Thomas Mitchell Schmidt, Ph.D.

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Education and Training

1974 – 1978	B.S., Biology/Chemistry, University of Michigan; Ann Arbor, MI
1979 – 1981	M.S., Environmental Biology, Ohio State University; Columbus, OH
1981 – 1985	Ph.D., Microbiology, Ohio State University; Columbus, OH
1985 – 1987	Post-doctoral researcher, Scripps Institute of Oceanography; San Diego, CA
1987 – 1990	Post-doctoral fellow, Indiana University; Bloomington, IN

Academic Appointments

1990 – 1992	Assistant Professor, Miami University; Oxford, OH
1992 – 1999	Assistant Professor, Michigan State University; East Lansing, MI
1999 – 2002	Associate Professor, Michigan State University; East Lansing, MI
2002 – 2012	Professor, Michigan State University; East Lansing, MI
2014 – present	Professor, University of Michigan, Ann Arbor, MI

Research Interests

- Dynamics and management of host-associated microbial communities
- Relationships between genome evolution and microbial life histories
- Microbial metabolism and competition in low-oxygen environments

Honors and Awards

1999	Teacher-Scholar Award, College of Natural Sciences, Michigan State University
1999	Article (Relman, Schmidt et al. NEJM 1990, 323:1573) selected by the American Society for Microbiology as a "significant event in the history of microbiology"
2000	University-Wide Teacher-Scholar Award, Michigan State University
2000	Elected Chair, Division of Evolutionary & Genomic Microbiology, ASM
2002	Elected to the American Academy of Microbiology
2003	Selected as Director, MBL Microbial Diversity Course, Woods Hole, MA
2008	Distinguished Alumni Lecturer, Marine Biological Laboratory
2010	Graduate Teaching Award Laureate, American Society for Microbiology
2015	Elected Chair, Division of General Microbiology, ASM
2018	Selected for Norman R. Pace Annual Lecture in Microbiology

Memberships in Professional Societies

American Society for Microbiology
Ecological Society of America
International Society for Microbial Ecology
Sigma Xi
Society for Applied Microbiology

Editorial Positions, Boards, and Peer-Review Service

Senior Editor

The ISME Journal 2015 – 2019

Editorial Board Member

Environmental Microbiology 1999 – present
Annual Reviews of Microbiology 2012 - 2016
Microbiome 2012 – 2015

Administration and Advisory Boards (recent, selected)

Co-Director, Host Microbiome Initiative, University of Michigan, 2017 – present
University of Michigan Senate Assembly, 2015 - present
Scientific Advisory Board, Department of Energy "ENIGMA: Ecosystems and Networks Integrated with Genes and Molecular Assemblies" 2015 – current
Scientific Advisory Board, Sexually Transmitted Infections Cooperative Research Center, University of Washington, 2016- current
American Academy for Microbiology, Committee on Awards, 2010 – 2018
Scientific Advisory Board, Max Planck Institute for Terrestrial Microbiology 2012 – 2018
Biosciences Initiative Coordinating Committee, Univ. Michigan 2017-2018
President's Advisory Panel on the Biosciences, Univ. Michigan, 2015-2016
ASM General Meeting Planning Committee, 2011 – 2016
Scientific Advisory Board, Genome Canada Environmental Genomics Project, 2011 – 2015
Michigan BioTrust Scientific Advisory Board Members, 2010 – 2015
Co-Convener of 2 sessions at the ASM Meeting, 2014
Faculty Panelist, MSTEM Academies, 2014

Recent NIH Grant Peer-Review Panels

National Health, Lung, and Blood Institute; Extramural Research Program, September 2018
Discovery and Biological Signatures of Diet-Derived Microbial Metabolites (R01), July 2018
NIH Director's Early Independence Award (DP5), February 2018
Clinical Research and Field Studies of Infectious Diseases Study Section, Oct. 2017, March 2017, June 2015, and Oct. 2014
Special Emphasis Panel: Topics in bacterial pathogenesis and host interactions, March 2015.
Nutrigenetics and Nutrigenomics Approaches for Nutrition Research, July 2014

Graduate students	**Degree/Awards**	**Current Position**
Paul Lepp	Ph.D. 1997	Associate Professor, Minot State University
Joel Hashimoto	M.S. 2000	Research Associate, Oregon Health and Sciences
Daniel Buckley	Ph.D. 2000	Associate Professor, Cornell University
Bradley Stevenson	Ph.D. 2000	Associate Professor, Oklahoma State University
Joel Klappenbach	Ph.D. 2001	Director of Applied Genomics, Merck
Les Dethlefsen	Ph.D. 2004	Staff Scientist, Stanford University
Kristin Huizinga	Ph.D. 2006	Research Scientist, Monsanto
Stephanie Eichorst	Ph.D. 2007	Research Scientist, University of Vienna
Dana Gerken	M.S. 2009	Laboratory Technician, Auburn University
Uri Levine	Ph.D. 2009	Scientist, Novozymes
Zarraz May-Ping Lee	Ph.D. 2011	Research Fellow, Nanyang Environmental and Water Research Institute, Singapore

Keara Towery	M.S. 2012	Research Technician, MSU
Benjamin Roller	Ph.D. 2015	Postdoctoral fellow, ETH Zurich
Colleen Brand	M.S. 2016	Research Technician, Baylor Univ.
Brendan O'Neill	Ph.D. 2017	Postdoctoral fellow, Michigan State Univ.
Bradley Pingel	M.S. 2017	Doctoral student, Baylor Univ.
Byron Smith	Ph.D. 2018	Ph.D. candidate, Ecology & Evolutionary Biology
Austin Campbell	current	Ph.D. candidate, Microbiology & Immunology

I have served as a committee member for over 50 graduate students from the following departments: Microbiology and Immunology, Civil and Environmental Engineering, Zoology, Computer Science, Entomology, Plant and Soil Science, Animal Sciences and Genetics. Approximately 45 undergraduate students have conducted research projects in my laboratory.

Post-Doctoral Fellows	**Dates**	**Current Position**
Bonnie Jo Bratina	1992 – 1996	Professor, Univ. Wisconsin, La Crosse
Jorge Santo Domingo	1993	Scientist, US Environmental Protection Agency
Tim Lilburn	1997 – 1998	Scientist, American Type Culture Collection
John Urbance	2000	Associate Professor, Michigan State University
Bradley Stevenson	2001 – 2004	Associate Professor, Oklahoma State University
Jorge Rodrigues	2003 – 2005	Associate Professor, University of California, Davis
Dionysius Antonopolous	2004 – 2007	Associate Professor, University of Chicago
Russell Grant	2008 – 2009	Lecturer, Newcastle University
Vicente Alvarez-Gomez	2008 – 2010	Scientist, US Environmental Protection Agency
Tracy Teal	2008 – 2012	Assistant Professor, Michigan State University
Kevin Theis	2008 – 2014	Assistant Professor, Wayne State University
Heli Juottonen	2009 – 2010	Post-doctoral Fellow, University of Helsinki, Finland
Bjorn Ostman	2010 – 2012	Bilingual Engineer, QualiTest Group, Google Inc.
Dongjuan Dai	2011 – 2012	Research Scientist, Virginia Technical University
Rachel Morris	2012 – 2013	Teaching Specialist, Biomedical Laboratory Diagnostics Michigan State University
Brian Gray	2013 - 2014	Assistant Professor, York College of Pennsylvania
Steven Stoddard	2012 – 2014	Retired
Jessica Sieber	2013 – 2015	Assistant Professor, University of Minnesota-Duluth
Arvind Venkataraman	2012 – 2016	Research Scientist, Procter and Gamble Co.
Niel Baxter	2016 – 2018	Research Scientist, Elanco Co., Indianapolis, IN
Matthew Hoostal	2016 – current	
Kristi MacCready	2018 – current	
Qingseng Shang	2019 - current	

Sabbaticals Hosted	**Semester/Year**	**Home Institution**
Eric Torng	Fall 2005	Michigan State University (Dept. Computer Science)
Jeanne Poindexter	Spring 2000	Columbia University, Barnard College
John Breznak	Fall 1999	Michigan State University
Randall Hicks	Fall/Spring1994	University of Minnesota, Duluth
Nina Lin	Fall 2014	University of Michigan, Chemical Engineering
Nancy Love	Fall 2014	University of Michigan, Civil and Environmental Eng.

Grants - Active

Integrated Training in Epidemiology and Microbiome Sciences (ITiMS: 2/2015 – 1/2020)
Role: PI with Betsy Foxman, $2,500,000, Burroughs Wellcome Fund
http://www.ns.umich.edu/new/releases/22749-training-young-scientists-to-look-for-links-between-health-microbes

Does Authentic Research in Introductory Courses Increase Persistence in STEM? (9/2014 – 8/2019)
Role – CoPI. $1,500,000, Howard Hughes Medical Institute
http://record.umich.edu/articles/15m-grant-expands-undergraduate-research-opportunities

Impacts of Molecular Oxygen on the Structure and Function of the Intestinal Microbiome
(2/2013 – 1/2018) Role: PI. $1,116,657 NIH/1R01GM0099549-01A1

Fidelity, robustness, and diversity in RNA virus evolution and pathogenesis (09/01/2015 – 08/31/2020)
Role: co-PI, $2,134,002 NIH/NIAID

Previous Grants

The Michigan Microbiome Project (03/2015 – 03/2017)
Role: PI, $750,000 Proctor and Gamble

The KBS LTER Project Long Term Ecological Research in Row-Crop Agriculture (12/2010 – 11/2016) Role: co-PI. $3,920,000 NSF/DEB-1027253

Understanding the Lung Microbiome in HIV-Infected and HIV-Uninfected Individuals
(09/2009 – 07/2015) Role: Co-I, $116,344 NIH/NHLBI/U01 HL098961

Expanding the Culture Collection of Microaerobes for Screening of Probiotics (12/2013 – 11/2014)
Role: PI, $165,000 Proctor & Gamble

The Role of the Gut Microbiota in Ulcerative Colitis (06/24/2010 – 07/31/2014)
Role: Co-PI, $2,042,395 NIH/NIDDK/OD/UH3 DK 083993-02

Biodiversity Conservation and Drug Discovery in Madagascar and Microbial Community Assessment in Marine Microbial Field Training (06/01/2011 – 05/31/2014)
Role: Co-PI, $32,537 NIH 5U01-TW000313-19

Screening of candidate probiotics to modulate obesity (6/1/2012 – 5/31/2013)
Role: Instructor, $369,405 Proctor & Gamble

A Symbiotic Approach to the Study of Animal Communication (08/01/2009 – 08/30/2013)
Role: Co-PI, $480,000 NSF IOS 0920505

Cultivation and Characterization of Microaerobes from the Human Microbiome (10/2008 – 07/2013)
Role: PI, $1,624,346 NIH/1R01HG004906

Improving carbon dioxide flux predictions in soils by understanding metabolic tradeoffs in decomposition (9/2010 – 8/2013). Role: PI, $21,000 U.S. Dept. of Energy

Microbial Ecology of Helicobacter-Induced Colitis (07/01/2008 – 06/30/2012)
Role: Co-I, $261,857 NIH/1R01DK070875-01A2

Genomics of Terrestrial Microbial Communities Associated with the Production and Consumption of Greenhouse Gases (09/2007 – 10/2011). Role: PI, $1,695,687 NSF/0731913

Multi-Scale Consequences of Rotational Diversity in Midwestern Agricultural Systems (10/2009 – 9/2012). Role: PI, $448,500 U. S. Department of Agriculture

Long Term Ecological Research Row-Crop Agriculture (12/2004 – 11/2010)
Role: co-PI, $5,420,000 NSF

Investigations into the Metabolic Diversity of Microorganisms (06/2005 – 05/2010)
Role: PI, DOE/FG0285ER13361

Incorporating Genomics into the MBL Microbial Diversity Course (09/2004 – 08/2009)
Role: PI, NSF/MCB-0415401

Testing Fundamental Tradeoffs between Power and Efficiency in the Translational Machinery of Bacteria (07/2004 – 06/2008). Role: PI, $599,501 NSF

Phylogeny to Function: Genomic Analyses of Dominant, Uncultured Soil Bacteria (10/2001 – 09/2004)
Role: PI, $651,170 NSF

Towards an Understanding of the Untapped Microbial Diversity of Soils (09/2000 – 11/2003)
Role: PI, $330,000 USDA

Physiological and Ecological Significance of Multiple rRNA Operons in Bacteria (04/1999 – 03/2002)
Role: PI, $330,000 NSF

Taxonomic Characterization of a Novel Bacterial Genus (03/1997 – 08/1999)
Role: PI, $125,413 Archer, Daniels, and Midland Co.

Quantitative Detection of Microorganisms in Environmental Samples (10/1992 – 10/1995)
Role: PI, $347,261 EPA

Patents

1. **Schmidt, T.M.** (2017) Compositions and methods for increasing butyrate production. Patent under review.
2. **Schmidt, T.M.** and S.F. Stoddard (2002). Endogenous ketogulonigenium plasmid. United States Patent 6,503,748 B2

Bibliography

H-index: 66, total number of citations 29,295; See Google Scholar for additional details

Peer-Reviewed Journals and Publications

1. Golob JL, DeMeules MM, Loeffelholz T, Quinn ZZ, Dame MK, Silvestri SS, Wu MC, **Schmidt TM**, Fiedler TL, Hoostal MJ, Mielcarek M, Spence J, Pergam SA, Fredricks DN (2019) Butyrogenic bacteria after acute graft-versus-host disease (GVHD) are associated with the development of steroid-refractory GVHD. Blood Adv 3: 2866-2869.
2. Smith, Byron J., R.A. Miller, A.C. Ericsson, D.E. Harrison, R. Strong, and **T.M. Schmidt** (2019) Changes in the gut microbiota and fermentation products concurrent with enhanced longevity in acarbose-treated mice. BMC Microbiology, 19:130 doi: 10.1186/s12866-019-1494-7

3. Baxter, Nielson T; Schmidt, Alexander W; Venkataraman, Arvind; Kim, Kwi S; Waldron, Clive; **Schmidt, Thomas M** (2019) Dynamics of Human Gut Microbiota and Short-Chain Fatty Acids in Response to Dietary Interventions with Three Fermentable Fibers. mBIO 10: e02566-1
4. Flowers, SA; Baxter, NT; Ward, KM; Kraal, AZ; McInnis, MG; **Schmidt, TM**; Ellingrod, VL (2019) Effects of Atypical Antipsychotic Treatment and Resistant Starch Supplementation on Gut Microbiome Composition in a Cohort of Patients with Bipolar Disorder or Schizophrenia. Pharmacotherapy 39: 161-170.
5. Grate, Jay W.; Liu, Bingwen; Kelly, Ryan T.; Anheier, Norman C.; **Schmidt, Thomas M.** (2019) Microfluidic Sensors with Impregnated Fluorophores for Simultaneous Imaging of Spatial Structure and Chemical Oxygen Gradients. ACS Sensors 4:317 – 325.
6. Kim, Y-G., Sakamoto, K., Seo, S-U., Pickard, J.M., Gillilland, M.G. III, Pudlo, N.A., Hoostal, M., Li, X., Wang, T.D., Feehley, T., Stefka, A.T., **Schmidt, T.M**., Martens, E.C. Shinji Fukuda, S., Inohara, N., Cathryn R. Nagler, C.R., and Núñez, G. (2017) Neonatal Acquisition of Clostridia Species Controls Colonization Resistance Against Bacterial Pathogens. Science 356: 315-319, DOI: 10.1126/science.aag2029
7. Hill DR, Huang S, Nagy MS, Yadagiri VK, Fields C, Mukherjee D, Bons B, Dedhia PH, Chin AM, Tsai YH, Thodla S, **Schmidt TM**, Walk S, Young VB, Spence JR (2017) Bacterial colonization stimulates a complex physiological response in the immature human intestinal epithelium. Elife 6: e29132, 2017. PM29110754
8. Landis, DA, C Gratton, RD Jackson, KL Gross, DS Duncan, CLiang, TD Meehan, BA Robertson, **TM Schmidt**, KA Stahlheber, JM Tiedje, BP Werling (2017) Biomass crop effects on biodiversity and ecosystem services in the North Central US. Biomass and Bioenergy (2017) 10.1016/j.biombioe.2017.02.003
9. Roller B.R., Stoddard S.F., **Schmidt T.M**. Exploiting rRNA operon copy number to investigate bacterial reproductive strategies (2016) Nature Microbiology 1:16160 DOI: 10.1038/nmicrobiol.2016.160.
10. Venkataraman A, Sieber JR, Schmidt AW, Waldron C, Theis KR, **Schmidt TM (2016)** Variable responses of human microbiomes to dietary supplementation with resistant starch. Microbiome 4(1): 33, 2016. PM27357127 102.
11. Mathewson ND, Jenq R, Mathew AV, Koenigsknecht M, Hanash A, Toubani T, Oravecz-Wilson K, Wu S, Sun Y, Rossi C, Fujiwara H, Byum J, Shono Y, Lindemans C, Calafiore M, **Schmidt TM**, Honda K, Young VB, Pennathur S, van den Brink M, Reddy P (2016) Gut microbiome–derived metabolites modulate intestinal epithelial cell damage and mitigate graft-versus-host disease Nature Immunology 17: 505-513, 2016.
12. Loudon A.H., Venkataraman A., Van Treuren W., Woodhams D.C., Parfrey L.W., McKenzie V.J., Knight R., **Schmidt T.M.**, Harris R.N. Vertebrate Hosts as Islands: Dynamics of Selection, Immigration, Loss, Persistence, and Potential Function of Bacteria on Salamander Skin. Front Microbiol 2016;7:333. PM27014249/PMC4793798
13. Carmody L.A., Zhao J., Kalikin L.M., LeBar W., Simon R.H., Venkataraman A., **Schmidt, T.M.**, Schloss P.D., LiPuma J.J. The Daily dynamics of the cystic fibrosis airway microbiome during clinical stability and at exacerbation. Microbiome 2015;3:12. doi: 10.1513/AnnalsATS.201211-107OC Microbiome. PM25834733/PMC4381400
14. Bassis C.M., Erb-Downward J.R., Dickson R.P., Freeman C.M., **Schmidt T.M.**, Young V.B., Beck J.M., Curtis J.L., Huffnagle G.B. Analysis of the upper respiratory tract microbiome as the source of the lower respiratory tract and gastric microbiomes in healthy individuals. MBio 2015;6(2):e00037. PM25736890/PMC4358017
15. Stoddard S.F., Smith B.J., Hein R., Roller B.R., **Schmidt TM**. rrnDB: Improved tools for interpreting rRNA gene abundance in Bacteria and Archaea and a new foundation for future development. Nucleic Acids Res 2015;43(Database issue):D593-8. PM25414355/PMC4383981

16. Venkataraman A., Bassis C.M., Beck J.M., Young V.B., Curtis J.L., Huffnagle G.B., **Schmidt, T.M.**. Application of a neutral community model to assess structuring of the human lung microbiome. mBio 2015;6(1). PMC4324308
"Highlighted in The Scientist":
http://www.the-scientist.com/?articles.view/articleNo/41955/title/Breathing-in-Bacteria/
17. Roller B.R., Benjamin R.K., **Schmidt, T.M.** The Physiology and Ecological Implications of Efficient Growth. ISME J 2015;9(7):1481-7. PM25575305/PMC4478692
18. Beck J.M., Schloss P.D., Venkataraman A., Twigg H. III., Jablonski K.A., Bushman F.D., Campbell T.B., Charlson E.S., Collman R.G., Crothers K., Curtis J.L., Drews K.L., Flores S.C., Fontenot A.P., Foulkes M.A., Frank I., Ghedin E., Huang L., Lynch S.V., Morris A., Palmer B.E., **Schmidt T.M.**, Sodergren E., Weinstock G.M., Young V.B., Lung HIV Microbiome Project. Multicenter Comparison of Lung and Oral Microbiomes of HIV-infected and HIV-uninfected Individuals. Am J Respir Crit Care Med 2015;192(11):1335-44. PM26247840
19. Robertson P.G., Gross K., Hamilton S., Landis D., **Schmidt, T.M.**, Snapp S., Swinton S. Farming for Ecosystem Services: An Ecological Approach to Production Agriculture. BioScience. 2014;64(5):404-15. PM26955069/PMC4776676
20. Blasiak L.C., Schmidt A.W., Andriamiarinoro, H., Mulaw T., Rasolomampianina R., Applequist W.L., Birkinshaw C., Rejo-Fienena F., Lowry II P.P., **Schmidt, T.M.**, Hill R.T. Bacterial communities in Malagasy soils with differing levels of disturbance affecting botanical diversity. PloS One. 2014;9(1): e85097.
21. Werling B.P., Dickson T.L., Isaacs R., Gaines H., Gratton C., Gross K.L., Liere H., Malmstrom C.M., Meehan T.D., Ruan L., Robertson B.A., Robertson G.P., **Schmidt, T.M.**, Schrotenboer A.C., Teal T.K., Wilson J.K., Landis D.A. Perennial grasslands enhance biodiversity and multiple ecosystem services in bioenergy landscapes. Proc Natl Acad Sci U.S.A. 2014;111(4):1652-7. PM24474791
22. Lee Z.M., **Schmidt, T.M.** Bacterial growth efficiency varies in soils under different land management practices. Soil Biology and Biochemistry. 2014;69:282–290.
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25. Vital M., Penton C.R., Wang Q., Young V.B., Antonopoulos D.A., Sogin M.L., Morrison H.G., Raffals L.H., Chang E.B., Huffnagle G.B., **Schmidt, T.M.**, Cole J.R. and Tiedje J.M. A gene-targeted approach to investigate the intestinal butyrate-producing bacterial community. Microbiome. 2013, 1(1):8. PM24451334/PMC4126176
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28. Morris A., Beck J.M., Schloss P.D., Campbell T.B., Crothers K., Curtis J.L., Flores S.C., Fontenot A.P., Ghedin E., Huang L., Jablonski K., Kleerup E., Lynch S.V., Sodergren E., Twigg H., Young V.B., Bassis C.M., Venkataraman A., **Schmidt, T.M.,** Weinstock G. Lung HIV

Microbiome Project. Comparison of the respiratory microbiome in healthy non-smokers and smokers. Am. J. Respir. Crit. Care Med. 2013 May 15; 187(10):1067-75. PM23491408
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32. Human Microbiome Project Consortium. A framework for human microbiome research. Nature. 2012 Jun 13; 486(7402):215-21. PM22699610
33. Human Microbiome Project Consortium. Structure, function and diversity of the healthy human microbiome. Nature. 2012 Jun 13; 486(7402):207-14. PM22699609
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35. Jangid K., Williams M.A., Franzluebbers A.J., **Schmidt, T.M.**, Coleman D.C., Whitman W.B. Land-use history has a stronger impact on soil microbial community composition than aboveground vegetation and soil properties. Soil Biology & Biochemistry. 2011;43:2184-2193.
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37. Levine U.Y., Teal T.K., Robertson G.P., **Schmidt, T.M.** Agriculture's impact on microbial diversity and associated fluxes of carbon dioxide and methane. ISME J. 2011 Oct; 5(10):1683-91. PM21490688
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39. Teal T.K., **Schmidt, T.M.** Identifying and removing artificial replicates from 454 pyrosequencing data. Cold Spring Harb Protoc. 2010 Apr; 5(4). PM20360363
40. Gomez-Alvarez V., Teal T.K., **Schmidt, T.M.** Systematic artifacts in metagenomes from complex microbial communities. ISME J. 2009 Nov; 3(11):1314-7. PMID: 19587772
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47. Young V.B., Britton R.A., **Schmidt, T.M.** The human microbiome and infectious diseases: beyond koch. Interdiscip Perspect Infect Dis. 2008;2008:296873. PM19343181
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