

Curriculum Vitae

Michael D. Burkart

Business Address

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Educational Background

**National Institutes of Health Postdoctoral Fellow in Chemical Biology,
Harvard Medical School, Boston, MA (1999-2002)**

Research Advisor: Professor Christopher T. Walsh

Ph.D. in Organic Chemistry, The Scripps Research Institute, La Jolla, CA (1994-1999)

Ph.D. Dissertation Title: "The Mechanistic Study and Synthetic Use of Carbohydrate Modifying Enzymes." Research Advisor: Prof. Chi-Huey Wong

B.A. in Chemistry, Rice University, Houston, TX (1990-1994)

Research Advisors: Prof. George J. Schroepfer and Prof. Kenton H. Whitmire

Professional Experience

University of California, San Diego, La Jolla, CA

Professor of Chemistry and Biochemistry (2012-present)

Associate Director, San Diego Center for Algae Biotechnology (2010- present)

Associate Professor of Chemistry and Biochemistry (2008-2012)

Assistant Professor of Chemistry and Biochemistry (2002-2008)

Harvard Medical School, Boston, MA

NIH Postdoctoral Fellow (1999-2002)

The Scripps Research Institute, La Jolla, CA

Graduate Researcher (1995-1999)

Rice University, Houston, TX

Undergraduate Research Assistant (1994-1995)

Instituto Nacional de Biodiversidad (INBio), San José, Costa Rica

Undergraduate Research Assistant (1993)

Rice University, Houston, TX

Undergraduate Research Assistant (1991-1993)

Research Interests

The Burkart laboratory in the Department of Chemistry and Biochemistry at the University of California, San Diego, pursues interdisciplinary research in the fields of bioorganic / synthetic organic chemistry and chemical biology.

Honors and Awards

UCSD Chancellor's Award for Excellence in Postdoctoral Scholar Mentoring (2018-2019)

Teddy Traylor Faculty Scholar, UCSD (2017-2022)

Fellow, American Association for the Advancement of Science (elected 2017)

Fellow, Royal Society of Chemistry Fellow (elected 2015)

NIH EUREKA Award (2010)

OBC Lecture Award (Royal Society of Chemistry) (2010)

Alfred P. Sloan Fellowship (2007)

American Cancer Society Research Scholar (2006)

Hellman Fellow (2004)

National Science Foundation CAREER Award (2004)
 New Scholar Award in Global Infectious Disease, Ellison Medical Foundation (2003)
 United States Presidential Green Chemistry Challenge Award (co-recipient) (2000)
 NIH Postdoctoral Fellowship (1997-2000)
 Bristol-Myers Squibb Graduate Fellowship (1998)
 Zevi & Bertha Salsburg Award for Excellence in Chemistry, Rice University (1994)

Other Experience and Professional Memberships

Co-Founder & SAB member, Algenesis Materials (Biotech Startup), 2016-present
 Study Member, Gaseous Carbon Waste Streams Utilization, National Academies of Sciences, 2018
 Chair, Gordon Research Conference, Bioorganic Chemistry, 2014
 Vice-Chair, Gordon Research Conference, Bioorganic Chemistry, 2013
 Permanent Member, NIH Study Section, Synthetic and Biological Chemistry B Study Section [SBCB] (2013-2019)
 Co-Founder, Pareto Biotechnology (Biotech Startup), 2013-2016
 Reviewer, Sustainable Energy for Academy of Finland and CONICYT (Chile) and CNPq (Brazil) (2012)
 Associate Editor, Current Protocols in Chemical Biology (2012-present)
 Councilor, American Chemical Society (2011-2012)
 Organizer, American Society of Pharmacognosy, San Diego, CA (2011)
 Organizer, Third International Conference on Cofactors, Turku, Finland, (2011)
 External Reviewer, Graduate Program Review, The Scripps Research Institute, Kellogg School of Graduate Studies, 2010, 2014.
 Invited Participant, US Department of Energy ARPA-E Workshop on Renewable Energy (2010)
 Co-founder and Board of Directors, California Center for Algal Biotechnology (SD-CAB) (2010-present)
 Scientific Advisory Board, NSF Engineering Research Center for Biorenewable Chemicals (CBirC) (2009-2010)
 Chair, Transatlantic Frontiers of Chemistry 2006, International Symposium. American Chemical Society (US), Royal Society of Chemistry (UK) and Gesellschaft Deutscher Chemiker (Germany) (2005-2006)
 Chair, Syncon 2005, Southern California Synthetic Chemistry Symposium (2005)
 Member, Society for Industrial Microbiology (2005-present)
 Co-founder and Organizer, La Jolla Natural Products Affinity Group (2004-present)
 Chair, American Chemical Society, National Convention, Organic Chemistry, New York, NY (2003)
 Invited Participant, National Research Council Workshop, Health and Medicine: Challenges for the Chemical Sciences in the 21st Century (2000)
 Member, American Chemical Society (2000-present)
 Member, Society for Industrial Microbiology (2006-present)
 Member, Royal Society of Chemistry (2012-present)
 UC Academic Senate (2002-present)

Publications (In reverse-chronological order)

188. Beall CM, Michaud JM, Fish MA, Dinasquet J, Cornwell GC, Stokes MD, Burkart MD, Hill TC, DeMott PJ, Prather KA. Cultivable, halotolerant ice nucleating bacteria and fungi in coastal precipitation. *Atmospheric Chemistry and Physics Discussions*. **2021** Jan 5:1-33.
187. Chan WC, La Clair JJ, León B, Trieger KA, Slagt MQ, Verhaar MT, Bachera DU, Rispens MT, Hofman RM, de Boer VL, van der Hulst R. Scalable Synthesis of 17S-FD-895 Expands the Structural Understanding of Splice Modulatory Activity. *Cell Reports Physical Science*. **2020** Dec 23;1(12):100277.
186. Hong K, Beld J, Davis TD, Burkart MD, Palenik B. Screening and characterization of polyhydroxyalkanoate granules, and phylogenetic analysis of polyhydroxyalkanoate synthase gene PhaC in cyanobacteria. *Journal of Phycology*. **2020** Dec 22.
185. Bemis TA, La Clair JJ, Burkart MD. Traceless Staudinger ligation enabled parallel synthesis of proteolysis targeting chimera linker variants. *Chemical Communications*. **2021**, ASAP.

184. Hu Z, Sun H, Thompson MP, Xiao M, Allen MC, Zhou X, Ni QZ, Wang Z, Li W, Burkart MD, Deheyn DD. Structurally Colored Inks from Synthetic Melanin-Based Crosslinked Supraparticles. *ACS Materials Letters*. **2020** Dec 8;3:50-5.
183. Battistella C, McCallum NC, Vanthournout B, Forman CJ, Ni QZ, La Clair JJ, Burkart MD, Shawkey MD, Gianneschi NC. Bioinspired Chemoenzymatic Route to Artificial Melanin for Hair Pigmentation. *Chemistry of Materials*. **2020** Oct 30;32(21):9201-10.
182. Misson LE, Mindrebo JT, Davis TD, Patel A, McCammon JA, Noel JP, Burkart MD. Interfacial plasticity facilitates high reaction rate of *E. coli* FAS malonyl-CoA:ACP transacylase, FabD. *Proc Natl Acad Sci U S A*. **2020**;202009805. doi:10.1073/pnas.2009805117. PMID: 32929027
181. Mindrebo JT, Misson LE, Johnson C, Noel JP, Burkart MD. Activity Mapping the Acyl Carrier Protein: Elongating Ketosynthase Interaction in Fatty Acid Biosynthesis. *Biochemistry*. **2020**, ASAP;10.1021/acs.biochem.0c00605. doi:10.1021/acs.biochem.0c00605. PMID: 32857494
180. Subramanian RH, Suzuki Y, Tallorin L, et al. Enzyme-Directed Functionalization of Designed, Two-Dimensional Protein Lattices. *Biochemistry*. **2020**, ASAP;10.1021/acs.biochem.0c00363. doi:10.1021/acs.biochem.0c00363. PMID: 32706243
179. Gunawan NR, Tessman M, Schreiman AC, Simkovsky R, Samoylov AA, Neelakantan NK, Bemis TA, Burkart MD, Pomeroy RS, Mayfield SP. Rapid biodegradation of renewable polyurethane foams with identification of associated microorganisms and decomposition products. *Biores. Tech. Rep.* **2020**, 11, 100513.
178. Xie Y, Krug KA, Cay KS, Kalaj M, McCallum NC, Siwicka ZE, Wang Z, Gianneschi NC, Burkart MD, Rinehart JD. Peroxidase-Like Reactivity at Iron-Chelation Sites in a Mesoporous Synthetic Melanin. *CCS Chemistry*. **2020** Sep 1:1483-90.
177. Cao W, McCallum NC, Ni QZ, et al. Selenomelanin: An Abiotic Selenium Analogue of Pheomelanin. *J Am Chem Soc*. **2020**, 142, 12802-12810. PMID: 32638590
176. Phung Hai TA, De Backer LJ, Cosford ND, Burkart MD. Preparation of mono- and diisocyanates in flow from renewable carboxylic acids. *Org. Proc. Res. Dev.* **2020**. ASAP May 29.
175. Phung Hai TA, Neelakantan N, Tessman N, Sherman SD, Griffin G, Pomeroy R, Mayfield SP, Burkart MD. Flexible polyurethanes, renewable fuels, and flavorings from a microalgae oil waste stream. *Green Chem.*, **2020**, 22, 3088-94.
175. Corpuz JC, Podust LM, Davis TD, Jaremko MJ, Burkart MD. Dynamic visualization of type II peptidyl carrier protein recognition in pyoluteorin biosynthesis. *RSC Chemical Biology*. **2020**, 1, 8-12.
174. Du D, Katsuyama Y, Horiuchi M, Fushinobu S, Chen A, Davis TD, Burkart MD, Ohnishi Y. Structural basis for selectivity in a highly reducing type II polyketide synthase. *Nat Chem Biol*. **2020**, 16, 776-782. PMID: 32367018
173. Mindrebo JT, Patel A, Kim WE, Davis TD, Chen A, Bartholow TG, La Clair JJ, McCammon JA, Noel JP, Burkart MD. Gating mechanism of elongating β -ketoacyl-ACP synthases. *Nat Commun*. **2020**, 11, 1727. PMID: 32265440
172. Jaremko MJ, Davis TD, Corpuz JC, Burkart MD. Type II non-ribosomal peptide synthetase proteins: structure, mechanism, and protein-protein interactions. *Nat Prod Rep*. **2020**, 37, 355-379. PMID: 31593192
171. Trieger KA, La Clair JJ, Burkart MD. Splice Modulation Synergizes Cell Cycle Inhibition. *ACS Chem Biol*. **2020**, 15, 669-674. PMID: 32004428
170. Vickery CR, McCulloch IP, Sonnenschein EC, Beld J, Noel JP, Burkart MD. Dissecting modular synthases through inhibition: A complementary chemical and genetic approach. *Bioorg Med Chem Lett*. **2020**, 30, 126820. PMID: 31812466
169. Charov K, Burkart MD. Quantifying protein-protein interactions of the acyl carrier protein with solvatochromic probes. *Methods Enzymol*. **2020**, 638, 321-340. PMID: 32416920
168. Pachiadaki MG, Brown JM, Brown J, Bezuidt O, Berube PM, Biller SJ, Poulton NJ, Burkart MD, La Clair JJ, Chisholm SW, Stepanauskas R. Charting the Complexity of the Marine Microbiome through Single-Cell Genomics. *Cell*. **2019**, 179, 1623-1635.e11. PMID: 31835036
167. Bajo M, Patel RR, Hedges DM, Varodayan FP, Vlkolinsky R, Davis TD, Burkart MD, Blednov YA, Roberto M. Role of MyD88 in IL-1 β and Ethanol Modulation of GABAergic Transmission in the Central Amygdala. *Brain Sci*. **2019**, 9, 361. PMID: 31817854
166. Dodge GJ, Patel A, Jaremko KL, McCammon JA, Smith JL, Burkart MD. Structural and dynamical rationale for fatty acid unsaturation in *Escherichia coli*. *Proc. Nat. Acad. Sci.* **2019**, 116, 6775-6783. PMID: 30872475

165. Re RN, Proessdorf JC, La Clair JJ, Subileau M, Burkart MD. Tailoring chemoenzymatic oxidation via in situ peracids. *Org Biomol Chem*. **2019**, *17*, 9418-9424. PMID: 31650153
164. Sztain T, Bartholow TG, McCammon JA, Burkart MD. Shifting the Hydrolysis Equilibrium of Substrate Loaded Acyl Carrier Proteins. *Biochemistry*. **2019**, *58*, 3557-3560. PMID: 31397556
163. Xie Y, Wang J, Wang J, Hu Z, Hariri A, Tu N, Krug KA, Burkart MD, Gianneschi NC, Jokerst JV, Rinehart JD. Tuning the ultrasonic and photoacoustic response of polydopamine-stabilized perfluorocarbon contrast agents. *J Mater Chem B*. **2019**, *7*, 4833-4842. PMID: 31389967
162. Callmann CE, LeGuyader CLM, Burton ST, Thompson MP, Hennis R, Barback C, Henriksen NM, Chan WC, Jaremko MJ, Yang J, Garcia A, Burkart MD, Gilson MK, Momper JD, Bertin PA, Gianneschi NC. Antitumor Activity of 1,18-Octadecanedioic Acid-Paclitaxel Complexed with Human Serum Albumin. *J Am Chem Soc*. **2019**, *141*, 11765-11769. PMID: 31317744
161. Burkart MD, Hazari N, Tway CL, Zeitler EL. Opportunities and Challenges for Catalysis in Carbon Dioxide Utilization. *ACS Catalysis*. **2019**, *9*, 7937-56.
160. Charov K, Burkart MD. A Single Tool to Monitor Multiple Protein-Protein Interactions of the Escherichia coli Acyl Carrier Protein. *ACS Infect Dis*. **2019**, *5*, 1518-1523. PMID: 31317739
159. Milligan JC, Lee DJ, Jackson DR, Schaub AJ, Beld J, Barajas JF, Hale JJ, Luo R, Burkart MD, Tsai SC. Molecular basis for interactions between an acyl carrier protein and a ketosynthase. *Nature Chem. Biol*. **2019**, *15*, 669-671. PMID: 31209348.
158. Davis TD, Michaud JM, Burkart MD. Active site labeling of fatty acid and polyketide acyl-carrier protein transacylases. *Org Biomol Chem*. **2019**, *17*, 4720-4724. PMID: 31044196
157. Sztain T, Patel A, Lee DJ, Davis T, McCammon JA, Burkart MD. One atom matters: modifying the thioester linkage affects structure of the acyl carrier protein. *Angew Chem Int Ed Engl*. **2019**, *58*, 10888-10892. PMID: 31140212
156. Kim WE, Patel A, Hur GH, Tufar P, Wuo MG, McCammon JA, Burkart MD. Mechanistic Probes for the Epimerization Domain of Nonribosomal Peptide Synthetases. *ChemBiochem*. **2019**. 20(2):147-52. PMID: 30194895
155. Tallorin L, Wang J, Kim WE, Sahu S, Kosa NM, Yang P, Thompson M, Gilson MK, Frazier PI, Burkart MD, Gianneschi NC. Discovering de novo peptide substrates for enzymes using machine learning. *Nat Commun*. **2018**, *9*(1), 5253. PMID: 30531862
154. Chan WC, León B, Krug KA, Patel A, La Clair JJ, Burkart MD. Daedal Facets of Splice Modulator Optimization. *ACS Med Chem Lett*. **2018**, *9*(11), 1070-1072. PMID: 30429946
153. Konno S, La Clair J, Burkart MD. Trapping the complex molecular machinery of polyketide and fatty acid synthases with tunable silyl-cyanohydrin crosslinkers. *Angew Chem Int Ed Engl*. **2018**, *57*, 17009-17013. PMID: 30379389
152. Chen A, Re RN, Burkart MD. Type II fatty acid and polyketide synthases: deciphering protein-protein and protein-substrate interactions. *Nat Prod Rep*. **2018**, *35*(10), 1029-1045. PMID: 30046786
151. Roulet J, Taton A, Golden JW, Arabolaza A, Burkart MD, Gramajo H. Development of a cyanobacterial heterologous polyketide production platform. *Metab Eng*. **2018**, *49*, 94-104. PMID: 30036678
150. Michaud JM, Thompson LR, Kaul D, Espinoza JL, Richter RA, Xu ZZ, Lee C, Pham KM, Beall CM, Malfatti F, Azam F, Knight R, Burkart MD, Dupont CL, Prather KA. Taxon-specific aerosolization of bacteria and viruses in an experimental ocean-atmosphere mesocosm. *Nat Commun*. **2018**, *9*(1), 2017. PMID: 29789621
149. Davis TD, Kunakom S, Burkart MD, Eustaquio AS. Preparation, Assay, and Application of Chlorinase SalL for the Chemoenzymatic Synthesis of S-Adenosyl-I-Methionine and Analogs. *Methods Enzymol*. **2018**, *604*, 367-388.
148. Sarria S, Bartholow TG, Verga A, Burkart MD, Peralta-Yahya P. Matching Protein Interfaces for Improved Medium-Chain Fatty Acid Production. *ACS Synth Biol*. **2018**, *7*, 1179-1187.
147. Vickery CR, Cardenas J, Bowman ME, Burkart MD, Da Silva NA, Noel JP. A coupled in vitro/in vivo approach for engineering a heterologous type III PKS to enhance polyketide biosynthesis in *Saccharomyces cerevisiae*. *Biotechnol Bioeng*. **2018**, *115*, 1394-1402.
146. Jaremko MJ, Lee DJ, Patel A, Winslow V, Opella SJ, McCammon JA, Burkart MD. Manipulating protein-protein interactions in NRPS type II PCPs. *Biochemistry*. **2017**, *56*, 5269-5273.
145. Szyjka SJ, Mandal S, Schoepp NG, Tyler BM, Yohn CB, Poon YS, Villareal S, Burkart MD, Shurin JB, Mayfield SP. Evaluation of phenotype stability and ecological risk of a genetically engineered alga in open pond production. *Algal Research*. **2017**, *24*, 378-86.

144. Barajas JF, Shakya G, Moreno G, Rivera H, Jackson DR, Topper CL, Vagstad AL, La Clair JJ, Townsend CA, Burkart MD, Tsai SC. Polyketide mimetics yield structural and mechanistic insights into product template domain function in nonreducing polyketide synthases. *Proc. Nat. Acad. Sci.* **2017**, 114, E4142-E4148. PMID: 28484029
143. Finzel K, Beld J, Burkart MD, Charkoudian LK. Utilizing Mechanistic Cross-Linking Technology To Study Protein-Protein Interactions: An Experiment Designed for an Undergraduate Biochemistry Lab. *Journal of Chemical Education.* **2017**, 94, 375-9.
142. Leon B, Kashyap M, Chan W, Krug K, Castro J, La Clair J, Burkart MD. A Challenging Pie to Splice: Drugging the Spliceosome. *Angew Chem Int Ed Engl.* **2017**, 56, 12052-12063. PMID: 28371109
141. Shurin JB, Burkart MD, Mayfield SP, Smith VH. Recent progress and future challenges in algal biofuel production. *F1000Res.* **2016**, 5, 2434. PMID: 27781084
140. Uranga CC, Beld J, Mrse A, Córdova-Guerrero I, Burkart MD, Hernández-Martínez R. Data from mass spectrometry, NMR spectra, GC-MS of fatty acid esters produced by *Lasiodiplodia theobromae*. *Data Brief.* **2016**, 8, 31-39. PMID: 27274528
139. Finzel K, Burkart MD. Traffic Control in Modular Polyketide Synthases. *ACS Cent Sci.* **2016**, 2, 9-11. PMID: 27163020
138. Crews LA, Balaian L, Delos Santos NP, Leu HS, Court AC, Lazzari E, Sadarangani A, Zipeto MA, La Clair JJ, Villa R, Kulidjian A, Storb R, Morris SR, Ball ED, Burkart MD, Jamieson CH. RNA Splicing Modulation Selectively Impairs Leukemia Stem Cell Maintenance in Secondary Human AML. *Cell Stem Cell.* **2016**, S1934-5909(16)30250-8. PMID: 27570067
137. Mindrebo JT, Nartey CM, Seto Y, Burkart MD, Noel JP. Unveiling the functional diversity of the alpha/beta hydrolase superfamily in the plant kingdom. *Curr Opin Struct Biol.* **2016**, 41, 233-246. PMID: 27662376
136. Barajas JF, Finzel K, Valentic TR, Shakya G, Gamarra N, Martinez D, Meier JL, Vagstad AL, Newman AG, Townsend CA, Burkart MD, Tsai SC. Structural and Biochemical Analysis of Protein-Protein Interactions Between the Acyl-Carrier Protein and Product Template Domain. *Angew Chem Int Ed Engl.* **2016**, 55, 13005-13009. PMID: 27653519
135. Kumar D, Kashyap MK, La Clair JJ, Villa R, Spaanderman I, Chien S, Rassenti LZ, Kipps TJ, Burkart MD, Castro JE. Selectivity in Small Molecule Splicing Modulation. *ACS Chem Biol.* **2016**, 11, 2716-2723. PMID: 27499047
134. McCulloch I, Jaremko M, La Clair J, Burkart MD. Fluorescent mechanism-based probes for aerobic flavin-dependent enzyme activity. *Chembiochem.* **2016**, 17, 1598-601. PMID: 27271974
133. Foley TL, Dorjsuren D, Dexheimer TS, Burkart MD, Wight WC, Simeonov A. A Platform to Enable the Pharmacological Profiling of Small Molecules in Gel-Based Electrophoretic Mobility Shift Assays. *J Biomol Screen.* **2016**, 1087057116652895. PMID: 27269812
132. Vranken C, Fin A, Tufar P, Hofkens J, Burkart MD, Tor Y. Chemoenzymatic synthesis and utilization of a SAM analog with an isomorphous nucleobase. *Org Biomol Chem.* **2016**, 14, 6189-92. PMID: 27270873
131. Rivera H Jr, Dhar S, La Clair JJ, Tsai SC, Burkart MD. An unusual intramolecular *trans*-amidation. *Tetrahedron.* **2016**, 72, 3605-3608. PMID: 27346894
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129. Dhar S, La Clair JJ, León B, Hammons JC, Yu Z, Kashyap MK, Castro JE, Burkart MD. A Carbohydrate-Derived Splice Modulator. *J Am Chem Soc.* **2016**, 138, 5063-8. PMID: 27058259
128. Uranga CC, Beld J, Mrse A, Córdova-Guerrero I, Burkart MD, Hernández-Martínez R. Fatty acid esters produced by *Lasiodiplodia theobromae* function as growth regulators in tobacco seedlings. *Biochem Biophys Res Commun.* **2016**, 472, 339-45. PMID: 26926564
127. Tallorin L, Finzel K, Nguyen Q, Beld J, La Clair JJ, Burkart MD. Trapping of the Enoyl-Acyl Carrier Protein Reductase • Acyl Carrier Protein Interaction. *J Am Chem Soc.* **2016**, 138, 3962-5. PMID: 26938266
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- Aerosol Structure and Composition Using Cryogenic Transmission Electron Microscopy. *ACS Cent Sci.* **2016**, *2*, 40-47. PMID: 26878061
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123. Moynié L, Hope AG, Finzel K, Schmidberger J, Leckie SM, Schneider G, Burkart MD, Smith AD, Gray DW, Naismith JH. A Substrate Mimic Allows High-Throughput Assay of the FabA Protein and Consequently the Identification of a Novel Inhibitor of *Pseudomonas aeruginosa* FabA. *J Mol Biol.* **2016**, *428*, 108-120. PMID: 26562505
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118. Jaremko MJ, Lee DJ, Opella SJ, Burkart MD. Structure and Substrate Sequestration in the Pyoluteorin Type II Peptidyl Carrier Protein PtlL. *J Am Chem Soc.* **2015**, *137*, 11546-11549. PMID: 26340431
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118. Schoepp NG, Wong W, Mayfield SP, Burkart MD. Bulk solvent extraction of biomass slurries using a lipid trap. *RSC Advances*, **2015**, *5*, 57038-57044.
117. Ferreira-Camargo LS, Tran M, Beld J, Burkart MD, Mayfield SP. Selenocystamine improves protein accumulation in chloroplasts of eukaryotic green algae. *AMB Express.* **2015**, *5*, 126. PMID: 26137911
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115. Finzel K, Lee DJ, Burkart MD. Using modern tools to probe the structure-function relationship of Fatty Acid synthases. *Chembiochem.* **2015**, *16*, 528-47. PMID: 25676190
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110. Beld J, Cang H, Burkart MD. Visualizing the Chain-Flipping Mechanism in Fatty-Acid Biosynthesis. *Angew Chem Int Ed Engl.* **2014**, *53*, 14456-61. PMID: 25354391
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107. Beld J, Finzel K, Burkart MD. Versatility of acyl-acyl carrier protein synthetases. *Chem Biol.* **2014**, *21*, 1293-1299. PMID: 25308274
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