

Curriculum Vitae

Michael D. Jochum, Jr.

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Education and Training

Institution	Degree (if applicable)	Completion Date	Field of Study
Texas A&M University	B.S.	05/2009	Bioenvironmental Science
University of Texas at Austin	Post-bacc	05/2015	Non-degree seeking
Texas A&M University	PhD	05/2019	Plant Pathology
Baylor College of Medicine	Postdoctoral Fellow	--	Maternal-Fetal Medicine

Research and Professional Experience

- May 2019 – Present, Postdoctoral Fellow, Department of Obstetrics and Gynecology, Division of Maternal Fetal Medicine, Baylor College of Medicine, Houston, Texas.
- Aug 2015 – May 2019, Graduate Student, Department of Plant Pathology and Microbiology, Texas A&M University, College Station, Texas.
- Aug 2009 - Aug 2015, Lead Scientist, AlgEternal Technologies, LLC – Austin, Texas.
- Apr 2004 - May 2015, 1st Lieutenant, Medical Service Corps Officer, HHT 1/112th CAV RSTA Squadron, US Army National Guard.

Personal Statement

Prior to entering graduate school, I worked as a microbiologist for a biotech startup company based at the University of Texas at Austin, researching methodologies to produce large volumes of microalgae in a vertical semi-closed airlift photobioreactor for omega 3 free fatty acids, cosmetics, biofertilizers, and biofuel-based applications. As a graduate student at Texas A&M University, my research focused on the identification and bioinformatic interpretation of novel host-microbe interactions that conferred host resilience to a stressor. Using a plant model, I developed an experimental design termed host-mediated microbiome engineering (HMME) to increase the resilience of a host to respond to stress via indirectly selecting and propagating beneficial microbiomes via assaying the phenotypic resilience of a host under duress over multiple generations. Using this design coupled with a custom longitudinal bioinformatic analysis, I identified changes in i) microbiome community dynamics associates with mediating a significant delay in the onset of stress, ii) evolutionary (e.g., alterations in allele frequency, mutation, horizontal gene transfer) changes, and iii) metagenomic functional mechanisms responsible for conferring the increased host fitness. This in all led to one patent, four first-author papers, two additional papers, and three first author published conference proceedings. I am currently working in my postdoc as the bioinformatician for the Aagaard lab at Baylor College of Medicine / Texas Children's Hospital, primarily investigating how the microbiome impacts pregnancy, birth, and infancy using metagenomic datasets. Through my bioinformatic analyses, we have combined molecular techniques with metagenomic research to increase our understanding of how disease, medication, and obstetric related surgical procedures impact the health of women and babies. This research has led to one first author manuscript, seven middle author manuscripts, one first author manuscript currently under review after revisions at *Nature Scientific Reports*, and thirteen published conference proceedings (five first author).

Publications

- Walker K, Kalra D, Lowdon R *et al.* (2022). The third international hackathon for applying insights into large-scale genomic composition to use cases in a wide range of organisms. *F1000Research* 2022, 11:530, <https://doi.org/10.12688/f1000research.110194.1>
- Detlefs, S. E., Jochum, M. D., Salmanian, B., McKinney, J. R., & Aagaard, K. M. (2022). The impact of response to iron therapy on maternal and neonatal outcomes among pregnant women with anemia. *American Journal of Obstetrics & Gynecology MFM*, 4(2), 100569. doi:<https://doi.org/10.1016/j.ajogmf.2022.100569>
- Liu, Y., Elworth, R. L., Jochum, M. D., Aagaard, K. M., & Treangen, T. J. (2021). Squeegee: de-novo identification of reagent and laboratory induced microbial contaminants in low biomass microbiomes. *bioRxiv*. <https://doi.org/10.1101/2021.05.06.442815>
- Mc Cartney, A. M., Mahmoud, M., Jochum, M., Agustinho, D. P., Zorman, B., Al Khleifat, A., Dawood, M. (2021). An international virtual hackathon to build tools for the analysis of structural variants within species ranging from coronaviruses to vertebrates. *F1000Research*, 10(246), 246.
- Zidek, M. J., Yu, L., Jochum, M., & Jo, Y.-K. (2021). Complexity of Gaeumannomyces species causing take-all root rot of St. Augustinegrass in Texas. *Mycologia*, 113(3), 599-611.
- Sapoval N, Mahmoud M, Jochum MD, Liu Y, Elworth RL, Wang Q, et al. Hidden genomic diversity of SARS-CoV-2: implications for qRT-PCR diagnostics and transmission. *Genome Research*. Feb 2021. gr. 268961.120.
- Mahmoud M, Gener AR, Khayat MM *et al.* Methods developed during the first National Center for Biotechnology Information Structural Variation Codeathon at Baylor College of Medicine. *F1000Research* Sept. 2020, 9:1141 doi.org/10.12688/f1000research.23773.1.
- Jochum, Michael D., Maxim D. Seferovic, and Kjersti M. Aagaard. "Prenatal origins of the infant gut microbiome." *The Human Microbiome in Early Life: Implications to Health and Disease* (Sept. 2020): 81-99.
- Jochum M, McWilliams KL, Pierson EA, Jo YK. Host-mediated microbiome engineering (HMME) of drought tolerance in the wheat rhizosphere. *PLoS One* December 2019;14(12):e0225933.
- Jochum M, McWilliams KM, Borrego E, Kolomiets M, Niu G et al. Bioprospecting Plant growth-promoting rhizobacteria that mitigate drought stress in grasses. *Frontiers in microbiology* 2019;10:2106.
- Jochum, M., Moncayo, L. E., & Jo, Y. K. Microalgal cultivation for biofertilization in rice plants using a vertical semi-closed airlift photobioreactor. *PLOS ONE*. 13(9): e0203456. September 2018. <https://doi.org/10.1371/journal.pone.0203456>.
- Jochum M, McWilliams K, Jo Y, editors. Host mediated microbiome engineering for drought resistance in grasses. *Phytopathology*; 2018: American Phytopathological Society.

- Jochum M, Jung J, Jo Y-K, editors. Using unmanned aircraft vehicles in rice cropping systems. *Phytopathology*; 2017: American Phytopathological Society.
- Jochum M, Gaire SP, Niu G, Jo Y-K, editors. Bioprospecting rhizobacteria to improve drought resistance in grasses. 2017 APS Annual Meeting; 2017: APSNET.
- Jochum, M., Moncayo, L. E., & Jo, Y. K. Microalgal cultivation for biofertilization in rice plants using a vertical semi-closed airlift photobioreactor. *PLOS ONE*. 13(9): e0203456. September 2018. <https://doi.org/10.1371/journal.pone.0203456>.
- Jochum, M., Moncayo, L. E., & Jo, Y. K. Awardees focus on bioprospecting beneficial microbes for increasing stress tolerance and disease control. *Phytopathology News*, 51(10), 158. December 2017.

Dissertation

- Jochum, M. D., McWilliams, K. L., & Jo, Y. K. *Host mediated microbiome engineering for drought resistance in grasses*. Department of Plant Pathology and Microbiology, Texas A&M University, College Station, TX. March 2019.

Patents

- U.S. Patent No. 20110039326, *Biomass Production System and Apparatus*. Published (filing date Feb. 17, 2011) (Michael Jochum, co-inventor).

Published Conference Proceedings

- Jochum M, Gajęcka M, Gutaj P, Jaskiewicz K, Seferovic M, Showalter L, Wender-Ozegowska E. Association of maternal type I diabetes (T1D) on the maternal and newborn human microbiome. *American Journal of Obstetrics & Gynecology* 2022; 226(1), S388.
- Zietsman M, O'Neil D, Seferovic M, Shanahan M, Barrozo E, Jochum M, Aagaard K. Steps to Fetal Gene Therapy: Disruption of Bcl11a erythroid-specific enhancer region with CRISPR/Cas9. *American Journal of Obstetrics & Gynecology* 2022; 226(1), S49.
- Seferovic, M. D., Vinjamuri, A., Jochum, M, Suter, M, Banerjee, S., Chen, Y., Aagaard, K. The full complement of HMOs are found in utero months prior 'first exposure' via breastfeeding. *American Journal of Obstetrics & Gynecology* 2022; 226(1), S759-S760.
- Aagaard K, Seferovic M, Jochum M, Vinjamuri A, Banerjee S, Suter M, Lebrilla C. Comprehensive quantification of human milk oligosaccharides (HMOs) & sparse-but-true microbes in 2nd-trimester amniotic fluid (AF). *American Journal of Obstetrics & Gynecology* 2022; 226(1), S13-S14.
- O'Neil D, Jochum M, Goodspeed D, Gozalez-Rodriguez P, Shope C, Aagaard K. Deletion of Npas2 in the liver alters the functional gut microbiome at light/dark timepoints. *American Journal of Obstetrics & Gynecology* 2022; 226(1), S196.
- Jochum M., Belfort BD, Jochum M, Stokes M, Pope R, Seferovic M et al. 665 : Impact of surgical obstetric fistula repair on vaginal microbiome community reestablishment in Lilongwe, Malawi. *American Journal of Obstetrics & Gynecology* 2021;224(2):S418.

- O'Neil D, Jochum M, Goodspeed D, Hu M, Shope C et al. 1213: Disruptions in *Npas2* expression in the fetal liver alters the gut microbiome at light/dark timepoints. *American Journal of Obstetrics & Gynecology* 2020;222(1):S746-S747.
- Jochum M, Seferovic M, Bode L, Vidaeff A, Aagaard KM. 91: Human milk oligosaccharides are present in midgestation amniotic fluid & associated with a sparse microbiome. *American Journal of Obstetrics & Gynecology* 2020;222(1):S74-S75.
- Jochum M, O'Neil D, Shope C, Hu M, Goodspeed D et al. 85: Loss of *Npas2* liver expression during fetal & neonatal development alters the microbiome's metabolic function. *American Journal of Obstetrics & Gynecology* 2020;222(1):S71.
- Bolte E, Seferovic M, Valentine GC, Jochum M, Prince A et al. 695: Maternal microbial conventionalization alters type I interferon signaling in mice. *American Journal of Obstetrics & Gynecology* 2020;222(1):S439-S440.
- Bolte E, Seferovic M, Valentine GC, Jochum M, Chu D et al. 945: Maternal microbial conventionalization fails to normalize Zika Virus transmission compared to conventional mouse. *American Journal of Obstetrics & Gynecology* 2020;222(1):S586.
- Belfort BD, Jochum M, Stokes M, Pope R, Seferovic M et al. 182: Restoration of the vaginal microbiome & Its ecology following obstetrical fistula repair in Lilongwe, Malawi. *American Journal of Obstetrics & Gynecology* 2020;222(1):S128-S129.
- Jochum, M., K. McWilliams, and Y. K. Jo. July 2018 "Host mediated microbiome engineering for drought resistance in grasses." *Phytopathology*. Vol. 108. No. 10. American Phytopathological Society, 2018.
- Jochum, Michael, Jinha Jung, and Young-Ki Jo. "Using unmanned aircraft vehicles in rice cropping systems." *Phytopathology*. Vol. 107. No. 3. American Phytopathological Society, 2017.

Visiting Research

- July 2017 - Aug 2017, Visiting Researcher, Estación Experimental Central de la Amazonía-Instituto Nacional de Investigaciones Agropecuarias, Ecuador.
- Mar 2016 - Apr 2016, Visiting Researcher, Huazhong Agricultural University, Wuhan, Hubei Province, P.R. China.
- Aug 2011 - Aug 2015, Researcher, Industry/Academic Partnership - UTEX Culture Collection of Algae, Biological Science Department, University of Texas, Austin, Texas.

Presentations

- Jochum M, et. al, April 2022. Analysis of Bronchoalveolar Lavage Fluid Metatranscriptome Among Patients with COVID-19 Disease. Lecture selected as a lightning talk at the World of Microbiome Conference, Vienna, Austria.
- Jochum M, et. al, June 2021. Analysis of Bronchoalveolar Lavage Fluid Metatranscriptome Among Patients with COVID-19 Disease. Lecture presented virtually at the World Microbe Forum.

- Jochum M, et. al, May 2021. Bronchoalveolar Lavage Fluid Metatranscriptomes Analysis Amongst Patients with COVID-19. Lecture presented virtually at the International Human Microbiome Consortium.
- Jochum M, et. al, May 2021. Bronchoalveolar Lavage Fluid Metatranscriptomes Analysis Amongst Patients with COVID-19. Lecture presented virtually at the International Human Microbiome Consortium.
- Jochum M, et. al, May 2021. Impact of surgical obstetric fistula repair on vaginal microbiome community reestablishment in Lilongwe, Malawi. Lecture presented virtually at the International Human Microbiome Consortium.
- Jochum M, Seferovic M, Bode L, Vidaeff A, Aagaard KM., September 2020. Human Milk Oligosaccharides are Present in Midgestation Amniotic Fluid and Associated with A Low Abundance Microbiome. Poster presented virtually at the American Society for Microbiology conference.
- Jochum M, Seferovic M, Bode L, Vidaeff A, Aagaard KM., November 2019. Human milk oligosaccharides are present in midgestation amniotic fluid & associated with a sparse microbiome. World of Microbiome: Pregnancy, Birth, and Infancy Meeting, Milan, Italy.
- Jochum, M., McWilliams, K., Jo, Y. K., March 2019. Microbiome Engineering for enhanced drought tolerance in grasses. Lecture presented at the Ecological Integration Symposium, College Station, Tx
- Jochum, M., McWilliams, K., Jo, Y. K., March 2019. Effects of host mediated microbiome engineering under drought stress in the wheat rhizosphere. Lecture presented at the American Society for Microbiology Texas Branch Meeting. New Braunfels, Tx.
- Jochum, M., McWilliams, Jo, Y. K., October 2018. Host Mediated Microbiome Engineering for Drought Resistance in Grasses. Exit seminar presented at Texas A&M University, College Station, TX.
- Jochum, M., McWilliams, K., Niu, G., Jo, Y. K., July 2018. Host Mediated Microbiome Engineering for Drought Resistance in Grasses. Lecture presented at the International Congress of Plant Pathology, Boston, MA.
- Jochum M., Jo, Y. K., October 2017. Bioprospecting Rhizobacteria to Improve Drought Resistance in Grasses. Lecture presented at the American Society for Microbiology Texas Branch meeting, College Station, TX.
- Jochum, M., Jo, Y. K., August 2017. Bioprospecting Rhizobacteria to Improve Drought Resistance in Grasses. American Phytopathological Society meeting, San Antonio, TX.
- Jochum, M., Gaire, S., Jo, Y. K., May 19, 2017. Host Mediated Microbiome Engineering. Poster presented at the Texas A&M Plant Pathology and Microbiology Department Student Poster Symposium, College Station, TX.
- Jochum M., Jung J., Jo, Y. K., February 2017. Using Unmanned Aerial Vehicles in Rice Cropping Systems. Lecture presented at the 94th American Phytopathological Society Southern Division, College Station, TX.
- Jochum M., Jo, Y. K., December 2016. Bioprospecting Rhizosphere Bacteria to Improve Drought Tolerance and Disease Resistance in Grasses. Poster presented at the Texas Plant Protection Association Poster Symposium, College Station, TX.
- Jochum M., Jo, Y. K., April 29, 2016. Bioprospecting Beneficial Microbes to Improve Drought Tolerance and Disease Resistance in Turfgrass. Poster presented at the Texas A&M Plant Pathology and Microbiology Department Student Poster Symposium, College Station, TX.
- Jochum M., March 29, 2016. Autophagy Under Attack. Lecture presented at Li lab meeting, Huazhong Agricultural University, Hubei Province, P.R. China.
- Jochum M., March 3, 2016. The Use of UAS in Cropping Systems: A Novel Tool for Rice Research and Extension. Lecture presented the 36th Rice Technical Working Group in Galveston, TX.

- Jochum, M., Moncayo, L., Jo, Y. K., March 4, 2016. Microalgal Derived Biofertilizers for Organic Rice Cultivation. Poster presented the 36th Rice Technical Working Group in Galveston, TX.
- Jochum, M., March 17, 2015. Microalgae: Food, Fertilizer, and Fuel of the Future. Lecture presented at Smithsonian Future is Here Festival in Smithsonian Museum, Washington D.C. <http://www.smithsonianmag.com/videos/category/future-is-here/future-is-here-festival-2015-mikejochum/>
- Jochum, M., Moncayo L., Way M., Jo, Y. K., October 1, 2014. Microalgal Derived Biofertilizer for Organic Rice Cultivation. Poster Presented at the Algal Biomass Summit, San Diego, California.
- Manning, S., Jochum, M., Morris, M., Brand, J., October 1, 2012. Integrated Cultivation System for Improved Microalgal Production Optimizing Water and Nutrient Efficiency. Poster presented at the Algal Biomass Summit, Denver, CO.
- Jochum, M., October 2, 2012. Commercial Production of Microalgae. Lecture presented for the National Association of Environmental Professionals Student Chapter at Texas A&M University, College Station, TX.

Awards

- May 2020 – May 2023 National Institutes of Health T32 Research Fellowship ~ \$55,000/yr
- July 2022 – STAMPS 2022 Conference Travel Award, \$500
- March 2020 – Cyverse Container Camp Award, Cyverse, \$250
- March 2019 – 1st Place, Graduate Student Oral Competition, American Society for Microbiology (ASM) Texas Branch, \$50
- January 2019 - Maize Genetics Conference Travel Award, \$1,000
- May 2018 - TAMUS E&S Participant Competition Award, \$3000
- November 2017 - Alliance for Graduate Education and the Professoriate (AGEP) Professional Development Scholarship awardee, \$1000
- August 2017 - Phytobiomes Journal and Noble Research Institute poster awardee during the 2017 American Phytopathological Society meeting, \$200
- July 2017 - Alliance for Graduate Education and the Professoriate (AGEP) student mini-grant awardee, research funds for microbiome next generation sequencing, \$4000
- May 2017 – Teaching Assistantship, BESC403 Environmental Sampling and Monitoring, \$24,000
- March 2017 - American Phytopathological Society Office of International Programs Global International Experience Awardee, \$1500

- March 2017 - 1st Place, DuPont Plant Sciences Texas A&M Plant Breeding Poster Symposium, \$200
- April 2016 - 1st Place, Plant Pathology and Microbiology Department Poster Symposium, \$100
- March 2016 - Texas Rice Research Foundation Grant, First Round, \$10,000
- May 2015 - Texas A&M Agrilife Graduate Extension Assistantship, \$27,000
- April 2015 - Bioenvironmental Sciences Professional Board Service Award, \$0

Professional Societies

- Member, COVID19 International Research Team (COVIRT19), March 2020 – Present
- Member, Society for Fetal and Maternal Medicine (SMFM), May 2019 – Present
- Member, America Association for the Advancement of Science (AAAS), August 2015 – Present
- Ambassador, Alliance for Graduate Education and the Professoriate (AGEP), August 2017 – May 2019
- Member, American Phytopathological Society (APS), August 2015 – May 2019
- Member, Alliance for Graduate Education and the Professoriate (AGEP), August 2015 – May 2019
- Member, Bioenvironmental Sciences (BESC) Professional Board, Student Development and Mentoring Committee, August 2012 – March 2020
- Member, Algal Biomass Organization (ABO), October 2012 - October 2014

Repositories / Community Organizations

- Github - <https://github.com/MADscientist314>
- Dockerhub - <https://hub.docker.com/u/jochum00>
- COV-IRT - <https://www.cov-irt.org/team-members/>

