

Nate Korth

Postdoctoral Researcher at North Carolina State University

Phone: (479) 200-6889

Email: [njorth@ncsu.edu](mailto:njkorth@ncsu.edu)

Educational Background:

- Earned Doctor of Philosophy at the University of Nebraska in Complex Biosystems with a specialization in Microbial interactions – Advised by Andrew Benson and James Schnable, Winter 2022
- Foundation for Food and Agricultural Research professional development fellowship program, Fall of 2019 - 2022
- Midwest Big Data Summer School, Iowa State University 2018
- Earned bachelor's degree from the University of Nebraska in Food Science and Technology in May 2017, 3.5 GPA
- Graduated from Fayetteville High School, in 2013, 4.0 GPA

Technical Skills:

- Illumina MiSeq sequencer library preparation and maintenance
- PCR, qPCR, primer design, gel electrophoresis, DNA sequencing
- Experience in designing process automation pipelines.
- *In vitro* anaerobic microbiome fermentation experiments

Computer Skills:

- Microsoft Office Suite
- Python, R, Unix/Bash shell
 - Data analysis and visualization
- Quantitative Genetics
 - Mixed linear modeling techniques to parse variance and calculate heritability
 - Genome-wide association studies in multiple plant species
 - Linkage disequilibrium and haplotype blocking
- Microbiome Data Processing
 - Qiime2/dada2 pipeline for amplicon sequencing statistical analysis.
 - Dimensionality reduction of the human microbiome

Current Research:

Postdoctoral Researcher under Dr. Joeseeph Gage: Accounting for the microbiome in maize genotype and environmental interactions, G x E x MB.

Past Research:

- Postdoctoral Researcher under Dr. Andrew Benson and Dr. James Schnable: Human gut microbiome, and plant (cereal) quantitative genetics
 - High throughput, *in vitro* screening of diverse lines of crop plants in a simulated human digestive tract and microbe-environment
 - Involves robotic automation systems and high dimension data analytics.
 - Participate in greenhouse and field design, management, sampling, and harvest.
 - Includes microbial and sorghum genomics and genome-wide association studies.

Research goal: Identify and characterize plant-derived molecules that affect the gut microbiome and associate those changes with human health.

Presentations:

- Nebraska Plant Science Symposium: Spring 2023
 - “The Gut Microbiome as a Human Health Phenotype of Sorghum Bicolor in a Genetic Mapping Study”
- American Society of Microbiology (ASM) regional conference Spring 2023
 - “Identification and characterization of human gut microbiome active traits in Sorghum bicolor”
- Nebraska Food for Health Center Seminar Series Fall 2022
 - “Breeding Food for Health: The human gut microbiome as an agronomic trait”
- UNL Food Science Symposium Spring 2022
 - “Identification of Substrates from Quality Protein Popcorn that Promote Growth of Specific Beneficial Bacteria in the Human Gut Microbiome”
- Maize Genetics Conference Spring 2022
 - “Breeding Food for Health: Quality Protein Popcorn Promotes the Growth of Beneficial Bacteria in the Human Gut”
- Complex Biosystems Seminar Spring 2022
 - “A Crash Course in Scientific Presentations”
- Plant and Animal Genome Conference Spring 2022
 - “Breeding Food for Health: Identification of Substrates from Quality Protein Popcorn That Promote Growth of Specific Beneficial Bacteria in the Human Gut Microbiome”
- Maize Genetics Conference Spring 2021
 - "Do the major changes in seed proteins in quality protein popcorn influence the growth of beneficial, health-promoting bacteria in the human gut?" -see a 5-minute version [here](#)
- Plant and Animal Genome Conference poster presentation Spring 2020
 - “Genetic analysis of arabinoxylan biosynthesis in maize seed and impact on the human gut microbiome”
- Nebraska Food for Health Center Seminar Series Fall 2018
 - “Mapping the effects of plant diversity with disturbances in the gut microbiome”
- Undergraduate research fair Spring 2016
 - “Gluten Cross-Contact in Restaurant-Scale Pasta Cooking”

Awards:

- 1st Excellent oral presentation at the Nebraska Plant Science Symposium (Spring 2023)
- Outstanding Postdoc Presentation (First Place) – Regional ASM meeting (Spring 2023)
- Outstanding Workshop “Technical talks for a diverse audience” (First Place) – University of Nebraska Food Science Symposium (Spring 2023)
- Foundation for Food and Agricultural Research Fellowship (2019-2022)
- Nebraska Food for Health Center Fellowship (2018-2022)
- Milton E Mohr Biotechnology Research Scholarship (2016-2017)
 - “Recognizes students in the sciences of biotechnology and engineering based on their academic performance and potential for accomplishments in their fields.”

Teaching Experience:

- Food Science Symposium – Communication (Spring 2023)
 - “Technical talks for a diverse audience: Slide Design”
- Complex Biosystems 852 – Bioinformatics (Spring 2023)
 - One week of lectures on effective science communication
 - One week of lectures on tools for quantitative genetics -tutorial found [here](#)
- Nebraska Food for Health Center graduate student council (Fall 2021-present)
 - Invite speakers for seminar series, plan and execute events for graduate students within the center
- Microbiology 101 (Fall 2021)
 - Guest lecture: “Characterizing the effect of plant-derived molecules on the human gut microbiome”
- Life 891 (Fall 2020)
 - Course: computational biology
 - Designed lesson plan on microbiome metagenomic analysis
- Life 120 Lab (Fall 2017)
 - Taught two sections of undergraduate cellular biology lab.
 - Adapted lesson plans, gave class presentations, led students in laboratory exercises, and graded lab reports

Pre-Graduate School Experience:

- Research Rotations
 - Lab of Dr. Thomas Clemente (Summer 2017)
 - Characterized stomatal patterning transgene in wheat.
 - Lab of Dr. Kurt Piepenbrink (Fall 2017)
 - Assayed *Acinetobacter baumannii* motility and biofilm-forming ability
 - Lab of Dr. James Schnable (Spring 2018)
 - Performed GWAS analysis for multiple traits in pearl millet
- UCARE: UNL undergraduate research program (2015-2016)
 - Drafted competitive, funded, proposal
 - Individual project analyzing gluten contamination
 - Conducted gluten assays & replicated restaurant setting
- Cedar Point Biological Research Station kitchen staff (Summer 2016)
 - Cooked for sixty people daily, revamped recipes, sanitized kitchen, cleared trails, and completed general research station tasks
- Food Allergy Research lab, FARRP – University of Nebraska (2014-2016)
 - Completed sample and equipment preparation

Publications:

Korth, N., Yang, Q., Van Haute, M.J., Tross, M.C., Peng, B., Shrestha, N., Zwiener, M., Mural, R.V., Schnable, J.C. and Benson, A.K., 2023. Grain Utilization by the Gut Microbiome as a Human Health Phenotype to Identify Multiple Effect Loci in Genome-Wide Association Studies of *Sorghum bicolor*. bioRxiv, pp.2023-09.

Yang, Q., Van Haute, M., **Korth, N.**, Sattler, S., Rose, D., Juritsch, A., Shao, J., Beede, K., Schmaltz, R., Price, J., Toy, J., Ramer-Tait, A. E., and Benson, A.K., 2023. The waxy mutation in sorghum and other cereal grains reshapes the gut microbiome by reducing levels of multiple beneficial species. *Gut Microbes*, 15(1), p.2178799.

Gomes-Neto*, J.C., Pavlovikj*, N., **Korth***, N., Naberhaus, S.A., Arruda, B. Benson, A.K., and Kreuder, A.J., 2023. Salmonella enterica induces biogeography-specific changes in the gut microbiome of pigs. *Frontiers in Veterinary Science*, 10, p.1186554. (*Co-first authorship)

Korth, N., 2022. Identification and characterization of human gut microbiome active traits in cereal grains. [Doctoral dissertation, University of Nebraska]. ProQuest Dissertations and Theses database

Korth, N., Parsons, L., Van Haute, M., Yang, Q., Hurst, P., Schnable, J.C., Holding, D.R. and Benson, A.K., 2022. The unique seed protein composition of quality protein popcorn promotes growth of beneficial bacteria from the human gut microbiome. *Frontiers in microbiology*, p.2305.

Yang, Q., Van Haute, M., **Korth, N.**, Sattler, S.E., Toy, J., Rose, D.J., Schnable, J.C. and Benson, A.K., 2022. Genetic analysis of seed traits in *Sorghum bicolor* that affect the human gut microbiome. *Nature Communications*, 13(1), pp.1-15.

Korth, N., Taylor, S.L., Clarke, J.L. and Downs, M., 2021. Gluten cross-contact in restaurant-scale pasta cooking. *Journal of Food Protection*.

Korth N., 2020. Trait Selection, the Human Microbiome and Health. *Foundation for Food and Agriculture Research*

In Review:

Gonçalves, J. P. R., Melo, A. D. B., Yang, Q., Marçal, D. A., Arnaut, P. R., França, I., Valini, G. A. C., Silva, C. A., de Oliveira, M. J. K., Pavlovikj, N., **Korth, N.**, Campos, P. H. R. F., Brand, H. G., Htoo, J. K., Gomes-Neto, J. C., Benson, A. K., Hauschild, L. 2023. Effects of dietary threonine, methionine, and tryptophan supplementation on growth performance of weaned pigs raised under poor sanitary conditions. *Journal of Animal Sciences*

In Progress:

Korth, N., Yang, Q., S, Schnable, J.C., Ramer-Tait, A.E., Benson, A.K., Price, J., in preparation. Amylose extender maize offers protection from dss-induced gut epithelial inflammation in humanized mice.

Van Haute, M., Yang, Q., **Korth, N.**, Happ, M., McCullough, H., Eskridge, K., Hyten, D., Benson, A.K., in preparation. Genetic analysis of human gut microbiome-active traits (MATs) in common bean (*Phaseolus vulgaris* L.) Middle American Diversity Panel identifies seven major-effect loci where genetic variation has pleiotropic effects on multiple gut microbes from diverse human microbiomes.