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# Biotechnology – on the brink of something big?



*If the 19<sup>th</sup> century was characterised by breakthroughs in chemistry, and the 20<sup>th</sup> century by big leaps forward in physics, it appears that the 21<sup>st</sup> century will be all about biology, whereby we will vastly expand our capacities in reengineering biological systems to meet our needs and address pressing global issues. Government ambitions in the space coincide with powerful drivers such as demographics, decarbonisation and deglobalisation to make this a noteworthy portfolio play for long-term investors.*

Biotechnology taps into nature's toolbox, harnessing its cellular and biomolecular processes to develop technologies and products that could improve our lives and the health of our planet. Breakthroughs in mapping the human genome have been credited with "changing the course of science", comparable perhaps to the impact the silicon chip had on the IT sector. Now, scientists can tailor living organisms to specific tasks – for example, stem cells can be cultured in a lab, converted into the desired cell type and then surgically implanted to replace diseased tissue with healthy tissue.

Technology is a positive disruptor in biotech, with AI, big data and computer science presenting innumerate opportunities. Advances in genomic sequencing, gene editing and synthetic biology, pave the way for nothing short of a revolution in various industries including medicine, agriculture, energy, chemicals and materials, through the creation of new products and processes.

Given its far-reaching potential, the sector is quickly becoming the focus of governments. Noting that “the world is on the cusp of an industrial revolution fueled by biotechnology and biomanufacturing”, President Biden signed an executive order to advance US capabilities in the space, while requesting industries apply biotechnology to address goals such as finding climate change solutions, food and agriculture innovation, supply chain resilience and improving human health. Looking East, Beijing has listed biotechnology as one of 10 key sectors for development under its ‘Made in China 2025’ industrial strategy.

Of course, big biotech ambitions will require significant capital deployment from both the public and private spheres. The “biotech revolution” is something that should be on the radar of long-term investors as tailwinds gather strength. According to BioSpace, the global biotechnology market size is expected to be worth around USD 3.44 trillion by 2030 (from USD 852.88 billion in 2020) and the anticipated CAGR is 17.83% over the same period. In 2022, the largest portion of global biotech revenues were generated in the US, followed by Asia Pacific.

The main method of investing in the biotech sector is through stocks. However, biotechnology is a very heterogenous discipline that can be divided into as many as ten categories – from marine biotechnology to medical, each advancing at a different pace. It can also be volatile as companies within often have to take risks in developing new technologies and products. Because of this, assessing biotech investments requires more nuance than standard financial analysis. Looking at the medical sphere, much depends on whether the company will have positive test results for a potential blockbuster drug, and then whether regulators will approve the drug. Given the complexity of this theme, it therefore makes sense to lean on professional fund managers with adequate scientific and financial training. They will likely be more apt in curating a portfolio of promising names, while ensuring adequate diversification in terms of categories, geographic locations and company size (for example by having a balance between speculative, newly-listed companies in the clinical trial phase and large, well-established biotech large-caps that are less likely to succumb to bad market conditions.)

An alternative option for investors that want to capture the potential of biotech start-ups could be to take the private equity route. By not being publicly-listed, companies can avoid volatility and the public glare as they work to develop their end-products. According to McKinsey, venture capitalists have been largely focused on identifying biotech start-ups with next-generation platform technologies—such as new therapeutic delivery methods and machine-learning-enabled drug discovery. Start-ups with these technologies attracted nearly \$35 billion in VC funding from 2019 to 2021, compared with \$17 billion for other therapeutics such as

immunology.

The 10 biotech categories:

<b>Red or medical</b>	Related to medicine, red biotechnology encompasses the development of vaccines, antibiotics and the production of new drugs, as well as molecular diagnostic techniques, regenerative therapies and the development of genetic engineering to cure diseases through genetic manipulation.
<b>White or industrial</b>	Involves optimising industrial processes across sectors such as chemicals, food, and energy
<b>Yellow or nutritional</b>	Refers to the creation or improvement of certain food products, for example, eliminating allergens from food
<b>Grey or ecological</b>	Focuses on environmental applications, such as the protection of biodiversity, the elimination of pollutants and different substances such as heavy metals and hydrocarbons.
<b>Green or agricultural</b>	Green biotechnology mainly deals with the genetic modification of plants to make them more drought or disease resistant. It also includes the development of biopesticides and biofertilizers to reduce the chemical impact of nitrogen on the environment.
<b>Brown or desert</b>	This is related to the treatment of desert soils and the research of drought resistant plants.
<b>Blue or marine</b>	Based on the use of marine resources for the creation of products of industrial interest. E.g. algae can be used for food, drugs and biofuels.
<b>Golden or informatics</b>	Focuses on bioinformatics, computer science, chip technology and nanobiotechnology.
<b>Orange or informative</b>	The topic of orange biotechnology is the reflection about how to teach and what to teach about biotechnology due to the fact that biotechnology is a rather complex field with a lot of interdisciplinary connections.
<b>Violet or legal</b>	Focused on the study of the legal aspects surrounding biotechnology, a discipline that is, in itself, quite controversial. Hence the need for regulation.

Source: US National Library of Medicine, BIL

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