

W. Nathan Cude, Ph.D.

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Experienced Science Manager and Project Leader

CAREER EXPERIENCE

NOVOZYMES NORTH AMERICA, Durham, NC

Senior Scientist – Project Leader

2018 – Present

- Lead and coordinate a team of more than 40 cross-functional researchers with the goal of replacing chemical fertilizers in corn with nitrogen fixing bacteria. In charge of setting project goals, aligning expectations with leadership, and dividing project resources and responsibilities into relevant teams to execute the scientific strategy.
- Design product development research strategies as a technical expert on the Fertilizer Replacement Agile Innovation Team, a corporate priority project in Novozymes BioAg. Work closely with the commercial organization to assess customer desirability, commercial viability, and technical feasibility of our product development pipeline.
- More than doubled the N fixation ability of dozens of microbes using genetic engineering and identified candidate strains that increased plant nitrogen content in early field trials.
- Work closely with Regulatory Affairs to ensure project compliance with local, state, and federal regulations for lab and field testing of wild and genetically engineering microbes. Interact directly with the USDA to educate the agency on new technologies, product concepts, and company interests.
- Consult in discussions with customers and external companies to explore opportunities, develop relationships, and maintain co-development partnerships.
- Represent Novozymes at technical and industry relevant conferences and external events, frequently communicating information to broad audiences of different levels of technical understanding.

Scientist – Team Leader

2014 – 2017

- Led the Microbial Discovery team in the Monsanto-Novozymes BioAg Alliance. Coordinated the activities of twelve project team members and directly managed four research associates. Ensured thousands of microorganisms were risk assessed, characterized, and prioritized for on time delivery to more than 500,000 corn and soy field trials ran every year of the Alliance.
- Developed novel microbial isolation strategies to obtain new and diverse microorganisms with potential to enhance plant growth.
- Established high throughput genome sequencing workflows for thousands of microbes per year and implemented novel high throughput characterization assays. Used the results of these assays in combination with comparative genomics to predict plant growth promoting physiologies and prioritize microbes for field testing.
- Built a multi-year product development pipeline that identified dozens of microbial product candidates that increased corn and soy crop yields in the field. Top strains are in the final stages of development before launch as biological inoculant products.

OAK RIDGE NATIONAL LABORATORY, Oak Ridge, TN**Postdoctoral Research Associate****2013 – 2014**

- Investigated the beneficial roles of bacterial symbionts on plant growth in the lab of Dr. Dale Pelletier as part of the [Plant Microbe Interfaces](#) Scientific Focus Area for the US Department of Energy.
- Designed and implemented novel methods to enrich endosymbionts of *Populus* tree root material for culturing, sorting by flow cytometry, single-cell genomics, and metagenomic sequencing. Published one first-author scientific paper on this work.

EDUCATION

2008 – 2013**University of Tennessee****Knoxville, TN**

- PhD in Microbiology, Dissertation titled *Genetic and Ecological Characterization of Indigoidine Production by Phaeobacter sp. strain Y4I*.
- Investigated the metabolisms of coastal marine bacteria of the *Roseobacter* lineage in the lab of [Dr. Alison Buchan](#). Discovered novel antimicrobial and signaling molecules and published three first-author scientific papers on the subject.
- Honors: Graduate Teaching Assistant Award (2012), Excellence in Graduate Student Research Award (2013)

2004 - 2008**University of Tennessee****Knoxville, TN**

- B.S. in Biological Sciences, Microbiology Concentration
- University's Honors Program (2004 – 2007)

PATENTS

Cude, W.N.; Young, H.; Blasiak, L; Rowells, K. L.; Lilburn T.G.; Hall, C.; Tang, M.; Knight, C., ***Paenibacillus isolates and uses thereof***. WO2021101949A1, Nov 22, 2019.

Barnhart, D. M.; **Cude, W.N.;** Sutton, K. B.; Lilburn T.G.; Pham J.; Maloney, G. S.; Layman, J., ***Pseudomonas isolates and uses thereof***. WO2021101937A1, Nov 20, 2019.

Blasiak, L; **Cude, W.N.;** Kang, Y.; Sutton-Brandon K.; Lilburn T.G.; Pham J., ***Bacillus Isolates and Uses Thereof***. WO 18129016A1, Jan 3, 2018.

Blasiak, L; **Cude, W.N.;** Kang, Y.; Sutton-Brandon K.; Lilburn T.G.; Pham J., ***Lysinibacillus Isolates and Uses Thereof***. WO 18129018A1, Jan 3, 2018.

PUBLICATIONS

Utturkar*, Sagar M., **W. Nathan Cude***. *et al.* **Enrichment of root endophytic bacteria from *Populus deltoides* and single-cell genomics analysis.** *Applied and Environmental Microbiology*. September 2016. vol. 82 no. 18, 5698-5708. doi: 10.1128/AEM.01285-16.

* *Authors contributed equally to this work*

Cude, W. Nathan et al. ***Phaeobacter* sp. strain Y4I utilizes two separate cell-to-cell communication systems to regulate the production of the antimicrobial indigoidine.** *Applied and Environmental Microbiology*. December 2014 vol. 81 no. 4, 1417-1425.

Cude, W Nathan and Alison Buchan. **Acyl-homoserine lactone-based quorum sensing in the *Roseobacter* clade: complex cell-to-cell communication controls multiple physiologies.** *Frontiers in Microbiology*. November 2013. doi: 10.3389/fmicb.2013.00336

Cude, W. Nathan, et al. **The production of the antimicrobial secondary metabolite indigoidine contributes to competitive surface colonization in the marine roseobacter *Phaeobacter* sp. strain Y4I.** *Applied Environmental Microbiology*. July 2012 vol. 78 no. 14, 4771-4780.

PROFESSIONAL SOCIETIES

- 2008 – present American Society of Microbiology
- 2008 – present American Association for the Advancement of Science
- 2016 – present International Society for Microbial Ecology
- 2019 – present Ecology Society of America
 - Microbial Ecology Section Leadership: Industry Representative