2024 Superconvergence BioRevolution Series: Rise of the Self-Driving Lab

Published July 1, 2024

Christopher Gannatti, CFA
Global Head of Research

Key Takeaways

- The BioRevolution is a strategy focused on challenging and evolving various aspects of human life, including health care, food production, energy generation and data storage, through biological advancements.
- At WisdomTree, we have the WisdomTree BioRevolution Index, which is tracked by the WisdomTree BioRevolution Fund (WDNA).
- Artificial intelligence is being utilized in the drug discovery process to improve efficiency and productivity, potentially leading to the creation of new drugs and therapies.
- Self-driving labs, powered by AI and advanced automation, are revolutionizing the drug discovery and testing process, increasing research productivity and enabling scientists to tackle tougher scientific questions.

At WisdomTree, we work with Dr. Jamie Metzl on a strategy that we term the BioRevolution. We believe that we are on the precipice of a remarkable period that could last a few decades, where we challenge and ultimately evolve how we do such things as:

- Handle human health care
- Consider growing food for an expanding global population
- Generate novel materials, chemicals and energy from biological sources
- Think about storing massive amounts of data with higher density and fidelity than we have in the past

Dr. Metzl recently published the book, *Superconvergence: How the Genetics, Biotech, and AI Revolutions Will Transform our Lives, Work, and World.* We aim to publish a series of blog posts that draw attention to some of the ideas presented in the book.

The bottom line: thematic investing, in a sense, is about storytelling. *Superconvergence* does a great job conveying the narrative behind the WisdomTree BioRevolution Index, which is tracked, after fees and expenses, by the WisdomTree BioRevolution Fund (WDNA).

You've Heard of the Self-Driving Car—What About the Self-Driving Lab?

Imagine that you are about to take on a new task, but you have to consider the following details1:

- The task could take roughly 10 years, possibly longer, prior to your knowing it is complete.
- The budget required will be in the range of $1 billion, but likely more.
- The chance of success, meaning you make a choice to follow a particular path, and this allows you to progress fully to the finish without needing to restart efforts, is about 5%–10%.

Such a task, or a business arranged around the completion of such a task, does not on the face of it appear very attractive. However, these are roughly the statistics involved in developing a new drug, start to finish.

Exscientia: Using AI to Improve the Drug Discovery Process

On June 7, 2024, we released a conversation that we had with Exscientia on our *Next Big Thing podcast*. This company is focused on utilizing artificial intelligence in an attempt to improve different phases of the drug discovery process.

AI represents a new set of tools that we can use to get closer to evaluating different compounds that might be effective drugs or therapies against different diseases. Importantly, the framing of this problem is not "suddenly, AI will save us and create all of these new drugs," but rather that we as a society are spending, through our pharmaceutical industry, hundreds of billions of dollars attempting to create new drugs, presently.

What if a new set of tools were to become available that would help us to have a more efficient process of drug discovery? This is what AI can provide.

The Self-Driving Lab: Connecting the Software World with the Physical World

From *Superconvergence*2:

Researchers across the globe are now working to build new models of "self-driving laboratories," bringing together AI systems and advanced, high-throughput automated machines to help shift the drug discovery and testing process, and all of human-engineered biology for that matter, into superdrive. These automated labs are able to rapidly carry out thousands or even millions of experiments selected by machine learning algorithms to achieve objectives defined by human researchers. A January 2023 Nature paper estimated that this process can increase a human expert's overall research productivity by an estimated thirty times, enabling the humans to reallocate their energies toward exploring tougher scientific questions.

We frequently write about AI. So far, the markets have been very excited about graphics processing units (particularly those from Nvidia) and also about different software platforms. We have been thinking about how we may be on the cusp of seeing much more capable robots, but we are not yet seeing investors getting excited about robotics more specifically.

Robotics could be the critical link between a world of virtual reality or digital twins and the physical world. Whether one is thinking of a new drug or a new material, it's not enough to have a system that works well

within the confines of a virtual system—it needs to also prove out in the physical world and stand the test of real-world experimentation.

Conclusion: Convergence of Nvidia's Omniverse with the World of Laboratory Science

As we write these words, Nvidia has just attained the status of the world's most valuable company.3 Many are familiar with the company's revolutionary GPUs, but in listening to CEO and Founder Jensen Huang speak at GTC in March 2024 and then Computex in Taiwan in June 2024, it's clear that Nvidia wants to be seen across the entire tech stack. One of their most interesting discussions regards the omniverse.4

To us, the omniverse looks like a domain-specific world of virtual reality where various simulations can be run. It's not much of a leap to imagine how something like the omniverse could ultimately be empowered to drive the hardware of a self-driving lab at some point in the future. In this way, we can see how a market juggernaut, Nvidia, can be connected to a more currently esoteric concept, the self-driving lab.

It may not be long until will see self-driving labs proliferating more widely.

1 Source: Steve Lohr, "How A.I. Is Revolutionizing Drug Development," *New York Times*, 6/17/24.

2 Jamie Metzl, *Superconvergence: How the Genetics, Biotech, and AI Revolutions Will Transform our Lives, Work, and World*, 2024.

3 Source: Anita Hamilton & Adam Clark, "Nvidia Is the World's Most Valuable Company. Can It Hold On to the Crown?" *Barron's*, 6/18/24.

4 Source: https://www.nvidia.com/en-us/omniverse/

Important Risks Related to this Article

For current holdings of WDNA, please click here. Holdings are subject to risk and change.

There are risks associated with investing, including the possible loss of principal. The Fund invests in BioRevolution companies, which are companies significantly transformed by advancements in genetics and biotechnology. BioRevolution companies face intense competition and potentially rapid product obsolescence. These companies may be adversely affected by the loss or impairment of intellectual property rights and other proprietary information or changes in government regulations or policies. Additionally, BioRevolution companies may be subject to risks associated with genetic analysis. The Fund invests in the securities included in, or representative of, its Index regardless of their investment merit and the Fund does not attempt to outperform its Index or take defensive positions in declining markets. The composition of the Index is governed by an Index Committee and the Index may not perform as intended. Please read the Fund's prospectus for specific details regarding the Fund's risk profile.