

Andrew C Tolonen

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PROFESSIONAL EXPERIENCE

- Associate Director, Microbiomes and Immunity (2017-present) Broad Institute of MIT and Harvard (Cambridge MA, USA)
 - Associate Professor, Group Leader (2012-2016) Genoscope et l'Université Paris-Saclay (France)
 - Research Fellow (2007-2011) Harvard Medical School/Wyss Institute (Boston MA, USA), Dr George Church lab <http://arep.med.harvard.edu>
 - Chateaubriand fellow (2006) Institut Pasteur (Paris, France). Dr Nicole Tandeau de Marsac lab
 - PhD student (2000-2005) Massachusetts Institute of Technology (Cambridge MA, USA), Dr Sallie Chisholm lab <http://chisholmlab.mit.edu/>
 - Undergraduate (1994-1998) Dartmouth College (Hanover NH, USA), BA high honors in biology
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FELLOWSHIPS

2012-2016 CNRS Chair of Excellence
2008-2010 Sponsored Research Award (SBIR), Qteros Inc
2006 Chateaubriand Fellow, Ambassade de France
2003-2005 NSF Graduate Fellow
2001-2002 Merck Fellow in Biological Informatics
2000 MIT Parsons Fellow
1996-1997 NSF REU Fellowship, Dartmouth College

RESEARCH SUMMARY

My research aims to understand the molecular mechanisms by which microbes (bacteria, fungi, viruses) interact with and modify their environment. In particular, I am interested in how anaerobic microbes transform plant biomass (especially dietary fiber) into value-added chemicals and molecules that influence host immunity. To this end, I develop high-throughput screening and genome engineering technologies to study the physiology of gut microbes and create strains with improved phenotypes.

PUBLICATIONS

Google Scholar <https://scholar.google.fr/citations?user=fvS99CoAAAAJ&hl=en>

Hall AB, **Tolonen AC**, Xavier RJ (2017) Human genetic variation and the gut microbiome in disease. *Nat Rev Genet.* (11):690-699. doi: 10.1038/nrg.2017.63.

Tolonen AC, Xavier RJ (2017). Dissecting the human microbiome with single-cell genomics. *Genome Med.* 9(1):56. doi: 10.1186/s13073-017-0448-7

Cerisy T, Souterre T, Torres-Romero I, Boutard M, Dubois I, Patrouix J, Labadie K, Berrabah W, Salanoubat M, Doring V, **Tolonen AC**. (2017). Evolution of a biomass-fermenting bacterium to resist

lignin phenolics. *Appl Environ Microbiol.* 83(11). pii: e00289-17. doi: 10.1128/AEM.00289-17

Boutard M, Ettwiller L, Cerisy T, Alberti A, Labadie K, Salanoubat M, Schildkraut I, **Tolonen AC** (2016) Global repositioning of transcription start sites in a plant-fermenting bacterium. *Nature Communications* Dec 16;7:13783. doi: 10.1038/ncomms13783.

Tolonen AC, Cerisy T, El-Sayyed H, Boutard M, Salanoubat M, Church GM. (2015). Fungal lysis by a soil bacterium fermenting cellulose. *Environmental Microbiology.* 2015 17(8):2618-27.

Tolonen AC, Zuroff TR, Ramya M, Boutard M, Cerisy T, Curtis WR (2015). Physiology, genomics, and pathway engineering of an ethanol-tolerant strain of *Clostridium phytofermentans*. *Appl Environ Microbiol.* 81(16):5440-8. doi: 10.1128/AEM.00619-15.

Petit E, Coppi MV, Hayes JC, **Tolonen AC**, Warnick T, Latouf WG, Amisano D, Biddle A, Mukherjee S, Ivanova N, Lykidis A, Land M, Hauser L, Kyrpides N, Henrissat B, Lau J, Schnell D, Church GM, Leschine SB, Blanchard JL. (2015). Genome and transcriptome of *Clostridium phytofermentans*, catalyst for the direct conversion of plant feedstocks to fuels. *PLOS One* Jun 2;10(6):e0118285. doi: 10.1371/journal.pone.0118285

Boutard M, Cerisy T, Nogue PY, Alberti A, Weissenbach J, Salanoubat M, **Tolonen AC**. (2014). Functional diversity of carbohydrate-active enzymes enabling a bacterium to ferment plant biomass. *PLOS Genetics* DOI: 10.1371/journal.pgen.1004773.

Tolonen AC and Haas W (2014). Quantitative proteomics using reductive dimethyl stable isotope labeling. *Journal of Visualized Experiments.* (Issue 89. DOI: 10.3791/51416).

Tolonen AC, Petit E, Blanchard JL, Warnick T, Leschine SB. (2013). Technologies to study plant biomass fermentation using the model bacterium *Clostridium phytofermentans*. *Royal Society of Chemistry.* Energy and Environment Series 10. DOI:10.1039/9781849734738-00114

Isaacs FJ, Carr PA, Wang HH, Lajoie MJ, Sterling B, Kraal L, **Tolonen AC**, Gianoulis TA, Goodman DB, Reppas NB, Emig CJ, Bang D, Hwang SJ, Jewett MC, Jacobson JM, Church GM. (2011) Precise manipulation of chromosomes in vivo enables genome-wide codon replacement. *Science* 333 (6040):348-53.

Tolonen AC, Haas W, Chilaka AC, Aach J, Gygi S, Church GM (2011). Proteome-wide systems analysis of a cellulosic biofuel-producing microbe. *Molecular Systems Biology* 7:461 DOI 10.1038/msb.2010.116.

*Our paper was in the top 10 *MSB* articles in 2011:

<http://blogs.nature.com/sevenstones/2012/01/2011-top-accessed-articles.html>

Tolonen AC, Chilaka AC, Church GM. (2009). Targeted gene inactivation in *Clostridium phytofermentans* shows that cellulose degradation requires the family 9 hydrolase Cphy3367. *Molecular Microbiology* 74(6):1300-13

*Review of our study: Wilson DB (2009) The first evidence that a single cellulase can be essential for cellulose degradation in a cellulolytic microorganism

Molecular Microbiology 74(6): 1287-8

Frangeul L, Quillardet P, Castets AM, Humbert JF, Matthijs HC, Cortez D, **Tolonen A**, Zhang CC, Gribaldo S, Kehr JC, Zilliges Y, Ziemert N, Becker S, Talla E, Latifi A, Billault A, Lepelletier A, Dittmann E, Bouchier C, de Marsac NT. (2008). Highly plastic genome of *Microcystis aeruginosa* PCC 7806, a ubiquitous toxic freshwater cyanobacterium. *BMC Genomics* 9:274

Tolonen AC, Liszt GB, Hess WR. (2006). Genetic manipulation of *Prochlorococcus* MIT 9313: GFP

expression in an RSF1010 plasmid and Tn5 transposition. *Applied and Environmental Microbiology*. 72(12): 7607-13.

Tolonen AC, Aach J, Lindell D, Johnson ZI, Rector T, Steen R, Church GM, Chisholm SW. (2006). Global gene expression of *Prochlorococcus* ecotypes in response to changes in nitrogen availability. 2006. *Molecular Systems Biology* (Oct 2006 doi:10.1038).

Tolonen AC. (2005). *Prochlorococcus* genetic transformation and the genomics of nitrogen metabolism. PhD Thesis MIT, Cambridge MA.

Lindell D, Sullivan MB, Johnson ZI, **Tolonen AC**, Rohwer F, and Chisholm SW. (2004). Transfer of photosynthetic genes to and from *Prochlorococcus* viruses. *Proceedings of the National Academy of Sciences, USA*. (101): 11013-11018.

Rocap G, Larimer FW, Lamerdin J, Malfatti S, Chain P, Ahlgren NA, Arellano A, Coleman M, Hauser L, Hess WR, Johnson ZI, Land M, Lindell D, Post AF, Regala W, Shah M, Shaw SL, Steglich C, Sullivan MB, Ting CS, **Tolonen A**, Webb EA, Zinser ER, Chisholm SW. (2003). Genome divergence in two *Prochlorococcus* ecotypes reflects oceanic niche differentiation. *Nature* 424 (6952): 1042-1047.

Lee SS, Kennedy S, **Tolonen AC**, Ruvkun G. (2003). DAF-16 target genes that control *C. elegans* life-span and metabolism. *Science* 300 (5619): 644-647.

Tolonen, AC, Albeanu DF, Corbett JF, Handley H, Henson C, Malik P. (2002). Optimized *in situ* construction of oligomers on an array surface. *Nucleic Acids Research* 30 (20): e107.

CLASSROOM AND LABORATORY MENTORING

Trainees at the Université Paris-Saclay William Rostain (Postdoc), Tristan Cerisy (PhD), Chloé Baum (PhD), Alba Iglesias (M2), Ismael Torres-Romero (M2), Emiel van der Kouwe (M2), Hafez El Sayyed (M2), Audam Chhun (M1), Pierre-Yves Nogue (M1), Manon Huz (M1)

Teaching at the Université Paris-Saclay

Microbiology and systems/synthetic biology <http://www.tolonenlab.org/Presentations/index.html>

iGEM (International Genetically Engineered Machines Competition). Co-founder and Supervisor of the Évry- l'Université Paris-Saclay team

- 2014 "Sponge Patrol" Bronze medal at the MIT world championships: <http://2014.igem.org/Team:Evry>
- 2013 "Iron coli" Gold medal, Grand Prize ('Best Practices') at European Championships, qualified for the world championships at MIT: <http://2013.igem.org/Team:Evry>
- 2012 "The French Froggies Project" Gold medal, 2 Grand Prizes ('Best model' and 'Best Practices') at European Championships, qualified for the world championships at MIT: <http://2012.igem.org/Team:Evry>

PERSONAL INTERESTS

- Endurance cycling: member of Audax Club Parisien and Randonneurs USA, Super Randonneur, Paris-Brest-Paris in 2007 and 2015 <https://rusa.org>
- Mixit Print Studio (Treasurer) <https://www.mixitprint.com>
- MIT Hobby Shop <https://studentlife.mit.edu/hobbyshop>