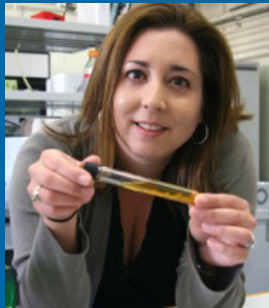




FACULTY OF
THE CENTER FOR
BIOENGINEERING

CBEPeople



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Systems Biology and Green Energy

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University of California,
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EDUCATION

University of Delaware
Ph.D. Chemical Engineering (2009)

Carnegie Mellon University
B.S. Chemical Engineering; B.S.
Biomedical Engineering (2004)

HONORS AND AWARDS

Presidential Early Career Award for
Scientists and Engineers (PECASE,
2016)

Alan P. Colburn Memorial Lecturer,
University of Delaware (2016)

NSF Career Award, Division of
Molecular and Cellular Biosciences
(2016)

MIT Technology Review Top 35
Innovators Under 35 (2015)

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RESEARCH OVERVIEW

The O'Malley group aspires to solve grand challenges in sustainability and medicine by deciphering how “unwieldy” microbes in the environment perform extraordinary tasks. We focus on anaerobic microbes, which have evolved to work together in complex communities that decompose and recycle carbon biomass throughout the Earth – from our guts to landfills and compost piles. Compared to microbes that thrive in the presence of oxygen, anaerobes are woefully understudied; they represent a vast, untapped resource for novel enzymes that degrade woody biomass into sugars, as well as natural products that could find use as new drugs. Despite their importance, little information exists to parse the role of each microbial member within their dynamic community. In particular, their metabolic “connection points” are vague, their secreted products are uncharacterized, and the enzyme machinery that they use to extract sugars from crude biomass is elusive. By understanding these natural systems, engineers can build new technologies that extract sugar from renewable plant biomass for conversion into commodity chemicals – an exciting alternative to producing chemicals from petroleum feedstocks. Similarly, an understanding of how anaerobic microbes “defend themselves” from neighbors could translate into new antimicrobial compounds for therapeutic use.

Group Website: <http://omalleylab.weebly.com>



HONORS AND AWARDS

Cottage Health – UCSB
Special Research Award
(2015)

TechConnect Innovation
Award (2014)

Hellman Faculty Fellowship
(2014)

US Dept of Energy (DOE)
Early Career Award (2013)

U.S. Department of Agriculture
(USDA) NIFA Postdoctoral
Fellowship (2011)

Marion and Jasper Whiting
Foundation Fellowship (2011)

University of Delaware Dept.
of Chemical Engineering
Teaching Fellowship (2007)

NASA-Harriet G. Jenkins
Predoctoral Fellowship (2006)

Undergraduate Research
(2003)

Selected Publications

1. K. V. Solomon, C. H. Haitjema, J. K. Henske, S. P. Gilmore, D. Borges-Rivera, A. Lipzen, H. M. Brewer, S. O. Purvine, A. T. Wright, M. K. Theodorou, I. Grigoriev, A. Regev, D. A. Thompson, M. A. O'Malley, "Early-branching gut fungi possess a large, comprehensive array of biomass-degrading enzymes," **Science**, 351: 1192-1195 (2016). Highlighted ahead of print as a First Release; featured in BBC News, Newsweek, CNBC News, Forbes, and radio interview on the BBC Newshour
2. J. L. Guerrero, M. A. O'Malley, P. S. Daugherty, "Intracellular FRET-based screen for redesigning the specificity of secreted proteases," **ACS-Chemical Biology**, In press. DOI: 10.1021/acscchembio.5b01051
3. K. V. Solomon, J. K. Henske, M. K. Theodorou, M. A. O'Malley, "Robust and effective methodologies for cryopreservation and DNA extraction for anaerobic gut fungi," **Anaerobe**, 38: 39-46 (2016).
4. S. P. Gilmore, J. K. Henske, M. A. O'Malley, "Driving biomass breakdown through engineered cellulosomes," **Bioengineered**, 6: 4, 204-208 (2015).
5. N. S. Schonenbach, S. Hussain, M. A. O'Malley, "Structure and function of G-protein coupled receptor oligomers: implications for drug discovery," **WIREs: Nanomedicine and Nanobiotechnology**, 7: 408-427 (2015).
6. C. Haitjema, K. V. Solomon, J. K. Henske, M. K. Theodorou, M. A. O'Malley, "Anaerobic gut fungi: advances in isolation, culture, and cellulolytic enzyme discovery for biofuel production," **Biotechnology and Bioengineering**, 111(8): 1471-1482 (2014).
7. K. V. Solomon, C. H. Haitjema, D. A. Thompson, M. A. O'Malley, "Extracting data from the muck: deriving biological insight from complex microbial communities and non-model organisms with next-generation sequencing," **Current Opinions in Biotechnology**, 28: 103-110 (2014).
8. M. A. O'Malley, M. K. Theodorou, C. A. Kaiser, "Evaluating expression and catalytic activity of anaerobic fungal fibrolytic enzymes native to *Piromyces* sp E2 in *Saccharomyces cerevisiae*," **Environmental Progress and Sustainable Energy**, 31(1): 37-46 (2012).
9. M. A. O'Malley. "Neuromethods, Vol. 60: Methods for the Discovery and Characterization of G Protein- Coupled Receptors, edited by Craig W. Stevens", **ChemBioChem**, 13(6): 905-906 (2012).
10. M. A. O'Malley, M. E. Helgeson, N. J. Wagner, A. S. Robinson, "Toward rational design of protein detergent complexes: determinants of mixed micelles that are critical for the in vitro stabilization of a G-protein coupled receptor," **Biophysical Journal**, 101(8): 1938-1948