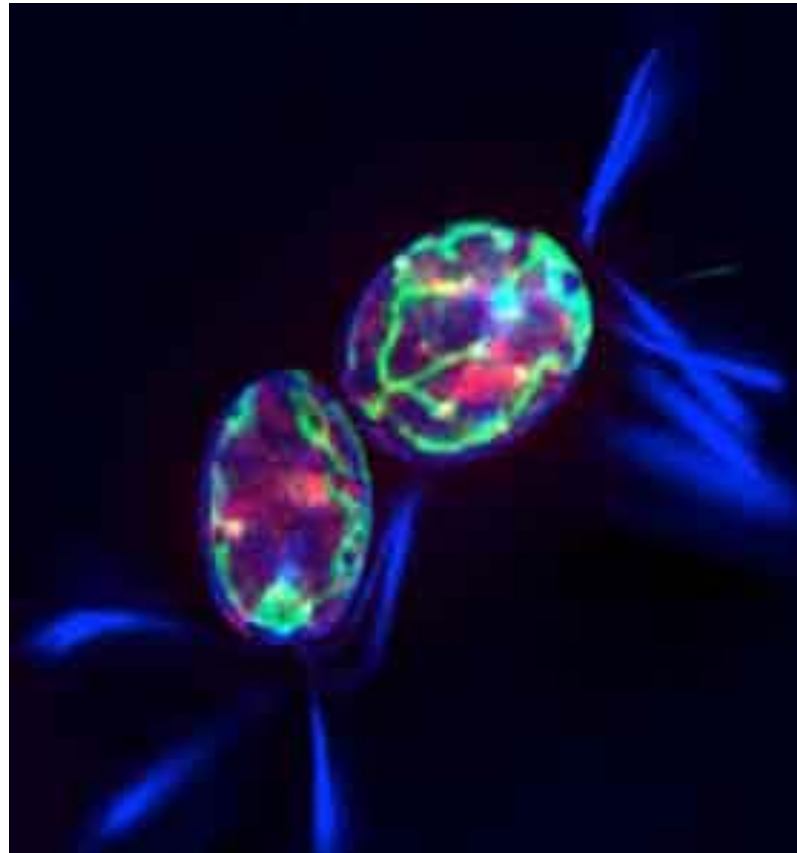


Lake: $P < 0.0001$
Treatment: $P < 0.0001$
Date: $P = 0.0003$
Lake*treatment: $P = 0.02$

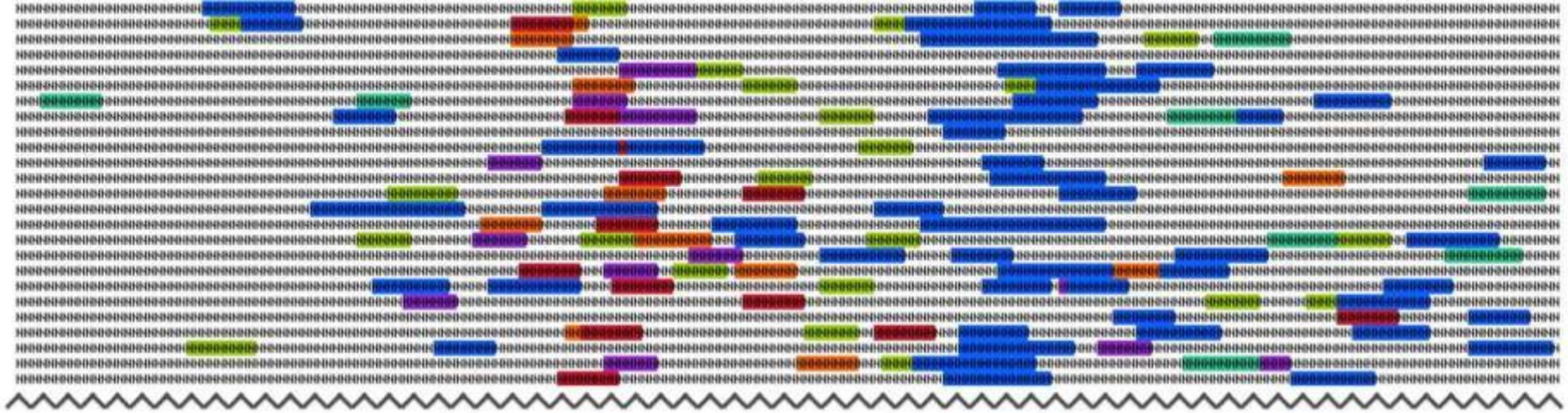
What did we learn from the outdoor GM trial

- Heterologous genes and phenotype are stable in outdoor cultivation – 60 days
- GM algae did not grow as well as wt outdoors
- Wt or GM algae can disperse – took 60 days to travel 50 meters
- Many other algae showed up in traps immediately – no large ponds near by and no significant rain during trial
- GM algae can reproduce in local water but do not overtake native strains or reduce complexity

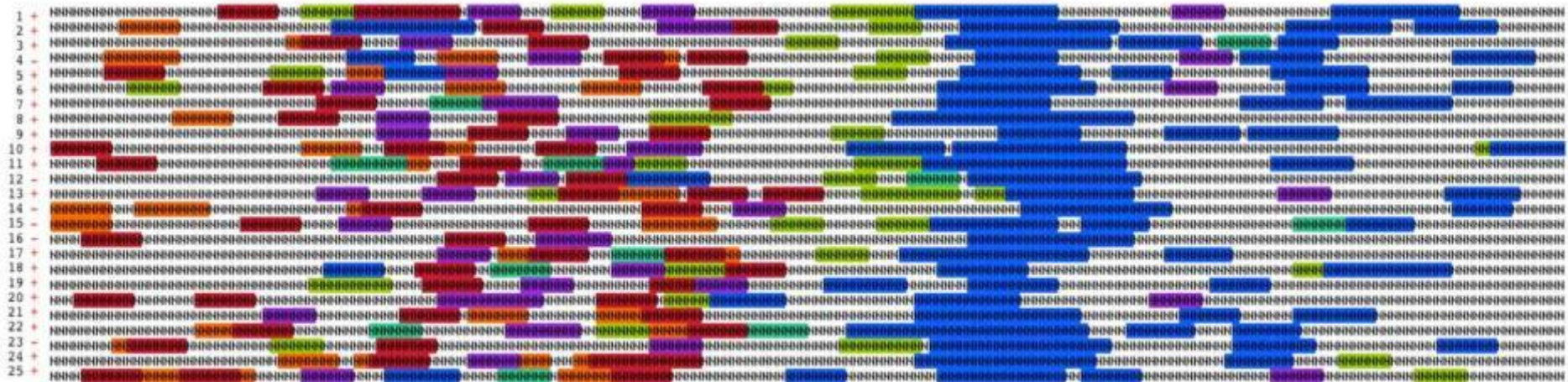
Advanced synthetic biology tools for green algae



Sequences preceding highly expressed genes from *C. reinhardtii* genome



25 unique synthetic promoters were generated



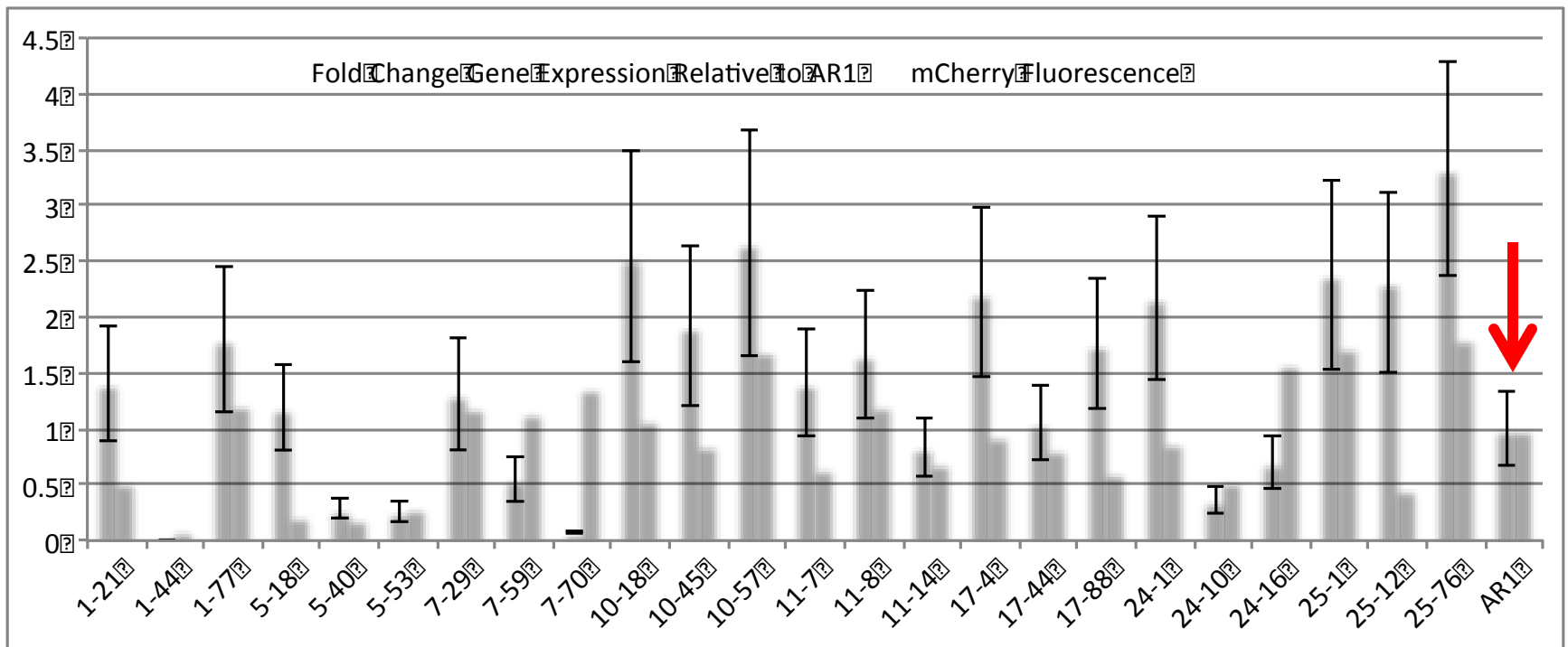
Synthetic promoters for enhance gene expression in *C. reinhardtii*



Synthetic Promoters 1-25
promoterless and AR1
promoter

- 500 bp synthetic promoters
- Designed from highly expressed genes
- Synthetic design using a position sensitive motif algorithm (Davis et al 2012)

Synthetic promoters have increases in transcripts and protein accumulation over best endogenous promoter

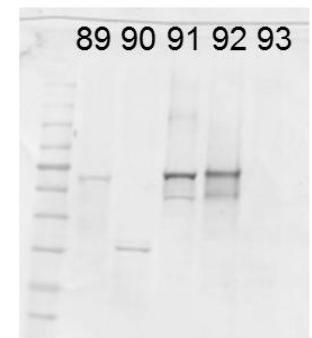
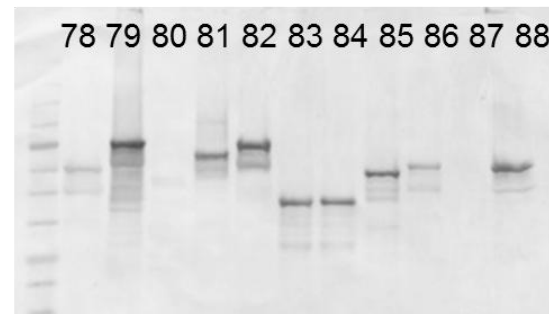
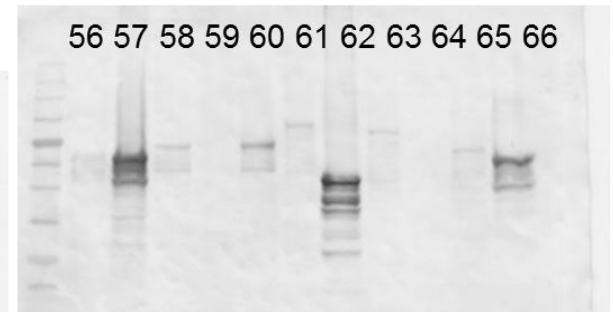
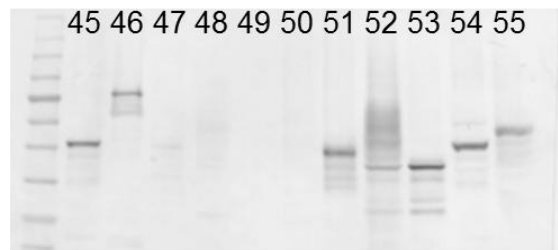
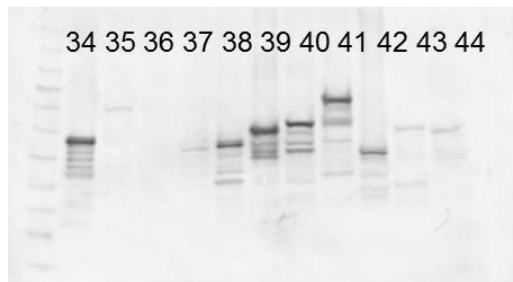
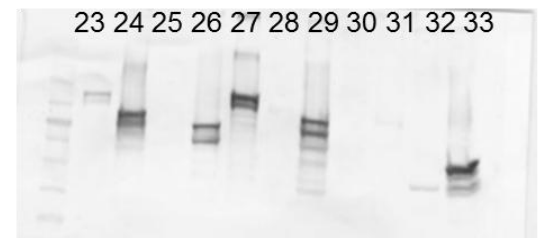
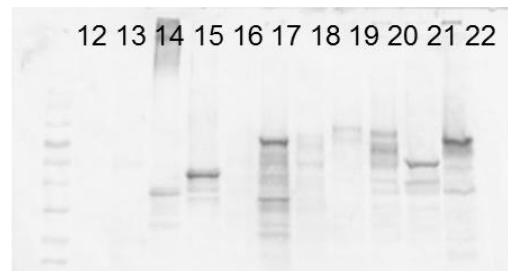
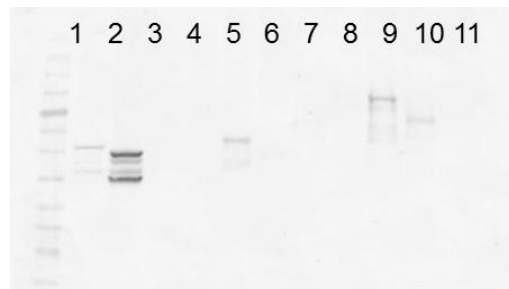


Chlamydomonas reinhardtii

Transcription Factors

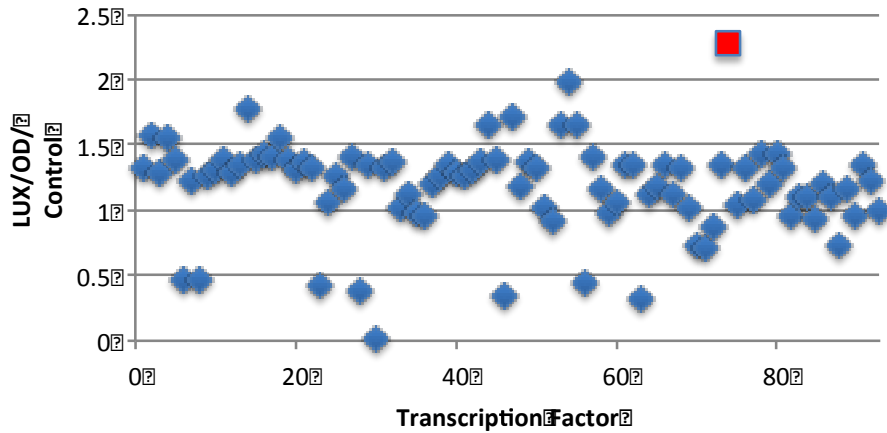
- 348 TFs in *Chlamydomonas*
 - Very little homology to plant TFs
 - Difficult to identify orthologs
 - Mostly separated by speciation (paralogs)
- Only ~11 have been characterized
 - Mostly analysis of mutants
 - Few known direct TF-promoter interactions and motifs
- Vary greatly by species
 - *Arabidopsis thaliana* - 2657 TFs / 27416 genes = 9.7%
 - *Saccharomyces cerevisiae* - 169 TFs / 5800 genes = 2.9%
 - *Chlamydomonas reinhardtii* - 348 TFs / 17114 genes = 2.0%
 - *Ostreococcus tauri* - 217 TFs / 7725 genes = 2.8%

C. reinhardtii TFs are expressed well in yeast cells

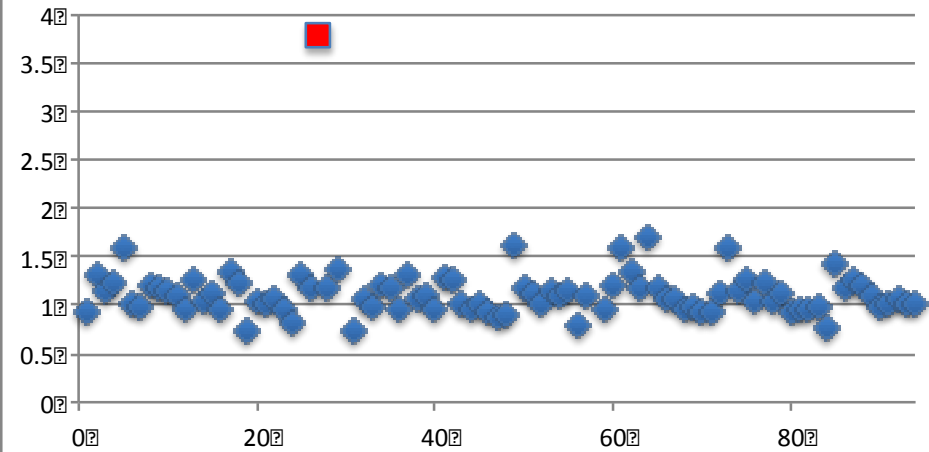


Yeast 1 hybrid assay - specific promoter regions bind specific TFs

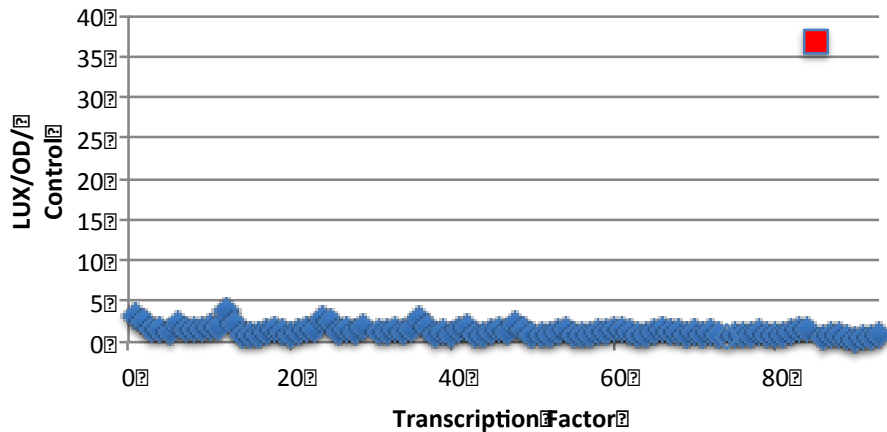
7 (84498) Chlamy LHCb5



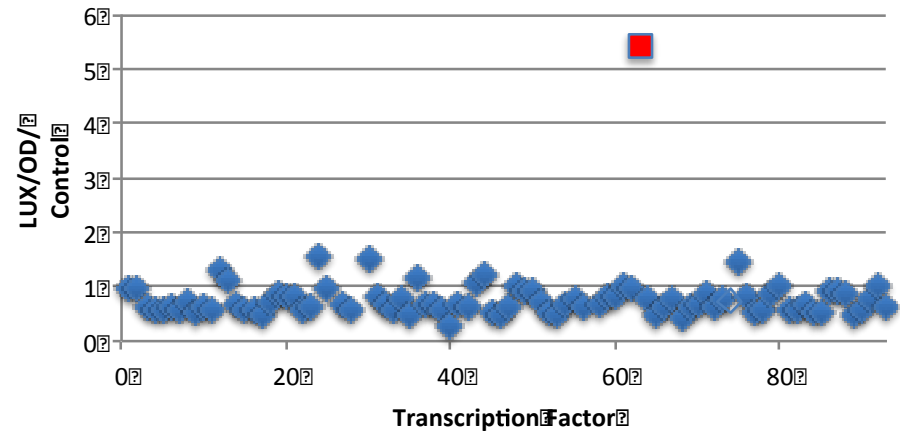
106 (121242)



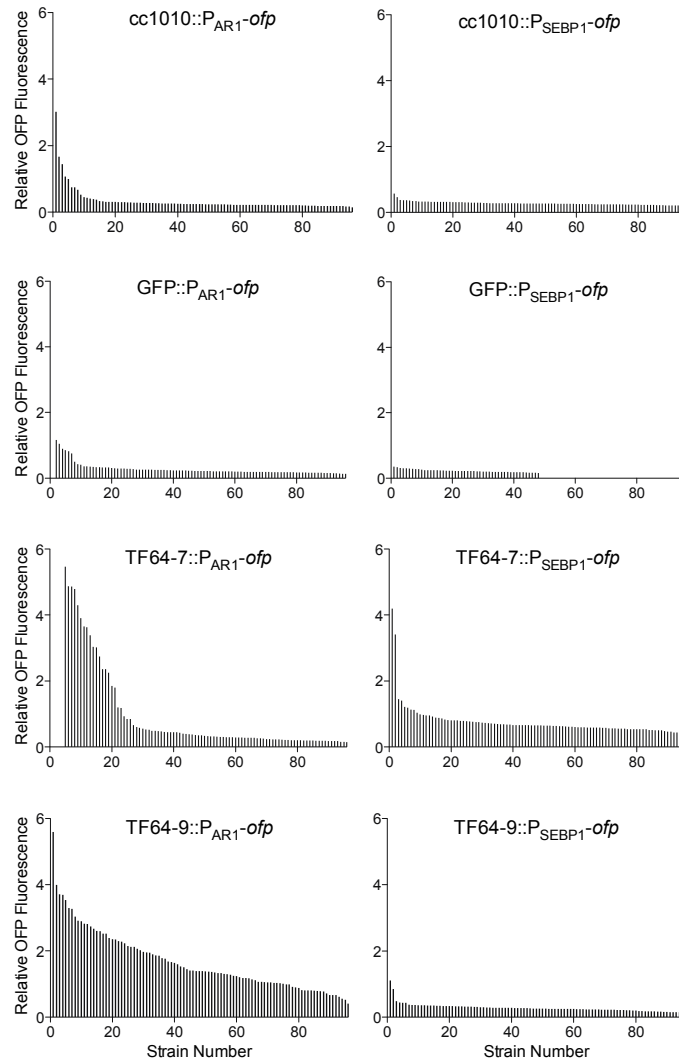
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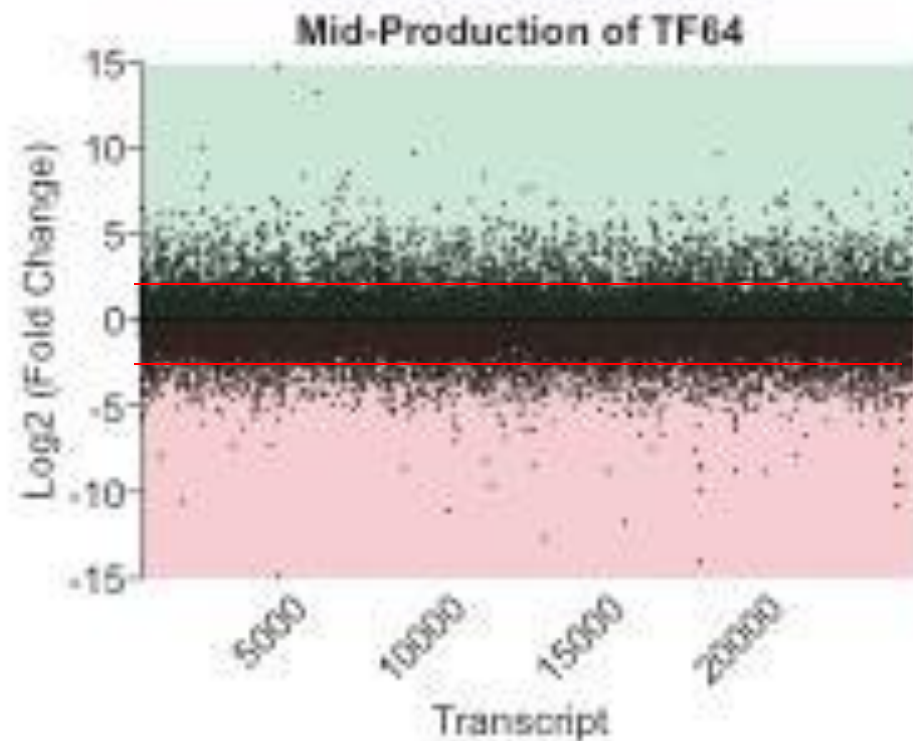
103 (6944)



Enhanced expression of AR1-OFP in *C. reinhardtii* by expression of TF64



Total RNA analysis of TF64 over-expression lines



Results Summary

- ✓ Identified **Crop Protection** strategies for Predators (amoeba) and pathogens (fungi)
- ✓ Demonstrated **Nutrient Utilization and Recycling**
- ✓ Built robust and commercially available **Genetic Tools** for cyanobacteria, green algae, and diatoms
- ✓ Conducted the first EPA approved GM algae outdoor trial to test genetic stability, and strain dispersal and invasion
- ✓ Developed protein co-product strains for commercial partner using HT advanced genetic technologies

Future Directions



TRITON
HEALTH & NUTRITION



 **heliae**

 **solazyme**



Arctic Foam

Responses to Previous Reviewers' Comments

- *What are the specific technical goals and milestones needed to achieve the value of the development process:*
For genetic tools these are now available through Life Technologies and have enabled the field to generate high value products both protein and small molecule. The increase can most easily be quantified by measuring increase in protein accumulation or the number of transgenic lines generated, and we have shown data for both of those.
- *How will the developments presented translate to other commercial processes beyond Sapphire:*
We have added additional commercial partners, Heliae and Triton H&N, and generated protein co-product strains for both. We are also in discussion with several other algae companies to either generate strains for them, or help them with their developmental programs. We have also supplied our vectors to labs world wide. The nutrient recycling is dependent upon the HTL process, but this process is now used beyond Sapphire.
- Final stage gate process conducted in March 2014 in conjunction with Cost Overrun request.
 - Led to additional funding/continuation of top 14 of 21 tasks

Publications

Task A. Crop Protection

- Wulfmeyer, T., C. Polzer, G. Hiepler, K. Hamacher, R. Shoeman, D.D. Dunigan, J.L. Van Etten, M. Lolicato, A. Moroni, G. Thiel, and T. Meckel. (2012). Structural organization of DNA in chlorella viruses. *PloS One* 7, e30133
- Van Etten, J.L. and Dunigan, DD. (2012). Chloroviruses: not your everyday plant virus. *Trends Plant Sci.* 17, 1-8. (cover photo).
- Dunigan, D.D., Cerny, R.L., Bauman, A.T., Roach, J.C., Lane, L.C., Agarkova, I.V., Wulser, K., Yanai-Balser, G.M., Gurnon, J.R., Vitek, J.C., Kronschnabel, B.J., Jeannard, A., Blanc, G., Upton, C., Duncan, G.A., McClung, O.W., Ma, F., Van Etten, J.L. (2012). *Paramecium bursaria* chlorella virus 1 proteome reveals novel architectural and regulatory features of a giant virus. *J. Virol.* 86, 8821-8834. [highlighted article and cover photo]
- Jeannard, A., Dunigan, D.D., Gurnon, J.R., Agarkova, I.V., Kang, M., Vitek, J., Duncan, G. McClung, O.W., Larsen, M., Claverie, J.M., Van Etten, J.L., Blanc, G. (20xx). Towards defining the chloroviruses: a genomic journey through a genus of large DNA viruses. *BMC Genomics* 14,158.
- Rowe, J.M., J.R. Gurnon, L.C. Lane, and J.L. Van Etten. (2010). Analysis of PBCV-1 resistance in *Chlorella* NC64A. *Viruses of Microbes*, Paris, France.
- Rowe, J. M., J. R. Gurnon, L. C. Lane, I. V. Agarkova, and J. L. Van Etten. (2010). Isolation and characterization of PBCV-1-resistant *Chlorella* NC64A. *International Society for Microbial Ecology*, 13th Symposium.
- Rowe, J.M., Dunigan, D.D., Blanc, G., Gurnon, J.R., Xia, Y., Van Etten, J.L. (2013). Evaluation of higher plant virus resistance genes in the green alga, *Chlorella variabilis* NC64A, during the early phase of infection with *Paramecium bursaria* chlorella virus-1. *Virology* 442, 101-113. (<http://dx.doi.org/10.1016/j.virol.2013.04.018>) [Chosen for Virology Highlights] (<http://www.elsevierblogs.com/virology/?p=58>)
- Blanc, G., Agarkova, I., Greenwood, J., Kuo, A., Brueggeman, A., Dunigan, DD., Gurnon, J., Ladunga, I., Lindquist, E., Lucas, S., Pangilinan, J., Proschold, T., Salamov, A., Schumtz, J., Weeks, D., Yamada, T., Claverie, JM., Grigoriev, I.V., Van Etten, J.L. (2012). The genome of the polar eukaryotic microalga *Coccomyxa subellipsoidea* reveals traits of cold adaptation. *Genome Biology* 13, R39.

Publications

Task A. Crop Protection (*continued*)

- Rowe, J.R., Dunigan, D.D., Blanc, G., Gurnon, J.R., Xia, Y., Van Etten, J.L. Evaluation of higher plant virus resistance genes in the green alga, *Chlorella variabilis* NC64A, the host for *Paramecium bursaria* chlorella virus (in preparation).
- Blatti JL, Beld J, Behnke CA, Mendez M, Mayfield SP, Burkart MD. 2012 Manipulating Fatty Acid Biosynthesis in Microalgae for Biofuel through Protein-Protein Interactions. *PLoS One* 2012;7(9):e42949. doi: 10.1371/journal.pone.0042949. Epub 2012 Sep 13.
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Task A. Crop Protection (*continued*)

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Task A. Crop Protection (*continued*)

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Task B. Nutrient Utilization

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- “A Model for Light-regulated Net Growth Rate of the Marine Diatom *Thalassiosira pseudonana*.” Authors: Daniel Yee¹, Niu Du¹, Egil Sakshaug², Maria Vernet¹, Osmund Holm-Hansen¹, Satoru Taguchi³, B. Greg Mitchell¹. Collaborating Institutions: ¹Scripps Institution of Oceanography, University of California San Diego, La Jolla, CA 92093; ² Trondhjem Biological Station, The Museum, University of Trondheim, Bynesueien 46, N-7018 Trondheim, Norway; ³ Soka University, 1-236 Tngi-cho, Hachioji-shi, Tokyo 192-8577, Japan. To be submitted to the Journal of Applied Phycology.
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Task B. Nutrient Utilization

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¹Department of Computer Science and Engineering, University of California San Diego ²Sapphire Energy ³Life Technologies. (In prep.).
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Task C. Genetic Tools

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Task C. Genetic Tools (continued)

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- Kendall, A., Yuan, J. (In Press) Comparing Life Cycle Assessments of Different Biofuel Options. *Current Opinion in Chemical Biology* DOI: 10.1016/j.cbpa.2013.02.020
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Task C. Genetic Tools *(continued)*

- Hwang, W. C., J. W. Golden, J. Pascual, D. Xu, A. Cheltsov, and A. Godzik. 2014. Site-specific recombination of nitrogen-fixation genes in cyanobacteria by XisF-XisH-XisI complex: structures and models. *Proteins*, in revision.
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Task C. Genetic Tools (continued)

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- Traller, JC, Hildebrand M. 2013. Application of high throughput imaging to the diatom *Cyclotella cryptica* demonstrates substantial intrapopulation heterogeneity in the rate and extent of triacylglycerol accumulation. *Algal Research.* 2: 244–252.
- Evaluation of phenotype stability and ecological risk of genetically modified algae in open pond production. Shovon Mandal^{2,3*}, Nathan G. Schoepp^{1,3*}, Shawn Szyjka⁴, Briana Niessen⁴, Yan Poon⁴, Steven Villareal^{2,3}, Jonathan B. Shurin^{2,3}, Michael D. Burkart^{1,3}, Stephen P. Mayfield^{2,3+} ¹Department of Chemistry & Biochemistry, University of California San Diego, 9500 Gilman Drive, La Jolla, CA 92093, United States ²Division of Biological Sciences, University of California San Diego, 9500 Gilman Drive MC0368, La Jolla, CA 92093, United States ³The California Center for Algae Biotechnology, University of California San Diego, 9500 Gilman Drive MC0368, La Jolla, CA 92093, United States ⁴Sapphire Energy, 3115 Merryfield Row, San Diego, CA 92121. (In prep.).

Patents

- Provisional patent application LLC. PCT/US2012/032662 “**Single chain antibodies for photosynthetic microorganisms and method of use.**” Oyler GA, Rosenberg JN, Weeks DP. University of Nebraska-Lincoln // Synaptic Research, Filed April 7, 2011.
- Provisional patent application UCSD064.001PR “**Cyanobacterial Strains Resistant to Grazers and Capable of Autoflocculation.**” S.S. Golden, B. Brahamsha, R. Simkovsky, E. Daniels, B. Palenik, J.W. Golden. UCSD. Filed 4/19/2012.
- Provisional patent application UCSD062.001PR “**Targeted Delivery of Nutrients to Recipient Organisms.**” S.S. Golden, J.W. Golden, A. Daulo. UCSD. Filed 4/19/2012.
- Provisional patent application US201/2028267681 “**Compositions and Methods for Enhancing Lipid Production in Marine Microalgae.**” Paul Falkowski, Miguel Frada, Kevin Wyman, James Gibson. Rutgers State University of New Jersey. Filed 4/25/2012.
- Provisional patent application 2012/036010 “**Production of P. falciparum surface proteins in algae as transmission blocking vaccine candidates.**” Stephen P. Mayfield. The Regents of the University of California, San Diego. Filed 03/10/2012.
- U.S. Provisional Application Serial No. 61/775,283, filed March 8, 2013. “**Regulation of gene expression in cyanobacteria.**” James Golden and Amy Ma.
- 2014. UCSD Docket No. SD2014-222. “**Using algae to deliver bioactive proteins to modify gut flora**”. Stephen Mayfield, Daniel Barrera, George Oyler.
- U.S. provisional Application Serial No. 61/894,197, “**Overexpression of Dgat2D gene in *Phaeodactylum tricorutum***”, 2013. Falkowski, PG., Dinamarca, J. , Levitan, O.
- U.S. Provisional Application Serial No. 61/824,305, “**Increased Lipid Accumulation in *Thalassiosira Pseudonana* by Metabolic Engineering of Lipid Catabolism**”. May 16, 2013. Hildebrand, M. , Gerwick, W., Trentcoste, E., Hull, J.
- US Provisional Application Serial no. 61/836,848, June 19, 2013. “**Efficient Method for Selecting Microalgae using Flow Cytometric Sorting**”. Hildebrand, M., Manandhar-Shrestha, K.
- International patent WO 2013/063388 A1 . “**Diatom-based vaccines**”. Lynette Corbeil, Mark Hildebrand, Roshan Shrestha, Aubrey Davis, Rachel Schrier, George Oyler, Julian Rosenberg.

Presentations

Task A. Crop Protection

- Gross, J., Systemic genomics of Chlamydomonas for understanding salt tolerance mechanisms in biofuel algae. Annual Meeting, Consortium for Algal Biofuels Commercialization, San Diego CA, May 13, 2012.
- Gross, J., Wajid, S., Price, D., Chan, C. X., and Bhattacharya, D. sRNAs of Cyanophora paradoxa and Chlamydomonas reinhardtii, a system genomics approach to understand algal evolution. Phycological Society of America Annual Meeting, Charleston SC, June 20-23, 2012.
- Mueller, C.M., Dunigan, D.D., Gurnon, J. R., and Van Etten, J.L. (2012) Flyswat 2012 in Nebraska City, Nebraska. Title: An evaluation of Nebraska River Systems for chloroviruses
- Dunigan, D.D., and Van Etten, J.L. (2012). Algal Biofuels Symposium 2012 in La Jolla, California. Title: Algal – virus interactions: A proteomic approach to host range specificity.
- Dunigan, D.D. (2012). Plant Virus Ecology Network Workshop 5 in Lawrence, Kansas, USA. Title: A two year comparison of chloroviruses in Nebraska river systems.
- Van Etten, J.L. Invited talk at Algal Biofuels Symposium 2012 held in La Jolla, CA. May 2012. Title: Chlorella viruses: possible infectious agents of humans and experimental animals.
- Van Etten, J.L. Invited talk at the American Society of Microbiology annual meeting. June, 2012. Title: Giant viruses change the perception of viruses.
- Van Etten, J.L. Invited talk at the Second International Conference on Viruses of Microbes held in Brussels, Belgium. July 2012. Title: Chlorella viruses: possible infectious agents of humans and experimental animals.
- Van Etten, J.L. Invited talk at the annual meeting of the Mediterranean Infestation held in Gordes, France. Oct. 2012. Title: Chloroviruses: giant algal viruses
- Van Etten, J.L. Invited seminar at the University of California – Riverside. Riverside, CA. Feb, 2012. Title: Unusual life-style of giant algal viruses.
- Van Etten, J.L. Invited seminar at Centro de Investigación Científica y de Educación Superior de Ensenada Ensenada, Mexico. March, 2012. Title: Unusual life-style of giant algal viruses.

Presentations

Task A. Crop Protection (*continued*)

- Van Etten, J.L. Invited seminar at the University of Naples, Naples, Italy. July, 2012: Title: Chlorella viruses have a sweet tooth.
- Van Etten, J.L. Invited seminar at the University of Genova, Genova, Italy. July, 2012. Title. Chlorella viruses have a sweet tooth.
- Van Etten, J.L. Invited seminar at Nebraska Wesleyan University. Lincoln, NE. Oct. 2012. Title: A fascinating journey with giant chlorella viruses.
- Van Etten, J.L. Talk. The genetic potential of the chlorella viruses is huge. Food and Fuel for the 21st Century – Expanding the Opportunities. April, 2013.
- Dunigan: 11th Annual Symposium in Virology, held in Lincoln, Nebraska, September 2011. Title (Poster presentation): An evaluation of Nebraska River Systems for chloroviruses; Authors: Claire Mueller, David Dunigan, James Gurnon, James Van Etten.
- Dunigan: Aquatic Virus Workshop 6, held in Texel, The Netherlands, October 2011. Title (Oral presentation): The evolving view of chlorovirus structure; Authors: Dunigan, D.D., Duncan, G.A., Lane, L.C., Zhang, X., Rossmann, M., Van Etten, J.L.
- Dunigan: Aquatic Virus Workshop 6, held in Texel, The Netherlands, October 2011. Title (Poster presentation): An evaluation of Nebraska Streams for Chloroviruses; Authors: Mueller, C.M., Dunigan, D.D., Gurnon, J. R., Van Etten, J.L.
- Dunigan: 2011 Flyswat, held in Nebraska City, Nebraska, March 2011. Title: Chlorovirus major capsid proteins. Authors: D. D. Dunigan, L. C. Lane, G. L. Lewis, G. A. Duncan, G. M. Yanai-Balser, J. C. Vitek, R. L. Cerny, J. L. Van Etten.
- Dunigan: Algal Biofuels Symposium 2011, held in La Jolla, California; April 2011. Title: Future crop protection; viruses of eukaryotic algae. Authors: D. D. Dunigan, J. L. Van Etten.

Presentations

Task A. Crop Protection (*continued*)

- Dunigan, D.D. Talk. Algal-virus interactions: A transcriptomic Evaluation of the innate immune response of *Chlorella variabilis* to PBCV-1 infection. Food and Fuel for the 21st Century – Expanding the Opportunities. April, 2013.
- Van Etten. Aquatic Virus Workshop #6. Texel, Netherlands. Oct. 2011. Title: Chlorella viruses continue to surprise. Sole author.
- Van Etten. Invited keynote talk at the First International Conference on Viruses of Microbes held in Paris, France. June, 2010. Title: Early events associated with infection by chlorella virus PBCV-1.
- Van Etten. Invited seminar at Johns Hopkins University, Baltimore, MD. Dec. 2011. Title. Unusual life-style of giant algal viruses.
- Van Etten. Invited seminar at Temple University, Philadelphia, PA. April, 2011. Title: Unusual life-style of giant algal viruses.
- Van Etten. Invited seminar at the University of Mediterranean, Marseille, France. Feb. 2011. Title: Unusual life-style of giant algal viruses.
- Van Etten. Invited seminar at the University of Milano, Milano, Italy. June, 2010. Title: Unusual life-style of giant algal viruses.
- Van Etten. Invited seminar at the University of Minnesota, Minneapolis, MN. Dec. 2011. Title: Unusual life-style of giant algal viruses.
- Van Etten. Invited seminar at the University of Missouri – Kansas City. March, 2010. Title: Unusual life-style of giant algal viruses.
- Van Etten. Invited talk at a Food and Fuel meeting at the state capital in Lincoln, NE. Oct. 2011. Algal viruses – the good and the bad.
- Van Etten, J.L., L. Jones-Brando, E. Severance, M. Webster, S. Kim, J. Gurnon, D.D. Dunigan, F. Dickerson, R. Yolken. (2012). Chlorella viruses: potential infectious agents of humans and experimental animals. Viruses of Microbes 2012.

Presentations

Task A. Crop Protection (*continued*)

- De Castro, C., D. Garozzo, R. Lanzetta, A. Molinaro, M. Parrilli, L. Sturiale, J. Gurnon, J.L. Van Etten, M. Tonetti. (2013). A molecular modeling view into the complex N-linked oligosaccharide from A430L envelope protein isolated from *Paramecium bursaria* chlorella virus PBCV-1. Gordon Conference on Glycobiology.
- De Castro, C., D. Garozzo, L. Sturiale, A. Molinaro, F. Piacente, J. Gurnon, J.L. Van Etten, M. Tonetti. (2013). Structural characterization of the N-linked glycans associated with the major capsid protein of the giant DNA virus PBCV-1. Gordon Conference on Glycobiology.
- Duncan, G., D. Dunigan, J. Gurnon, and J.L. Van Etten. (2103). Antigenic mutants of the chlorovirus PBCV-1: Sequence analysis of the gene a064r. Abstracts of the American Society of Virology. p. xx.
- Dunigan, D.D., A. Jeanniard, J.R. Gurnon, I.V. Agarkova, M. Kang, J. Vitek, G. Duncan, O.W. McClung, M. Larsen, J.M. Claverie, J.L. Van Etten, and G. Blanc. (2013). A genomic analysis of giant viruses in the genus Chlorovirus. Abstracts of the American Society of Virology. p. xx.
- Agarkova, I., B. Hertel, X Zhang, D. Dunigan, M. Rossmann, G. Thiel, and J.L. Van Etten. (2013). Chlorovirus attachment to the host cell wall is reversible. Abstracts of the American Society of Virology. p. xx.
- Dunigan, D. D., Van Etten, J. L., Jeanniard, A. (2013). Exploration of Chloroviruses through genomics. Algal Biomass Summit.
- Blatti: Releasing stored solar energy within pond scum: Biodiesel from algal lipids, oral presentation, 243rd American Chemical Society National Meeting, San Diego, CA, March 29, 2012.
- Burkart: Role of protein-protein interactions in algal fatty acid synthase engineering, 243rd American Chemical Society National Meeting, San Diego, CA, March 28, 2012.
- Sonnenschein and Burkart: Metabolic engineering of microalgae towards the production of secondary metabolites, poster presentation at the Food and Fuel for the 21st Century, April 22-23, 2012, La Jolla, CA, USA

Presentations

Task A. Crop Protection (*continued*)

- Burkart: Modular synthase engineering in algae, oral presentation at the Food and Fuel for the 21st Century, April 22-23, 2012, La Jolla, CA, USA.
- Burkart: University of Maryland Center for Environmental Science (College Park, Maryland; October 2011)
- Eva Sonnenschein, Michael Burkart: Activation of Secondary Metabolite Pathways in Microalgae, General Meeting of the American Society for Microbiology, May 18-21, 2013
- Sonnenschein and Burkart: Metabolic engineering of microalgae towards the production of secondary metabolites, poster presentation at the 15th International Conference on the Cell & Molecular Biology of Chlamydomonas, June 5-10, 2012, Potsdam, Germany.
- Burkart: Studies on Algal Fatty Acid Biosynthesis, oral presentation at the Food and Fuel for the 21st Century Symposium, April 19-20, 2013, La Jolla, CA.
- Sonnenschein and Burkart: Metabolic engineering of microalgae towards the production of secondary metabolites, poster presentation at the CEC Large Molecule Sustainable Fuels Roadmap Meeting - October 18, 2012, La Jolla, CA, USA.
- Joris Beld, Jen Michaud, Nathan Schoepp, Eva Sonnenschein, Michael Burkart: Towards a sustainable future - algae research in the Burkart lab, poster presentation at the Food and Fuel for the 21st Century, April 19-20, 2013, La Jolla, CA.
- Ryan Simkovsky, Emy Daniels, Karen Tang, Stacey Huynh, Susan Golden, and Bianca Brahamsha: Impairment of O-antigen production confers resistance to grazing in a model cyanobacterium-amoeba predator-prey system; poster presentation at the Food and Fuel for the 21st Century, May 11-12, 2012, La Jolla, CA, USA
- Amy Ma, Emy Daniels, Javier Paz Yepes, James Golden, and Bianca Brahamsha: Proteomic analysis of *Anabaena sp.* Strain PCC 7120 after co-culture with wild amoebal isolate HGG1; poster presentation at the Food and Fuel for the 21st Century, May 11-12, 2012, La Jolla, CA, USA
- Ryan Simkovsky, Emy Daniels, Karen Tang, Stacey Huynh, Susan Golden, and Bianca Brahamsha: O-antigen Impairment Confers Resistance to Grazing in a Model Cyanobacterium-Amoeba System.; poster presentation at the San Diego Microbiology Meeting, June 9, 2012, La Jolla, CA, USA

Presentations

Task A. Crop Protection (*continued*)

- Ryan Simkovsky: Protecting cyanobacteria from amoebal predators, San Diego Microbiology Group, April 17, 2013, La Jolla, CA, USA
- Amy T. Ma, Emy Daniels, Brian Knight, James W. Golden, Bianca Brahamsha: Characterizing Interactions Between *Anabaena* sp. PCC 7120 and Amoeba HGG1. poster presentation at the Food and Fuel for the 21st Century, April 19-20, 2013, La Jolla, CA.
- Amy T. Ma & James W. Golden: Riboswitch-Mediated Regulation of Gene Expression in Cyanobacteria. poster presentation at the Food and Fuel for the 21st Century, April 19-20, 2013, La Jolla, CA.
- Golden, S. Impairment of O-antigen production confers resistance to grazing in a model cyanobacterium-amoeba predator-prey system, 14th Intl Symposium on Phototrophic Prokaryotes, Porto, Portugal, 5 - 10 Aug 2012.
- Golden, J. July seminars on “Cyanobacterial Biotechnology” in China at the Hydrobiology Institute and Central Normal University (Wuhan), Qingdao Institute of Bioenergy and Bioprocess Technology (Qingdao), and the Shanghai.
- S. Briggs. Talk. “Reconstruction of Protein Networks from an Atlas of Proteotypes”, FF21 Symposium La Jolla, CA. April 2013.
- F. Nohilly. Talk. “Algae chytrid interactions”, SD-CAB Student and Post-doc symposium. La Jolla, CA. April 2011
- Z. Shen. Talk. “Chytrid pathogenesis programs the algal host proteotype”, SD-CAB & FF21 Symposium, La Jolla, CA, May 2012.
- S. Wehrkamp-Richter. Talk. “Proteomics Analysis of Scenedesmus infection with Fungus”, SD-CAB/Sapphire Collaborators Meeting, La Jolla, CA. March 2013.
- F. Nohilly. Poster. “Chytrid pathogenesis programs the algal host proteotype”. SD-CAB & FF21 Symposium, La Jolla, CA. May 2012.
- F. Nohilly. Poster. “Chytrid pathogenesis programs the algal host proteotype”, International Conference on Algal Biomass, Biofuels, and Bioproducts. San Diego, CA. June 2012

Presentations

Task A. Crop Protection (*continued*)

- F. Nohilly, Poster. “Chytrid pathogenesis programs the algal host proteotype”, UCSD Biological Sciences Research Symposium. La Jolla, CA. June 2012.
- F. Nohilly. Poster. “Chytrid pathogenesis programs the algal host proteotype”, California Energy Commission Roadmap Meeting, La Jolla, CA. October 2012.
- F. Nohilly. Poster. “Chytrid pathogenesis programs the algal host proteotype”, French BioBeach Symposium , La Jolla, CA. November 2012.
- S. Wehrkamp-Richter, F. Nohilly. Poster. “Conservation of plant stress hormone responses in the unicellular alga, *Scenedesmus dimorphus*”. Food and Fuel for the 21st Century Symposium. La Jolla, CA. April 2013.
- Visualizing the chain-flipping mechanism in fatty acid biosynthesis, GRC Bioorganic, Proctor Academy (June 2014), Poster presentation. Beld, J. Cang, H., Burkart, M. D.,
- Experimental risk assessment for dispersal, invasion, and impact on wild algae of genetically-modified *Scenedesmus dimorphus*. Algae Biomass Organization Summit Meeting; Sept. 29-Oct 2nd, San Diego, CA. Presentation. Shurin, J. (2014)
- Pathways to Grazer Resistance in Cyanobacteria. Algae Biomass Organization Summit Meeting; Sept. 29-Oct 2nd, San Diego, CA. Presentation. Simkovsky, R. (2014)
- Interrogating the fatty acid synthase in bacteria and algae, NOBCChE, San Diego, USA (March 2014), <http://ucsd.academia.edu/NOBCChEUCSD>, oral presentation. Beld, J.
- Molecular approaches for protection of cyanobacterial crops (Oral Presentation). 2014 Food & Fuel for the 21st Century Symposium, UC San Diego, March 14-15, 2014. Brahamsha, Bianca.
- Lipopolysaccharide Mutants Reveal Novel Targets for Cyanobacterial Grazer Resistance and Tolerance to LPS Deletion (Poster Presentation). 2014 Food & Fuel for the 21st Century Symposium, UC San Diego, March 14-15, 2014. Simkovsky, Ryan; Effner, Emily; Iglesias-Sanchez, Maria Jose; Tang, Karen; Kenchel, Joshua; Bearmar, Nicholas; Golden, Susan.
- Bhattacharya D*. Experimental evolution of microalgae and its application to biofuels. International Congress of Protistology (ICOP; <http://www.icoprotist.com>), July 31, 2013, Vancouver, Canada. *speaker

Presentations

Task A. Crop Protection (*continued*)

- Bhattacharya D*, Gross J, Price DC, Chan CX. The Cyanophora genome: analysis of gene and small RNA content in a pivotal algal lineage. 10th International Phycological Congress (<http://ipc10.intphycsoc.org/>), August 9, 2013. *speaker
- Bhattacharya D*, Perrineau MM, Gross J, Price DC, Zelzion U. Biofuel crop improvement using experimental evolution. 10th International Phycological Congress (<http://ipc10.intphycsoc.org/>), August 5, 2013. *speaker
- Bhattacharya D, Gross J, Price DC, Chan CX. The Cyanophora genome: analysis of gene and small RNA content in a pivotal algal lineage. 10th International Phycological Congress (<http://ipc10.intphycsoc.org/>), August 9, 2013.
- Foflonker F1, Palenik B, Price DC, Bhattacharya D. Genome sequence of a biofuel candidate alga provides insights into stress adaptation. 10th International Phycological Congress (<http://ipc10.intphycsoc.org/>), August 9, 2013.
- Bianca Brahamsha. “Grazing and the Cyanobacterial Cell Surface”. Oral presentation at the San Diego Microbiology Group Meeting of March 20, 2013.
- Dunigan, D. D. Invited seminar at Purdue University, West Lafayette, Indiana, USA: May 2013 “The immediate-early events of Chlorovirus infections”.
- Amy Ma, E.Daniels, B. Knight, J. Golden, B. Brahamsha. “Characterizing interactions between Anabaena sp. PCC7120 and Amoeba HGG1.” Poster presentation at the Annual Meeting of the San Diego Microbiology Group. May, 11, 2013.
- Amy Ma, E. Daniels, J. Golden, B. Brahamsha. “Proteomic Response of Anabaena sp. PCC7120 to grazing by natural amoebal isolate HGG1.” Poster presentation at the 11th Workshop on Cyanobacteria, Washington University, St. Louis, Aug. 7-11, 2013.
- Amy Ma, Postdoctoral Scholar. “Predator-prey Interactions Between Cyanobacteria and Amoebae”. Oral presentation at the SD-CAB student and Postdoc Symposium, March 15, 2013.

Presentations

Task A. Crop Protection (*continued*)

- Ryan Simkovsky, Maria José Iglesias-Sánchez, Karen Tang, Joshua Kenchel, Nicholas Bearmar, and Susan Golden. “Rough Phenotype Screen Reveals New Candidate Genes Conferring Resistance to Grazing in a Model Cyanobacterium-Amoeba System” Poster presentation at the 11th Workshop on Cyanobacteria, St. Louis, MO, Aug. 7 – Aug 11, 2013.
- Ryan Simkovsky, Maria José Iglesias-Sánchez, Karen Tang, Joshua Kenchel, Nicholas Bearmar, and Susan Golden. “Rough Phenotype Screen Reveals New Candidate Genes Conferring Resistance to Grazing in a Model Cyanobacterium-Amoeba System” Poster presentation at the UCSD Postdoctoral Research Symposium, La Jolla, CA, Sept 13, 2013.
- Dunigan, D. D. (2013). Invited seminar at University of California-Davis, Davis, California, USA: October 2013
“Rise of the giant viruses: A view from the midrealm”
- Dunigan, D. D. (2013). Invited seminar at Oklahoma State University, Stillwater, Oklahoma, USA: October 2013
“A view of giant viruses from the midrealm of the chloroviruses”
- Dunigan, DD (2013). Aquatic Virus Workshop 7, held in St. Petersburg, Florida, USA, November 2013.

Presentations

Task B. Nutrient Utilization

- **James Golden:** July seminars on “Cyanobacterial Biotechnology” in China at the Hydrobiology Institute and Central Normal University (Wuhan), Qingdao Institute of Bioenergy and Bioprocess Technology (Qingdao), and the Shanghai Institute of Plant Physiology and Ecology (Shanghai).
- S. Wang, B. Palenik. Microalgal use of diverse nitrogen sources for growth. Poster presentation at the Food and fuel for the 21st Century, April 19-20, 2013, La Jolla, CA, USA.
- W. Lambert, B. Palenik. Co-culturing nitrogen fixing cyanobacteria and diatoms in nitrogen deplete media for biofuels production. Poster presentation at the Food and Fuel for the 21st Century, May 11-13, 2012, La Jolla, CA, USA.
- W. Lambert. **Greenhouse and Pond Cultivation of Nitrogen-fixing Cyanobacteria Co-cultured with Diatoms.** Poster presentation at the Food and Fuel for the 21st Century Symposium, April 19-20, 2013, La Jolla, CA.
- **Jonathan Shurin** presented on ecology of algae biofuel in following conferences/ seminars:
 1. Departmental Seminar, University of Kansas, March 6, 2012
 2. Departmental Seminar, Missouri State University, March 9, 2012
 3. Associations for the Sciences of Limnology and Oceanography, special symposium on Biodiversity, July 10, 2012.
 4. Ecological Society of America, special invited symposium on Microbial Ecology, August 10, 2011.
 5. Sapphire Energy, special seminar, August 21, 2012
- **B. G. Mitchell**, UCSD-SIO CAB-COMM PRESENTATION, 2012
 - 1) National Alliance for Advanced Biofuels and Bioproducts, 2nd International Conference, June 10-13, San Diego, CA. Poster Presentation: “Effect of Light and Temperature on Photosynthetic Quantum Yield, Pigment, Lipid, Protein and Carbohydrate Content in the Marine Diatom *Thalassiosira pseudonana*” Danielli Matias Dantas¹, Frank Shang, Sitti Raehanah Muhamad Shaleh, Patricia Abelin, Niu Du, Elliot Weiss, Dominick Mendola and B. Greg Mitchell, Scripps Institution of Oceanography UCSD, La Jolla CA 92093.

Presentations

Task B. Nutrient Utilization *(continued)*

- 2) National Alliance for Advanced Biofuels and Bioproducts, 2nd International Conference, June 10-13, San Diego, CA. Oral Presentation: “Modeling gross production, net production, and respiration of photosynthetic microalgae”, B. Greg Mitchell, Niu Du. Scripps Institution of Oceanography UCSD, La Jolla CA 92093.
- 3) 31st IUBS General Assembly and Conferences on Biological Sciences and Bioindustry, July 5-9, 2012, Suzhou, China, Oral Presentation: “Modeling growth of photosynthetic microalgae and carbon partitioning between lipid, protein and carbohydrate”, B. Greg Mitchell*, Niu Du, Scripps Institution of Oceanography UCSD, La Jolla CA 92093.
- 4) Algae Biomass Organization Summit Meeting. Sept. 24-27, 2012, Denver, CO, USA. Oral Presentation: “Photosynthetic Quantum Yield of Algae”, B. Greg Mitchell*, Niu Du, Daniel Yee, Scripps Institution of Oceanography UCSD, La Jolla CA 92093.
- 5) Algae Biomass Organization Summit Meeting. Sept. 24-27, 2012, Denver, CO, USA. Poster Presentation: “Determination of water soluble carbohydrate for microalgae cultures using the TPTZ method and application to the study of cellular carbon partitioning”, ¹Patricia Abelin, ²Laura T. Carney, ¹Frank Shang and ¹B. Greg Mitchell; ¹Scripps Institution of Oceanography, University of California San Diego, La Jolla, CA 92093. ²Sandia National Laboratory, Livermore, CA 94551.
- 6) Mendola, D. 2013. Micro-Algae Biofuels & Bio-Products Research & Pilot Commercial-Scale Projects Worldwide. Ningbo University, Ningbo, China, April, 2013.
- 7) Mendola, D. 2013. Algae Biofuels & Bio-Products - R&D. Ningbo University, Ningbo, China, April, 2013.
- Mitchell: Opportunities for Improving Environmental Quality and Enhancing Natural Resource Base Provided by Algal Biofuels, NAS-NRC Study, March 17, 2011, San Diego, CA . B. G. Mitchell
- Mitchell: Photosynthetic Quantum Efficiency Measurement and Modeling: How and Why, ABO Summit, October 25, 2011, Minneapolis, MN. B. G. Mitchell

Presentations

Task B. Nutrient Utilization *(continued)*

- Mitchell: Algal Biofuels: Because A Pig Won't Eat A Lump Of Coal, BIOCOM, September 15, 2010 San Diego, CA. B. G. Mitchell
- Mitchell: Are (Micro/Macro)Algae a Viable Option for Biofuel? G'Day USA Clean Tech Conference, January 12, 2010, San Diego, CA. B. G. Mitchell
- Mitchell: Consortium for Algal Biofuels Commercialization (CAB-Comm), DOE Webinar, September 8, 2010. B. G. Mitchell
- Mitchell: Growth Rates and Yields of Oil, Protein and Carbohydrate for Microalgae as Regulated by Growth Conditions, Algae World Summit, May 23, 2011, Del Mar, CA. B. G. Mitchell
- Mitchell: Imperial Valley, Salton Sea and Water: The Algae Alternative, California Independent Voter Project, November 15, 2010, Maui, Hawaii
- Mitchell: Photosynthetic Quantum Efficiency Measurement and Modeling: How and Why SDCAB, Algal Biofuels Symposium, April 30, 2011, La Jolla, CA B. Greg Mitchell
- Mitchell: Prediction of the Consequences of the Obvious, SD-CAB Symposium, April 23, 2010. B. G. Mitchell
- Mitchell: Program Committee Member and Session moderator; Algae Biomass Summit meeting, Denver, CO., 23-27 September, 2012.
- Mendola: Energy from Algae - Aquatic Biomass Conversion for the Coachella Valley, Coachella Valley Energy Summit, May 12, 2011. Dominick Mendola
- Mendola: The Future for Algae Crops in the Imperial Valley, Imperial Valley Renewable Energy Expo, March 17, 2011, Dominick Mendola
- Du/Woertz/Rhodes/Mendola/Mitchell/Lundquist/Benemann; Critical review on algal biofuel LCA articles' parameters and results, ABO Summit, October 25, 2011, Minneapolis, MN. Du Niu, Ian Woertz, James Rhodes, Dominick Mendola, Greg Mitchell, Tryg Lundquist, John Benemann

Presentations

Task B. Nutrient Utilization *(continued)*

- Neori/Abelin/Shaleh/Mendola/Mitchell: Spray Irrigation Culture of Macroalgae in CO₂ Enriched Atmosphere using Recirculated Seawater, ABO Summit, October 25, 2011, Minneapolis, MN. Amir Neori, Patricia Abelin, Sitti Raehanah M. Shaleh, Dominick Mendola, B. G. Mitchell
- Shang/Carney/Abelin/Brookhart/Mitchell: Effect of Temperature and Light Variation of on Fatty Acids, Pigment and Carbohydrate Yields for Marine Diatom, *Thalassiosira pseudonana*, ABO Summit, September 9, 2010, Denver, CO. Frank Shang, Laura Carney, Patricia Abelin, Rex Brookhart, B. G. Mitchell
- Shurin, “Algal traits and diversity as components of productivity and stability for biofuels”, oral presentation at the Food and Fuel for the 21st Century, April 22-23, 2012, La Jolla, CA, USA
- Shurin/Mitchell: Effect of irradiance and CO₂ on the utilization of carbon in the marine diatom *Thalassiosira pseudonana*. SD-CAB Symposium, May 13, 2012, La Jolla, CA. Jonathan Shurin, B. G. Mitchell
- Shurin: NRC Committee on Sustainable Development of Algal Biofuel (UC Irvine, CA; Sept 2011)
- Application and validation of TPTZ method for measuring total carbohydrate content in microalgae culture. Algae Biomass Organization Summit Meeting; Sept. 29-Oct 2nd, San Diego, CA. Poster Presentation. Patricia Abelin, Alyssa Velloze, Frank Shang, Laura T. Carney, Wilson G. Mendoza and B. Greg Mitchell. (2014)
- Photo-physiology of the Haptophyte marine alga *Isochrysis galbana* under a light gradient in culture: carbon partitioning into cellular constituents. Algae Biomass Organization Summit Meeting; Sept. 29-Oct 2nd, San Diego, CA. Poster Presentation. Margarita Godoy, Elliot Weiss, Patricia Abelin, Wilson G. Mendoza, and B. Greg Mitchell. (2014)
- Modeling of Light dependent growth and respiration for the marine diatom *Thalassiosira pseudonana*. Algae Biomass Organization Summit Meeting; Sept. 29-Oct 2nd, San Diego, CA. Poster Presentation. Awarded third prize for the Young Algae Research Awards, presented to winners for research conducted in two subject areas: biology and engineering, for outstanding research in algae biology. Niu Du, Daniel Yee, Egil Sakshaug, Maria Vernet, Osmund Holm-Hansen, Satoru Taguchi, B. Greg Mitchell. (2014)

Presentations

Task B. Nutrient Utilization (*continued*)

- Irradiance-dependent biomass growth model of *Scenedesmus* sp. in outdoor ponds. Algae Biomass Organization Summit Meeting; Sept. 29-Oct 2nd, San Diego, CA. Poster Presentation. Awarded first prize for the Young Algae Research Awards, presented to winners for research conducted in two subject areas: biology and engineering, for outstanding research in algae biology. Wilson G. Mendoza, Patricia Abelin, Dominick Mendola, Du Niu, Elliot Weiss, Brian Schieber and Greg Mitchell. (2014)
- Characterization of the Use of Wastewater from Hydrothermal Liquefaction as a Nitrogen Source by the Potential Algal Biofuel Strain *Picochlorum* sp. Algae Biomass Organization Summit Meeting; Sept. 29-Oct 2nd, San Diego, CA. Presentation. Palenik, Brian (2014)
- Variation in cellular growth and pigment packaging in response to growth irradiance for *Dunaliella tertiolecta* and *Thalassiosira pseudonana*. Algae Biomass Organization Summit Meeting; Sept. 29-Oct 2nd, San Diego, CA. Poster Presentation. Alyssa Velloze, Elliot Weiss, Niu Du, Patricia Abelin, B. Greg Mitchell. (2014)
- A comparison of on-site nutrient and energy recycling technologies in algal oil production. Poster presented at ISSST2014. May 19-21: Oakland, CA. Zhang, Y., Kendall, A., Yuan, J. (2014)
- Carbon partitioning into lipids, protein, carbohydrates, and pigments induced by irradiance, CO₂ and N-limitation in the marine diatom *Thalassiosira pseudonana* (Oral Presentation). 2014 Food & Fuel for the 21st Century Symposium, UC San Diego, March 14-15, 2014. Mitchell, Greg.
- A comparison of on-site nutrient and energy recycling technologies in algal oil production (Poster Presentation). 2014 Food & Fuel for the 21st Century Symposium, UC San Diego, March 14-15, 2014. Zhang, Yizhen; Kendall, Alissa; and Yuan, Juhong.
- Shuyi Wang, Sophia Giang, W. Lambert, and Brian Palenik. Microalgal assemblages in a poikilohaline pond and isolates transition to biofuels pond growth. Poster presentation at the Food and fuel for the 21st Century Symposium. April 19, 2013.
- Shurin J.B. The ecology of algae biofuels. Universidad Pedagógico y Tecnológico de Colombia in Tunja, Colombia, May 24, 2013.

Presentations

Task B. Nutrient Utilization *(continued)*

- Shuyi Wang, Postdoctoral Scholar. “Microbial Dynamics in Model Algal Biofuels Ponds”. Oral presentation at the SD-CAB student and Postdoc Symposium, March 15, 2013.
- Shuyi Wang. Microalgal assemblages in a poikilohaline pond and isolates transition to biofuels pond growth. Talk. Xiamen University, China. April 2013.
- Wang, S. Lambert, W., Giang, S., Goericke, R., and Palenik, B. “Microalgal Strains for Algal Biofuels Production in Outdoor Ponds”. Algae Biomass Summit, Orlando, Florida (September 30-October 3, 2013)
- Experimental Risk Assessment for Dispersal, Invasion, and Impact on Wild Algae of Genetically-Modified *Scenedesmus dimorphus*. 2014 Algae Biomass Summit October 2, 2014, San Diego, CA. Oral Presentation. Shurin, Jon.

Presentations

Task C. Genetic Tools

- Weeks: Transcriptome analysis of *Chlamydomonas* subjected to carbon dioxide deprivation, to USDA North Central 1168 Photosynthesis Conference, Michigan State University
- Weeks: Li-COR Corporation (Lincoln, NE; December 12, 2011)
- Weeks: Algal Biofuels Symposium 2012, held in La Jolla, California; May 2012. Title (Oral presentation): Massive changes in *Chlamydomonas* gene expression during activation of the CO₂-concentration mechanism triggered by CO₂ depletion.
- D. P. Weeks, Invited presentation: Massive changes in gene expression associated with activation of the CO₂-concentrating mechanism in *Chlamydomonas reinhardtii*. Don Weeks, 15th International *Chlamydomonas* Conference, Potsdam, Germany, June 7, 2012
- D. P. Weeks, Oral Presentation: Developing Surface Nanobodies Specific to *Chlamydomonas reinhardtii*, ABO Algae Biomass Summit (Denver, CO), September 27, 2012.
- D. P. Weeks, Seminar: Lawrence Berkeley Laboratory, UC Berkeley. “Massive Transcriptome Changes During Activation of the CO₂-concentrating Mechanism (CCM) in Microalgae and Development of TAL Effector Nucleases (TALENs) for Targeted Gene Knockout for Yeast and Rice”. December 18, 2012
- D. P. Weeks, Seminar: Nebraska LEAD Program. Algal and Agricultural Biotechnology: The Next Wave. October 25, 2012
- Drew Brueggeman, Poster: UNL Research Fair. “Massive changes in gene expression associated with CO₂ deprivation in *Chlamydomonas reinhardtii*. November 16, 2012.
- D. P. Weeks, Seminar: USDA NC-1200 Regional Meeting, Reno, NV. “Use of TAL Effector Nuclease (TALN) Technologies for Targeted Gene Knockout and Gene Replacement”. November 17, 2012
- Drew Brueggeman, Seminar. Development and testing of herbicide resistance genes for *Chlamydomonas reinhardtii* and algae of potential commercial importance. Nebraska Coalition for Algal Biology and Biotechnology, February 25, 2013

Presentations

Task C. Genetic Tools (continued)

- Thomas Plucinak, Seminar. The power of FMDV 2A technology for production of multiple proteins from a single gene in *Chlamydomonas reinhardtii*. Nebraska Coalition for Algal Biology and Biotechnology, February 25, 2013
- D. P. Weeks, Seminar: UNL Center for Plant Science Innovation. "Use of TAL Effector Nuclease (TALEN) Technologies for Targeted Gene Knockout and Gene Replacement". January 17, 2013
- Yuan, J., Kendall, A., (2012) "Life cycle assessment of second and third generation biofuels: a review of feedstocks, processes and environmental implications", *Growing the Bioeconomy Conference*, Banff, Alberta, Canada.
- M. Hildebrand: Development of Diatom Genetic Manipulation Tools; oral presentation at the Food and Fuel for the 21st Century, April 22-23, 2012, La Jolla, CA, USA.
- M. Hildebrand: Invited Keynote Speaker and Session Chair, The Second International Conference on Algal Biomass, Biofuels, and Bioproducts, "Evolutionary-based Differences in Microalgal Cellular Organization and Processes as Related to Biofuels Production" San Diego, CA, June 10-13, 2012.
- M. Hildebrand: Invited talk, "Improvement of Lipid Accumulation in Microalgae by Carbon Flux Metabolic Engineering." FF21 Symposium, UCSD, La Jolla, CA. April 19-20, 2013.
- Smith, S.R., Allen, A.E., Hildebrand, M.: Poster, "A global regulatory mechanism integrates carbon and energy metabolism in the diatom *Thalassiosira pseudonana*." FF21 Symposium, UCSD, La Jolla, CA. April 19-20, 2013.
- Taton A., E. Lis, D. M. Adin, G. Dong, S. Cookson, T. Swinney, E. King, S. A. Kay, S. S. Golden, and J. W. Golden (2012) - Development of *Leptolyngbya* sp. BL0902 as a new bioengineering platform and improved genetic tools for cyanobacteria. Proceedings of 14th International Symposium on Phototrophic Prokaryotes, Porto, Portugal, August 5 to 10. (TALK)
- Taton A., E. Lis, D. M. Adin, G. Dong, F. Unglaub, T. Swinney, E. King, R. Cook, N.E. Wright, S. A. Kay, S. S. Golden, and J. W. Golden (2012) - Development of *Leptolyngbya* sp. BL0902 as a new bioengineering platform and improved genetic tools for cyanobacteria. Development of Microalgae Industrial Biotechnology: from animal food to bioenergy, French BioBeach - November 12, San Diego, CA. (POSTER)

Presentations

Task C. Genetic Tools (continued)

- Golden: Speaker, Keystone conference on Biofuels, Singapore, "Developing Cyanobacteria for Production of Industrial Products and Fuels," March 2011
- Golden: Breakout session on alternative fuels, National Academy of Sciences annual meeting, "Micro-algae for the Production of Biofuels and Bio-products," Washington DC, May 1, 2011
- J. W. Golden. Multiple seminars on "Heterocyst Development" and "Cyanobacterial Biotechnology" in China at the Hydrobiology Institute (Wuhan), Central Normal University (Wuhan), Qingdao Institute of Bioenergy and Bioprocess Technology (Qingdao), and the Shanghai Institute of Plant Physiology and Ecology (Shanghai), July 1-12, 2012. Invited presentations.
- J. W. Golden. Food and Fuel for the 21st Century, La Jolla, CA, May 11-13, 2012. "Cyanobacterial strains, genetic tools, crop protection, and nutrient supply". Oral presentation.
- Golden, S. (2013) - Developing Cyanobacteria as Platforms for Food and Fuel Production. FF21 Symposium, UCSD, La Jolla, CA. April 19-20 (Invited talk).
- Taton A., E. Lis, D. M. Adin, G. Dong, S. Cookson, T. Swinney, E. King, S. A. Kay, S. S. Golden, and J. W. Golden (2012) - Development of *Leptolyngbya* sp. BL0902 as a new bioengineering platform and improved genetic tools for cyanobacteria. Proceedings of 14th International Symposium on Phototrophic Prokaryotes, Porto, Portugal, August 5 to 10. (TALK)
- Taton A., E. Lis, D. M. Adin, G. Dong, F. Unglaub, T. Swinney, E. King, R. Cook, N.E. Wright, S. A. Kay, S. S. Golden, and J. W. Golden (2012) - Development of *Leptolyngbya* sp. BL0902 as a new bioengineering platform and improved genetic tools for cyanobacteria. Development of Microalgae Industrial Biotechnology: from animal food to bioenergy, French BioBeach - November 12, San Diego, CA. (POSTER)
- Rasala BA, Lee P, Ng J, Barerra D, Plucinak TM, Rosenberg J, Weeks D, Oyler G, Mayfield SP. "Genetic tools for microalgal research and biotechnology." Algal Biomass Summit, ABO meeting, Denver, Colorado, September 27, 2012. Poster presentation.
- Rasala BA and Mayfield, SP. "Development of Molecular Genetic Tools for Microalgae." SD-CAB Symposium 2012, Food and Fuel for the 21st Century. May 2012. Platform presentation.

Presentations

Task C. Genetic Tools *(continued)*

- Rasala BA and Mayfield SP. “Production of industrial enzymes in microalgae to enable cellulosic biofuels.” American Chemical Society Spring 2012 National Meeting and Exposition. March 2012. Platform presentation.
- Specht EA, Mayfield SP: Genetic Manipulation of Chloroplast Gene Regulation. Poster presented at San Diego Center for Algal Biotechnology Annual Symposium, La Jolla CA, 13 May 2012.
- Specht, EA. Talk. Characterizing chloroplast gene regulatory elements to construct optimized synthetic regulatory regions. Talk, Quantitative Biology Winter Conference. Waikiki, Hawaii. February 18, 2013.
- Mayfield: Agilent (Santa Clara, CA; November 2011)
- Mayfield: Algal Biomass Organization (Minneapolis, MN; October 2011)
- Mayfield: Atlantic meets the Pacific Forum (La Jolla, CA; October 2011)
- Mayfield: Berlin Algae Conference (Berlin, Germany; December 2011)
- Mayfield: Environmental Entrepreneurs Breakfast (La Jolla, CA; October 2011)
- Mayfield: Microorganisms for Biofuel Production from Sunlight (Bielefeld, Germany; September 2011)
- Mayfield SP. Invited Talk. Washington University St. Louis, DOE biofuels Center, January 22, 2013.
- Mayfield SP. Invited Talk. Michigan State University, Department of Biochemistry, January 24, 2013.
- Mayfield SP. Invited talk. San Diego Science and Engineering Festival, March 20, 2013.
- Mayfield SP. Invited Talk. Life Technologies, Carlsbad CA, February 19, 2013.
- Mayfield SP. Invited Talk. California oversight committee meeting on Salton Sea, February 22, 2013.
- Mayfield SP. Talk. “Green Algae for Bio-products Production.” FF21 Symposium, UCSD, La Jolla, CA. April 19-20, 2013.
- Rasala, B.A., Lee, P., Barrera, D., Haerizadeh, F., Peterson, T., Rosenberg, J., Oyler, G., Plucinak, T.M., Weeks, D., Mayfield, S. Poster. “Genetic tools for microalgal research and biotechnology.” FF21 Symposium, UCSD, La Jolla, CA. April 19-20, 2013.

Presentations

Task C. Genetic Tools (continued)

- Specht, E., Poster, “Genetic Manipulation of Chloroplast Gene Expression.” FF21 Symposium, UCSD, La Jolla, CA. April 19-20, 2013.
- Gimpel, J., Poster, “Analysis of Heterologous Regulatory and Coding Regions in Algal Chloroplasts.” FF21 Symposium, UCSD, La Jolla, CA. April 19-20, 2013.
- Georjina, D.R., Davis, I.W., Elich, T., Mayfield, S.P., Poster, “Development of Functional Synthetic Promoters for *C. reinhardtii*.” FF21 Symposium, UCSD, La Jolla, CA. April 19-20, 2013.
- Muff, T.J., Mayfield, S., Poster, “Transcriptional regulation in *Chlamydomonas reinhardtii*.” FF21 Symposium, UCSD, La Jolla, CA. April 19-20, 2013.
- Tran, M., Camargo, L., Poster. “Disulfide bond formation as a rate limiting step in the accumulation of complex recombinant proteins.” FF21 Symposium, UCSD, La Jolla, CA. April 19-20, 2013.
- Arnaud Taton, Ewa Lis, Dawn M. Adin, Guogang Dong, Scott Cookson, Federico Unglaub, Tyler Swinney, Edward King, Ron Cook, Nicole E. Wright, Steve A. Kay, Susan S. Golden & James W. Golden. Poster. “Development of *Leptolyngbya* sp. BL0902 as a new bioengineering platform and improved genetic tools for cyanobacteria.” FF21 Symposium, UCSD, La Jolla, CA. April 19-20, 2013.
- Emily Trentacoste, Jennifer R. Hull, Roshan Shrestha, Sarah R. Smith, Corine Glé, Aaron C. Hartmann, William H. Gerwick, Mark Hildebrand. Poster. “Metabolic Engineering of Lipid Catabolism Improves Lipid Yields from Microalgae.” FF21 Symposium, UCSD, La Jolla, CA. April 19-20, 2013.
- Oyler: Noel EA, Kobayashi N, Barnes AL, Watson A, Rosenberg JN, Erikson GE, Van Etten J, Oyler GA. Integrated algae growth on anaerobic digester effluent: phylogeny and lipid compositions of *Chlorella* spp., ABO Algae Biomass Summit (Denver, CO), September 24-27, 2012.
- Oyler GA. *Chlamy* Chloroplast Expression VHH Antibodies and Protein Delivery Domains and VHH Antibodies for Oral Therapeutics, ABO Algae Biomass Summit (Denver, CO), September 27, 2012.

Presentations

Task C. Genetic Tools (continued)

- Weeks DP. Developing Surface Nanobodies Specific to *Chlamydomonas reinhardtii*, ABO Algae Biomass Summit (Denver, CO), September 27, 2012.
- Rosenberg: Rosenberg JN, Wan M, Kobayashi N, Andlay G, Balasubramanian A, Betenbaugh MJ, Oyler GA. A comparative analysis of *Chlorella* species' heterotrophic growth characteristics and lipid composition, ABO Algae Biomass Summit (Denver, CO), Biology Breakout Session: Analysis and Modification of Lipid Production, September 27, 2012.
- Rosenberg JN, Wauchope AD, Jiang WZ, Kang M, Kobayashi N, Tremblay JM, Shoemaker CB, Weeks DP, Hildebrand M, Betenbaugh MJ, Mayfield SP, Oyler GA. Development of a single-chain antibody toolkit to interrogate and manipulate the microalgal cell, ABO Algae Biomass Summit (Denver, CO), September 24-27, 2012.
- D. P. Weeks, Talk. "Use of TAL Effector (TALEN) technology for development of rice resistant to bacterial blight". FF21 Symposium, UCSD, La Jolla, CA. April 20, 2013.
- G. A. Oyler, Talk. "A Vision for Integrated Algae Systems using *Chlorella*." FF21 Symposium, UCSD, La Jolla, CA. April 19-20, 2013.
- Dismukes: ACS National Meeting (Denver, CO, August 2011)
- Dismukes: NSF Algal Biofuels Workshop, <http://www.engr.colostate.edu/NSFalgaworkshop/index.html> (Arlington, VA; November, 2011);
- Kumaraswamy, G. Kenchappa. (2012). Metabolic engineering of *Synechococcus* sp. PCC 7002 for improved utilization of fixed carbon. Food and Fuel for 21st Century, May 11-13, La Jolla, CA.
- Algal Chloroplast Produced Camelid VHH Antitoxins are Capable of Neutralizing Botulinum Neurotoxin. Algae Biomass Organization Summit Meeting; Sept. 29-Oct 2nd, San Diego, CA. Poster Presentation. Barrera, D. (2014)
- Increase of Protein Accumulation in *Chlamydomonas reinhardtii* Chloroplasts: DsbA Protein. Algae Biomass Organization Summit Meeting; Sept. 29-Oct 2nd, San Diego, CA. Poster Presentation. Ferreira-Camargo, L. (2014)

Presentations

Task C. Genetic Tools *(continued)*

- Production of Recombinant Proteins in Microalgae at Pilot Greenhouse Scale. Algae Biomass Organization Summit Meeting; Sept. 29-Oct 2nd, San Diego, CA. Presentation. Gimpel, J. (2014)
- Panelist for “DOE Bioenergy Technologies, Office: Report from Project Performers”. Algae Biomass Organization Summit Meeting; Sept. 29-Oct 2nd, San Diego, CA. Mayfield, S. P. (2014)
- "Cyanobacterial synthetic biology, genetic tools, and production of renewable products, such as biofuels" Invited research seminar. Golden, J. California State University Fresno, Fresno, CA. April 2, 2014.
- "Cyanobacterial heterocyst development, nitrogen fixation, and biofuels" Invited research seminar. Golden, J. Reed College, Biology Department, Portland, OR. March 7, 2014.
- "Improved genetic tools for cyanobacteria" (Oral presentation). Golden, J. West Coast Bacterial Physiologist's Meeting, Asilomar Conference Grounds, Pacific Grove, California, Dec. 13-15, 2013.
- Algae expression of Nanobodies for Oral Enteric Theray (Oral Presentation). 2014 Food & Fuel for the 21st Century Symposium, UC San Diego, March 14-15, 2014. Oyler, George.
- Cyanobacterial Strains, Genetic Tools, and Crop Protection (Oral Presentation). 2014 Food & Fuel for the 21st Century Symposium, UC San Diego, March 14-15, 2014. Golden, Jim.
- The two sides of algae biofuels: building both molecular and political toolboxes (Oral Presentation). 2014 Food & Fuel for the 21st Century Symposium, UC San Diego, March 14-15, 2014. Trentacoste, Emily.
- Tools for algal nuclear engineering: homologous recombination (Oral Presentation). 2014 Food & Fuel for the 21st Century Symposium, UC San Diego, March 14-15, 2014. Specht, Liz.
- An Integrative Approach to Investigate the Regulation of Carbon Partitioning in the Marine Diatom *Thalassiosira pseudonana* (Poster Presentation). 2014 Food & Fuel for the 21st Century Symposium, UC San Diego, March 14-15, 2014. Abbriano, Raffaella; Smith, Sarah; Hildebrand, Mark.
- Algal chloroplast produced camelid VHH antitoxins are capable of neutralizing botulinum neurotoxin (Poster Presentation). 2014 Food & Fuel for the 21st Century Symposium, UC San Diego, March 14-15, 2014. Barrera, Daniel J.; Rosenberg, Julian N.; Chiu, Joanna G.; Chang, Yung-Nien; Debatis, Michelle; Ngoi, Soo-Mun; Chang, John T.; Shoemaker, Charles B.; Oyler, George A.; Mayfield, Stephen P.

Presentations

Task C. Genetic Tools *(continued)*

- Engineering biosynthesis of long-chain polyunsaturated fatty acids in cyanobacteria (Poster Presentation). 2014 Food & Fuel for the 21st Century Symposium, UC San Diego, March 14-15, 2014. Chen, You; Taton, Arnaud; Ma, Amy T.; Pieper, Lindsey; Allen, Eric E.; Golden Susan S.; Golden, James W.
- Chemical and biological strategies for protein accumulation in *Chlamydomonas reinhardtii* chloroplasts (Poster Presentation). 2014 Food & Fuel for the 21st Century Symposium, UC San Diego, March 14-15, 2014. Ferreira-Camargo, Livia; Tran, Miller; Tusakul, L.; Beld, Joris; Burkart, Michael; Mayfield, Stephen P.
- Development of Functional Synthetic Promoters for *C. reinhardtii* (Poster Presentation). 2014 Food & Fuel for the 21st Century Symposium, UC San Diego, March 14-15, 2014. Georgianna, D. Ryan; Muff Travis J.; Carruthers, David N.; Taylor, Bryn; Mayfield, Stephen P.
- Recombinant protein expression of M-SAA in *C. reinhardtii* chloroplast in a greenhouse facility (Poster Presentation). 2014 Food & Fuel for the 21st Century Symposium, UC San Diego, March 14-15, 2014. Hyun, James; Gimpel, Javier; Schoepp, Nathan; Mayfield, Stephen.
- Overexpression of DGAT2 gene increases accumulation of neutral lipids in the centric diatom *Thalassiosira pseudonana* (Poster Presentation). 2014 Food & Fuel for the 21st Century Symposium, UC San Diego, March 14-15, 2014. Manandhar-Shrestha, Kalpana and Hildebrand, Mark.
- Pacific Rim Summit on Industrial Biotechnology & Bioenergy. "Improved broad host range molecular tools for synthetic biology and biotechnology in cyanobacteria." Invited as a speaker for the Life Technologies' workshop entitled "Advances in Algal Synthetic Biology Technologies". Arnaud, T. San Diego, California, December 8-11, 2013.
- Cal-CAB Student and Postdoc Symposium Series. "Improved broad host range molecular tools for synthetic biology and biotechnology in cyanobacteria." Arnaud, T. La Jolla, California, November 15, 2013.
- "Improved genetic tools for cyanobacteria." Arnaud Taton, Amy Ma, You Chen, Federico Unglaub, Tyler Swinney, Edward King, Ron Cook, Nicole E. Wright, Susan S. Golden, and James W. Golden.

Presentations

Task C. Genetic Tools *(continued)*

- AT Ma and JW Golden. Riboswitch-Mediated Regulation of Gene Expression in Cyanobacteria. Annual meeting of the San Diego microbiology group. May 11, 2013. Poster
- Golden, J. Uppsala University, Uppsala, Sweden, September 25-27, 2013. Two presentations: "Broad host range tools for engineering cyanobacteria" and "Cyanobacterial synthetic biology, genetic tools, and production of renewable products". Invited research seminar and PhD Opponent.
- Golden, J. 11th Workshop on Cyanobacteria, St. Louis, MO, August 7-11, 2013. "Improved genetic tools for cyanobacteria". Poster presentation.
- Invited Speaker, M Hildebrand, AK Davis, K Manandhar-Shrestha, RM Abbriano, JE Polle, SR Smith, JC Traller, EM Trentacoste, R Roth, U Goodenough. The Third International Conference on Algal Biomass, Biofuels, and Bioproducts, "Metabolic and Cellular Organization in Evolutionarily Diverse Microalgae As Related to Biofuels Production" Toronto Canada, June 16- 19, 2013.
- EM Trentacoste, R Shrestha, SR Smith, C Gle, A Hartmann, M Hildebrand & WH Gerwick. The Third International Conference on Algal Biomass, Biofuels, and Bioproducts, "Increased lipid accumulation without compromising growth: Metabolic engineering of lipid catabolism in *Thalassiosira pseudonana*" Toronto Canada, June 16-19, 2013.
- J Traller, S Cokus, D Lopez, M Pellegrini, M Hildebrand. The Third International Conference on Algal Biomass, Biofuels, and Bioproducts. "Genome and Methylome Of A Candidate Biofuel Organism: How 'Omic' Data Can Inform Approaches To Improve Productivity", Toronto Canada, June 16-19, 2013.
- SR Smith, AE Allen, M Hildebrand. The Third International Conference on Algal Biomass, Biofuels, and Bioproducts. "A global regulatory mechanism integrates carbon and energy metabolism in the diatom *Thalassiosira pseudonana*." Toronto Canada, June 16-19, 2013.
- M Khasi, M Kang, KW Nickerson, G Oyler. Nuclear Encoded Expression of GFP in *Chlorella vulgaris* UTEX 259. American Society for Microbiology General Meeting (Denver, CO). May 18- 21, 2013.

Presentations

Task C. Genetic Tools *(continued)*

- Emily Trentacoste, R Shrestha, SR Smith, C Gle, A Hartmann, M Hildebrand & WH Gerwick. Increased Lipid Accumulation without Compromising Growth: Metabolic Engineering of Lipid Catabolism in *Thalassiosira pseudonana*. ABO Summit, Orlando, FL September 30 - October 3, 2013. Oral presentation.
- Sarah Smith, A Allen, M Hildebrand. A Global Regulatory Mechanism Integrates Carbon and Energy Metabolism in the Diatom *Thalassiosira pseudonana*. ABO Summit, Orlando, FL September 30 - October 3, 2013. Oral presentation.
- Mark Hildebrand. Improvement of Lipid Accumulation in Microalgae by Mutagenesis and Metabolic Engineering. ABO Summit, Orlando, FL September 30 - October 3, 2013. Oral presentation.
- Mark Hildebrand Improvement of Lipid Accumulation in Microalgae by Mutagenesis and Metabolic Engineering. ABO Summit, San Diego, CA September Invited speaker. September 29 – October 2, 2014