

Vernon L. McIntosh Jr., Ph.D.

Applied AI & Biotechnology Leader

Product Innovation • Commercialization • Scientific Systems Architecture

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EXECUTIVE PROFILE

Applied AI and biotechnology leader with 15 years of post-Ph.D. experience turning complex science into commercial products, operational systems, and decision tools. Ph.D. microbiologist whose career spans industrial fermentation, metabolic engineering, bioinformatics, machine learning, generative AI, scientific software, product management, and government R&D. Known for bridging the lab, the model, and the market: defining ambiguous problems, building the technical approach, aligning cross-functional teams, and translating results for customers and executives. Track record includes patented yeast platforms, an Edison Award-winning microbiome product, a global animal-health analytics platform, and NASA/DARPA space-biomanufacturing work.

CAREER IMPACT

Commercialized Galleon™: Reduced per-sample microbiome analysis cost from approximately \$180 to \$25; platform received a 2023 Gold Edison Award.

Led global digital products: Directed product strategy for a globally adopted poultry-health benchmarking and analytics platform.

Built protectable innovation: Named inventor on granted U.S. patents covering engineered yeast and succinate-production technologies.

Scaled industrial biotechnology: Developed microbial processes from bench scale through 2,000-L pilot fermentation and engineered yeast for commercial dicarboxylic-acid production.

Designed space biomanufacturing: Developed the conceptual bioprocess, organism strategy, metabolic engineering plan, and techno-economic analysis for NASA/DARPA B-SURE.

Advanced CBRNE and AI safety analysis: Conducted frontier-model red teaming and applied FEAT and Sequence of Concern workflows to taxonomic identity, expected and unexpected biological-risk sequences, genetic-engineering indicators, and threat-confidence determinations.

LEADERSHIP & TECHNICAL EXPERTISE

Technology Leadership: Applied AI, machine learning, scientific systems architecture, product strategy, R&D portfolio leadership, technical diligence, innovation management, and secure-on-prem scientific workflows.

Biotechnology: Industrial fermentation, metabolic engineering, strain development and candidate prioritization, bioprocess scale-up, enzyme and biocatalyst applications, microbial physiology, genomics, microbiome analytics, diagnostics, phytogetic natural-product and fermentation-derived feed ingredients, and data science deployed within GMP and food/feed-safety regulated environments (FDA/AAFCO).

Commercial & Organizational: Commercialization, customer discovery, market translation, cross-functional team leadership, executive communication, government R&D, proposal strategy, and partnership development.

PROFESSIONAL EXPERIENCE

Principal Consultant

McIntosh Consulting LLC | Indianapolis, IN / Remote | June 2023 to Present

- Lead independent advisory engagements at the intersection of biotechnology, AI, process development, technical diligence, and commercialization.
- Developed the conceptual bioprocess, organism and metabolic-engineering strategy, and techno-economic analysis for a DARPA B-SURE space-biomanufacturing project with NASA Kennedy Space Center focused on lactic acid production for construction materials.
- Design and build evidence-grounded generative AI and agentic LLM workflows and scientific knowledge systems with emphasis on provenance, validation, and deployment in sensitive or resource-constrained environments.
- Own the full engagement arc: define the problem with the client, analyze experimental and process data, test hypotheses against literature and operational constraints, and deliver an executable recommendation.

Biomanufacturing & Biotechnology Subject Matter Expert | Data Scientist

Signature Science LLC | Indianapolis, IN / Remote | January 2025 to August 2026

- Served as the biomanufacturing and biotechnology subject matter expert across government scientific programs, providing technical authority on fermentation, microbial systems, bioinformatics, and applied AI.
- Conducted red-team evaluations of frontier AI systems in CBRNE-relevant contexts for major AI developers and technology companies.
- Applied FEAT and Sequence of Concern workflows to taxonomic identity, expected and unexpected biological-risk sequences, genetic-engineering indicators, and threat-confidence determinations.
- Led an approved biological knowledge-graph IR&D proof of concept, integrating four authoritative data sources with provenance and confidence controls in NetworkX and Neo4j.
- Developed CBRNE technical proposals that translated mission questions into technical approaches, milestones, success measures, risk controls, and decision-ready briefings.

Innovation Manager, PMI Business Portfolio

Land O'Lakes | Minnesota / Remote | April 2021 to February 2023

- Owned innovation strategy and portfolio direction for specialty feed ingredients, including phytogetic natural-product additives, connecting scientific evidence, field performance, customer needs, regulatory constraints, and commercial positioning.
- Evaluated new molecules and functional ingredients for technical and commercial viability and advanced the strongest concepts through cross-functional development gates.
- Built portfolio dashboards and led go/no-go reviews to advance, redirect, hold or stop projects based on strategic fit, technical evidence and commercial value.

Senior Advisor & Product Manager, HTSi Poultry Analytics Platform

Elanco Animal Health | Greenfield, IN | 2018 to 2021

- Owned strategy, vision, roadmap and analytics direction for HTSi, a globally adopted poultry-health benchmarking and analytics platform.
- Standardized performance metrics and resolved persistent data-quality problems across veterinary, laboratory, software, field, and customer-facing teams.
- Guided cloud migration and the integration of machine learning and image analysis while balancing technical ambition with usability, adoption, and operational reliability.
- Built external research partnerships that improved diagnostic performance and strengthened scientific credibility with customers.

R&D Manager, Data Science and Poultry Nutrition

Cargill Animal Nutrition | Minneapolis, MN | 2015 to 2018

- Led development and commercialization of Galleon™ Broiler Microbiome Intelligence, reducing per-sample analysis cost from approximately \$180 to \$25 and making routine customer testing economically practical; the platform received a 2023 Gold Edison Award.
- Managed a cross-functional team of scientists, bioinformaticians, product leaders, and commercial stakeholders through the full path from research method to field-ready product.
- Built predictive models from microbial and genomic data and translated results into practical insights for poultry producers and nutrition teams.
- Developed field-deployable analysis methods and technical materials for use outside controlled laboratory environments.

Senior Metabolic Engineer

Cargill Biotechnology R&D | Minneapolis, MN | 2010 to 2015

- Developed microbial fermentation processes from bench through pilot scale, including hands-on operation and scale-up of fermenters to 2,000 L on carbohydrate feedstocks.
- Engineered yeast strains and designed metabolic-engineering strategies to improve biocatalyst yield, efficiency, and robustness for succinate and other dicarboxylic acids.
- Partnered with fermentation, analytical, engineering, and operations teams to investigate contamination events, yield drift, process deviations, and transfers that performed at bench scale but failed during pilot-scale operation.
- Used design of experiments and fermentation trend analysis to guide media reformulation, operating-condition changes, strain selection, and defensible process recommendations.
- Worked with LIMS and industrial data systems for real-time bioprocess monitoring and control on plant production data.
- Named inventor on granted U.S. patents covering engineered yeast systems and succinate-production technologies.

SELECTED PATENTS & APPLICATIONS, RECOGNITION & PUBLICATION

- Named co-inventor, [U.S. published patent application US20230298688A1](#): Microbiome Analytics Such as for Animal Nutrition Management (2023).
- U.S. Patent 11,034,982 B2 — Method of Producing Succinate from Yeast (2021).
- U.S. Patent 9,605,285 B2 — Yeast Cells Having a Reductive TCA Pathway from Pyruvate or PEP to Succinate (2017).
- WO 2014/018757 A1 — Yeasts Engineered for the Production of Dicarboxylic Acids (2014).
- 2023 Gold Edison Award — Galleon™ Broiler Microbiome Intelligence.
- Cansino Loeza, B., McIntosh, V., et al. "Space Biomanufacturing of Lactic Acid: Conceptual Design and Techno-Economic Analysis." *Computers & Chemical Engineering*, 2026; NASA Technical Reports Server 20250010828.

EDUCATION & TECHNICAL TOOLS

Ph.D., Microbiology — University of Tennessee, Knoxville, 2010. Doctoral research spanned genomics, transcriptomics, proteomics, and metabolomics, applying machine learning (SVM-based classification) to microbial gene-expression data for explosive and chemical-exposure detection.

Tools: Python, R, MATLAB, SQL, PyTorch, Excel, PowerPoint, AWS, Azure; Docker, Kubernetes, Git-based CI (Forgejo/GitHub); LIMS and industrial data systems; machine learning, generative AI and multi-agent LLM systems, multivariate analysis, design of experiments, data visualization, bioinformatics workflow development, and working knowledge of JMP.