

Industry: Pharma/CMO

Contract Manufacturing Organization (CMO) engineering microbes to produce large quantities of small molecule therapeutic drugs and biocontrol agents.

Management

David A. Mead, PhD

CEO and Co-Founder

CEO at Lucigen, sold for \$70M in 2018, invented TA Cloning, a \$1B product sold by ThermoFisher

Undisclosed, MBA

CBO

Executive from Merck, Syngenta, Biomarin

James La Clair, Ph.D.

CSO

Medicinal chemist with > 100 publications and > 25 years experience

John Hecht, CPA

CFO

Experienced finance executive

Matt Robey, Ph.D.

CIO

Expert in genome mining software

Advisory Team & Board of Directors

Mark R. Liles, Ph.D.

Co-Founder, Board member
Professor, Auburn University

Neil Kelleher, Ph.D.

Co-Founder, Board member
Professor, Northwestern University

Nancy Keller, Ph.D.

Co-Founder, Advisor
Professor, University Wisconsin

Kenton Shultis

Board member
Pharma executive at Rondaxe

David Pompliano

Advisor
Pharma executive at Merck, GSK

Intellectual Property

USPTO PCT/US2017/034023

USPTO PCT/US20/59502

USPTO PCT/US16/815399

Non-Dilutive Funding to Date

\$1.4M

Seeking a \$10M Series A Round

Terra Bioworks anticipates achieving the following milestones post financing:

- Onboard CBO, new Pharma customers
- Add capex and people to complete:
- Manufacturing pipeline for didemnin, 17S-FD-985, cyclosporine, rifamycin and plant pathogen compounds.

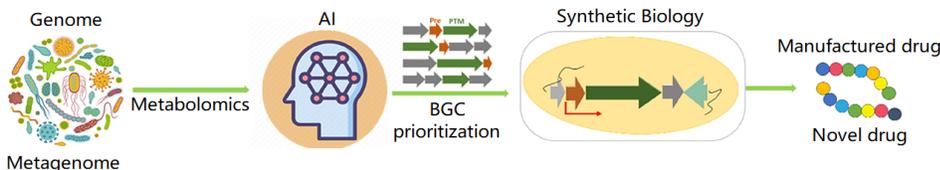
Executive Summary:

Terra Bioworks has pioneered a new synthetic biology portfolio of breakthrough proprietary tools and technology assets able to exploit natural product synthesis for existing premium drugs as well as discover new compounds from bacterial and fungal sources rapidly and at reduced costs. Our team can clone large microbial DNA pathways encoding rare and valuable small molecule therapeutic "drugs", and reprogram multiple types of hosts that serve as microbial factories, to manufacture new and existing natural product drugs, all of which will disrupt the CMO landscape.

Starting with CRISPR Cas9 precision cloning, followed by optimizing expression of naturally derived metabolites, enables large scale manufacture of microbial based drugs. Terra Bioworks' go-to-market strategy is to disrupt drug manufacturing of existing compounds that are challenging and expensive to produce.

Company and Technology Overview

Terra Bioworks first leveraged their technology to facilitate rapid screening of microbial genomes to identify new drugs. They started with soil bacteria, an untapped resource with the capacity for thousands of new therapeutics. Terra Bioworks developed a novel technology that allowed them to create libraries of thousands of large and complex DNA pathways to identify genes that encode new therapeutics, a daunting task not possible with alternative approaches. The team further utilized a series of big-data and AI technologies for sifting through the millions of genes within these libraries to find the drug "needle in the haystack".



The previously used methods could not hold the entire gene pathway (biosynthetic gene cluster or BGC), but Terra Biowork's vectors could. With this, came the first of several pivots through a bevy of co-development contracts that exposed a great use for their technology...faster, cheaper manufacturing of natural products.

Market Opportunity and Unmet Need

Terra Bioworks can create a custom microbial host with a pathway that optimizes production of microbial based drugs, reducing manufacturing costs exponentially. This new paradigm for manufacturing generic therapeutic compounds and those entering clinical trials is highly disruptive. Terra Bioworks can patent its manufacturing process and the genes used to do that without worrying about a company owning the rights to the molecule, their first target market. By focusing on high value drugs that have high manufacturing costs, Terra Bioworks has a total addressable market >\$2B within its own pipeline to pursue with a proven revolutionary technology.

The founders realized that their technology could break the code for "gram quantity" production of high value microbial based drugs that have high manufacturing costs. Terra Bioworks' synthetic biology platform takes advantage of the ability to clone the entire gene pathway and controlling its expression. The team has engineered inducible promoters and other strategies to skyrocket production capacity thus setting the table for a sea change in microbial drug manufacturing.

Technical Milestones Achieved

To find new drug producers from the millions of microbes in nature, Terra Bioworks created a unique AI-fueled search engine trained on millions of genes, compounds, and chemical analyses. This patented AI engine easily detected thousands of pathways for existing drugs to further optimize microbial production. Its powerful chemical analytics can profile organisms to identify unwanted potential by-products, allowing Terra Bioworks to maximize manufacturing efficiencies. Terra Bioworks invented a new paradigm for expression cloning that utilizes a pair of inducible promoters to activate the pathway on command, thus limiting the stress levels of the cell. This strategy is patent pending and has enabled the company to activate more pathways at the very beginning with greater success and faster than any other method, giving Terra Bioworks a significant advantage over competitors. Once a metabolite is being made with this initial screening strategy, Terra Bioworks further refines the pathway with additional genetic elements to make more compound. Terra Bioworks is currently the only company with this capability in the fungal drug space.