# Table of Contents

Credits ............................................................................................................................................. 1

2020 Investment Trends Continue as New Trends Emerge ................................................................. 4

Ongoing Trend: Therapeutics Sector Again Leads Synthetic Biology Investment in Q1 ................................................................. 5

Ongoing Trend: Funding for Life Science Diagnostics and Tools Continues in Q1 ................................................................. 7

New Trend: Investment into Synthetic Biology Food Companies in Q1 ................................................................. 9

New Trend: Investment into Energy Companies Increases in Q1 ......................................................... 11

Other On-Going Trends: The Continued Importance of SPACs ......................................................... 13

What to Look for in Q2 .................................................................................................................. 14

Q1 as a Roadmap: Investment Projections for 2021 ........................................................................... 15
Q1 Shatters Previous Synthetic Biology Investment Record - Signals Projected 2021 Investment of up to $36 Billion

2021 is shaping up to be a record year for synthetic biology investment. The first quarter of 2021 more than quadrupled the previous Q1 record set in 2020 and is more than ten-fold higher than Q1 investments from only four years ago. *(Figure 1).*

*Figure 1*

Investments into synthetic biology for Q1 2021 alone are greater than the total annual funding for the industry from 2009-2019. Q1 2021 is only topped by the record-setting funding from the entirety of 2020 *(Figure 6).* If current funding rates hold for this year, investments into the synthetic biology sector could be more than 200-400% larger than 2020 *(Figure 3).*
2020 Investment Trends Continue as New Trends Emerge

In many ways, this year’s record-breaking Q1 is a continuation of the record-setting ~$8 billion that went into the synthetic biology sector in 2020. Bruce Booth, a partner at the life science investment fund Atlas Venture, commented at the end of 2020, “The current financing market has been further buoyed by the strong sentiment that science will lead us out of this pandemic crisis.”¹ This appears true in 2021 as well, as more people are focused on healthcare—and therefore synthetic biology as a subsector—than ever before.

¹ https://www.forbes.com/sites/brucebooth/2020/07/15/the-record-breaking-biotech-funding-tsunami-of-1h2020/?sh=33a71f85c0fe
The healthcare industry as a whole is not the only sector seeing increased investment from the global pandemic. The global market impacts of COVID-19 also appear to be driving investment across the synthetic biology space (Figure 2). This raises two key questions:

- How has the funding environment evolved since the first year of the pandemic?
- Which trends can we expect to see as the year continues?

**Ongoing Trend: Therapeutics Sector Again Leads Synthetic Biology Investment in Q1**

The therapeutics sector was the most highly funded in 2020 and remains so in Q1 2021. This sector also saw the largest number of deals, with 19 deals overall (Figure 5). This is not surprising; therapeutics almost always attain the highest investment interest.

According to Booth², venture groups have typically gravitated towards therapeutics investments due to the more desirable risk-reward profile. Diagnostics, devices, and other similar technologies take on similar (if not higher) regulatory risks, but without the same potential payoff as a successful new medicine. For example, a new diagnostic often has to go through an approval process similar to therapeutics, but with much higher pricing pressure, a weaker intellectual property position, and more limited exit potential.

The most highly funded company in Q1 2021, ElevateBio, is in the therapeutics sector (Figure 3). The company raised $525M in Series C venture funding in a deal led by Matrix Capital Management, with participation by Vertex Ventures, EcoR1 Capital, and others. This level of investment is in line with Booth’s assessment. Therapeutics companies tend to attract a lot of capital simply because it is extremely costly to bring a drug to market: it is capital intensive in a way that other sectors are often not.

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² https://lifescivc.com/2013/04/unhealthy-prognosis-for-venture-backed-diagnostics/
Figure 3: Therapeutics and life science tools companies continued to lead funding levels in Q1. But synthetic biology energy company Gevo and cultured meat company Eat Just are both part of growing trends in bio-based energy and synthetic biology food investment, respectively.
Ongoing Trend: Funding for Life Science Diagnostics and Tools Continues in Q1

Q1 deal size in the life science tools sector was not record-topping by 2020 standards (the top tools and diagnostics deals last year were between $700-800M). But the deals made so far this year are still notable. Life sciences tools and diagnostics companies traditionally have both lower valuations and lower funding rounds. Recently, however, this trend has changed significantly.

According to PitchBook Data for Q1 2021, the deal size for life science tools and diagnostics has increased to a median value of $14.34 million.³ (Figure 4) Compare this to the previous median range of $2-4M over the past ten years. Although these numbers are not specific to the synthetic biology sector alone, they indicate increased investment interest and recognition of the crucial role tools play in enabling novel therapeutics.

Figure 4: The median deal size for life science tools and diagnostics companies increased significantly in Q1 2021. This indicates that investors are seeing greater value in the tools companies that underpin much of the synthetic biology industry.

³ PitchBook Data
According to Sean Kendall, Principal at ARCH Venture Partners, this trend is particularly relevant to synthetic biology. He says, “When you think about it, synthetic biology is actually pretty intimately linked with life science tools. Our ability to design, build, and test biology relies on the molecular and computational tools that we have. Even in the cases where evolution does the problem solving or engineering for us, the tools help us look into the ‘black box’ and understand how this complex system figured out a solution to a problem. It’s the idea that the better we understand the system, the more creative we can be,” says Kendall.

This relationship—understanding a system, then using that understanding to drive innovation—has been increasingly recognized. Keith Crandell, Co-founder and Managing Director of ARCH Venture Partners says investment in tools enables innovation in traditional synthetic biology companies. This innovation attracts further investment into those companies in a positive feedback loop. “Better tools used by these synthetic biology companies lead to new intellectual property development, which is ultimately what creates a good opportunity for investors,” says Crandell.

### Table 1: Top 10 investments into venture-backed life science tools/diagnostics companies in Q1 2021

<table>
<thead>
<tr>
<th>Company</th>
<th>Deal Size ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insitro</td>
<td>400,000,000</td>
</tr>
<tr>
<td>Miroculus</td>
<td>45,000,000</td>
</tr>
<tr>
<td>Earli</td>
<td>40,000,000</td>
</tr>
<tr>
<td>Delonix Bioworks</td>
<td>14,000,000</td>
</tr>
<tr>
<td>Parse Biosciences</td>
<td>7,000,000</td>
</tr>
<tr>
<td>Nanome</td>
<td>3,000,000</td>
</tr>
<tr>
<td>Droplet Genomics</td>
<td>1,190,000</td>
</tr>
<tr>
<td>Linear Diagnostics</td>
<td>1,106,000</td>
</tr>
<tr>
<td>Biomatter Designs</td>
<td>692,000</td>
</tr>
<tr>
<td>Phenotypeca</td>
<td>415,000</td>
</tr>
</tbody>
</table>
The life science tools company, Insitro, saw the biggest investment in the sector in Q1 2020. The company is developing a machine-learning technology for drug discovery to digitally generate new drug candidates. The latest round, a Series C, was backed by well-known biopharma investors such as Third Rock Ventures and ARCH Venture Partners. Other major investors included GV, Alexandria Venture Investments, Andreessen Horowitz, and BlackRock.

Life science tools are ultimately unique because they provide opportunities in valuable spaces: a tool enables a company to build a platform of multiple therapeutics or diagnostics. This provides large potential upsides (multiple diagnostics can serve to limit the risk-reward question mentioned earlier), while still enabling a revenue stream upfront since a research-use-only tool is not subject to regulatory scrutiny. As this is increasingly recognized, it is likely to drive further investment into life science tools.

**New Trend: Investment into Synthetic Biology Food Companies in Q1**

2021 has seen a new wave of investment into alternative meat and food ingredients companies. The vast majority of these companies are developing alternative meats and seafood made using synthetic biology techniques. These include microbial fermentation, bioengineering plant-based ingredients, and cell-culture technology.

During the pandemic, worker illness and shutdowns of meat processing plants led to beef, pork, and poultry shortages. Supply chains broke down further under quarantine restrictions. These factors have corresponded with a wave of new alternative meat consumers. Since the beginning of the pandemic, over half of US and European consumers have sampled plant-based meat, 63% of which became repeat users. This consumer trend has increased the demand for alternative proteins. The synthetic biology industry is particularly poised to meet these demands as it exists to tackle key societal challenges through biology.

“The COVID-19 pandemic has dramatically accelerated investment in the food and beverage space. Alternative protein companies have been the biggest driver of these trends as sustainability and supply chain resiliency comes into greater focus,” said Jake Matthews, senior intelligence analyst at CB Insights.4

Matthews isn’t alone in seeing how strongly the pandemic has fueled investment into bio-based foods. Anne Greven, global head of food and agribusiness innovation and the FoodBytes! platform at Rabobank, New York said, “The pandemic fundamentally exposed the fragility of the food system. As a result, it really helped validate the need for real innovation and real investment. Whether it was direct corporate investment or special venture funds, we saw a lot more money moving toward entrepreneurs who are solving big problems in the food system.”5

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4 [https://www.foodbusinessnews.net/articles/17637-food-entrepreneur-investment-trends-on-tap-for-2021](https://www.foodbusinessnews.net/articles/17637-food-entrepreneur-investment-trends-on-tap-for-2021)

Many of the synthetic biology food and food ingredients companies funded in Q1 2021 are alternative seafood companies. This is no coincidence, according to Bennett Cohen, a partner at Piva Capital. Cohen predicts alternative seafood is the “next wave in the clean meat movement.” He sees seafood as both a consumer demand and an opportunity for start-ups seeking to differentiate themselves in the market. According to Cohen, seafood tech start-ups tend to draw more investment than traditional meat alternatives.

BlueNalu, a company developing a mahi-mahi fish alternative, saw the most seafood tech investment with $60 million in convertible note financing—a type of financing that starts as debt and that can later convert to equity. The company plans to use the funding to complete its regulatory review with the FDA and open a 40,000 square foot production facility. The company will then begin testing its first cultured meat products.

<table>
<thead>
<tr>
<th>Company</th>
<th>Deal Size ($)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Eat Just</td>
<td>200,000,000</td>
</tr>
<tr>
<td>BlueNalu</td>
<td>60,000,000</td>
</tr>
<tr>
<td>Evolve Biosystems</td>
<td>55,000,000</td>
</tr>
<tr>
<td>Meatable</td>
<td>47,000,000</td>
</tr>
<tr>
<td>Air Protein</td>
<td>32,000,000</td>
</tr>
<tr>
<td>Redefine Meat</td>
<td>29,000,000</td>
</tr>
<tr>
<td>Future Meat Technologies</td>
<td>26,750,000</td>
</tr>
<tr>
<td>Arcadia Biosciences</td>
<td>25,100,000</td>
</tr>
<tr>
<td>New Wave Foods</td>
<td>18,000,000</td>
</tr>
<tr>
<td>Mosa Meat</td>
<td>10,000,000</td>
</tr>
<tr>
<td>Hoxton Farms</td>
<td>3,740,000</td>
</tr>
<tr>
<td>Future Fields</td>
<td>2,200,000</td>
</tr>
<tr>
<td>New Age Meats</td>
<td>2,000,000</td>
</tr>
</tbody>
</table>

*Table 2: Top 13 investments into venture-backed synthetic biology food companies Q1 2021. Notably, 7 of these top-funded companies use cell culture technologies, including Eat Just, BlueNalu, Meatable, Future Meat Technologies, Mosa Meat, Hoxton Farms, Future Fields, and New Age Meats.*
Cultured meats are made from cell cultures taken from animals—in the case of BlueNalu, cells from mahi-mahi fish—which are then grown in a bioreactor and assembled into a final product. These food technologies, also known as cell-based meats, were a major driver of synthetic biology food investment in Q1. Most notably, Eat Just, the first company approved to sell cultured meat in Singapore raised $200 million, led by Qatar’s sovereign wealth fund, Qatar Investment Authority. Of the top 13 synthetic biology food companies funded in Q1, seven are founded on cell culture technology platforms. (Table 2)

It’s currently unclear when the FDA and USDA will approve products like cultured meats. If approvals go through this year, it could dramatically shift the investment landscape for food and food ingredients. Even if US regulatory agencies do not decide this year, we still expect this trend will continue into Q2 2021 and beyond.

New Trend: Investment into Energy Companies Increases in Q1

Synthetic biology energy companies also saw an increase in funding in Q1. This seems fitting, since as an industry synthetic biology is especially well suited to alternative fuel manufacturing and other biology-based innovations in the energy sector. Though synthetic biology companies still represent a small share of energy sector investments, they have benefited from a significant increase in overall energy funding.

Deal size in the venture-backed energy sector increased dramatically this year (Figure 5). Median deal size upticked sharply to ~$11.5 million, whereas median deal size over the previous twelve years remained roughly consistent between $3.3 and $5 million. In short, Q1 2021 saw a 130% growth in energy venture funding.

Kendall says new policy initiatives are changing the emphasis on clean energy, creating room for synthetic biology companies to excel. “You’re seeing in policy globally that renewables are getting more attention. The way that the government is built right now indicates that there will likely be money going into these initiatives, as well as financial incentives created. So policy is one sector that has a high impact on clean tech’s future. Synthetic biology companies are particularly well suited to fill this gap due to the advanced stage of the technology. The science is there, it’s the costs that come into play.”

Particularly notable amongst the Q1 synthetic biology company deals was Gevo, a renewable chemicals and biofuels company that claims net-zero greenhouse-gas emissions. The company raised $260M through private investment in public equity (PIPE). Although Gevo has been around since 2007, this was by far the largest amount of capital the company has ever raised, topping its previous highest round—its IPO—by more than two-fold.

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7 [https://synbiobeta.com/does-meat-have-to-come-from-animals-not-anymore/](https://synbiobeta.com/does-meat-have-to-come-from-animals-not-anymore/)
8 PitchBook Data
Another notable synthetic biology company in the renewable energy space is LanzaJet, a company creating sustainable aviation fuel for airlines. LanzaJet was launched in June 2020, to help “a sector requiring climate-friendly fuel options as it starts to recover from the impacts of COVID-19,” according to its website. The company has since acquired multiple partnerships in 2021, including one with British Airways.

![Figure 5: The median deal size for venture-backed energy companies grew significantly in Q1 2021. This could signal new opportunities for synthetic biology energy companies.](image)

The renewed focus on the energy sector within synthetic biology is understandable, especially given the goals of the current U.S. administration to rejoin the Paris Climate Accord. The Biden administration has also announced plans to invest $2 trillion in clean energy, and fully decarbonize the power sector by 2035 to be net-zero in carbon emissions by 2050. This could mean a new wave of government grants and partnerships that would better enable profitability and scaling in an industry that has often faced difficult economics.

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Investment in synthetic biology energy companies is likely a trend that is only just beginning and will gather more momentum should the Biden Administration continue to pursue a decarbonization agenda.

Other On-Going Trends: The Continued Importance of SPACs

Lager market and investment trends are also impacting the number and value of synthetic biology deals beyond sector-based trends. The most notable ongoing trend of 2021 is the continued prevalence of special-purpose acquisition companies, or SPACs. Also known as “blank check” shell companies, SPACS offer an alternative route to raising public financing. The Wall Street Journal termed 2020 “a record year for new SPAC listings,” with over $125B in SPAC mergers announced by December 2020 alone.

In February, 23andMe announced its plan to go public via a SPAC in a $3.5B deal. Multiple new biotech SPAC deals have also been announced in rapid succession. These include SPAC deals from top biotech investor Peter Kolchinsky (founder of RA Capital) who announced his second SPAC (Research Alliance II) for $130M—only three days after completing a $300M SPAC raise for Point Biopharma.

SPACs have also emerged in the food and food ingredients sector as the sector has grown in popularity (Table 2). SPACs provide an alternative route for consumer packaged goods companies (i.e., CPGs) to be acquired while they are still relatively small, typically too small for large CPGs to buy.

SPAC deals don’t seem to be slowing down anytime soon, particularly in biotech. According to an analyst note on SPACs published by Pitchbook, “Given the high burn rate associated with R&D costs, capital expenditures, and multi-site clinical trial management, cash on hand is the lifeblood of these companies. Public investors have been a key source of capital for biotech companies progressing into large-scale clinical trials and those who are negotiating licensing fees and expensive manufacturing contracts. SPACs can provide [biotech companies] with quicker access to the public markets than a traditional IPO and mitigate much of the dilution and valuation discounting that occurs with crossover rounds and IPO transactions.”

The analysis goes on to say that, “the hype around SPACs will likely recede once more certainty returns to the financial markets; the time it takes to go public is not accelerated enough using

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10 https://www.theverge.com/21502700/spac-explained-meaning-special-purpose-acquisition-company
12 https://endpts.com/top-biotech-investor-peter-kolchinsky-tees-up-a-new-spac-3-days-after-a-300m-raise-for-radiopharmaceuticals-play/
13 PitchBook Data, “The 2020 SPAC Frenzy”
SPACs to simply supplant other options and make this strategy the go-to route for public listings.”

We think this is largely accurate, and while the momentum for SPAC listings is not slowing down just yet, it’s possible it could in the coming quarters of 2021.

**What to Look for in Q2**

Perhaps one of the largest and most pertinent issues in Congress is the renewed discussion around drug pricing. Democratic Senators recently re-introduced legislation allowing Medicare to negotiate drug prices. At the end of March, Senators held their first drug pricing hearing since Democrats took control of the chamber. If Senate Democrats move forward, this could impact the biotech public markets and slow down the wave of public financing that demarcated 2020.¹⁴

The current administration has also taken measures to be science-forward, including appointing Eric Lander as the Presidential Science Advisor (which Biden has elevated for the first time in history to be a member of his Cabinet), as well as director of the Office of Science and Technology Policy (OSTP). Bided also appointed Nobel Laureate and synthetic biology pioneer, Frances Arnold, to be a special advisor.¹⁵,¹⁶ Such actions signal an intentional focus on the role of science-informed policy and could lead to measures to address climate change. This change in environmental policy could fuel greater investment in alternative energy companies and continue the energy investment trends in the sector.

Figure 6: Upper and lower bound projections of total 2021 synthetic biology investments.

If investment continues at the same rate as Q1, this suggests a minimum of $16.8 annual investment into the synthetic biology sector (calculated by multiplying Q1 investment by four, which we have defined as the “Low bound”). If we assume that the per quarter growth rate of 2020 holds, this could project a $36B investment into synthetic biology in 2021 (which we have defined as the “upper bound”). Whether either scenario comes to fruition is certainly an open question and will depend on whether deal sizes and frequency increase or decrease as the year continues. In any case, Q1 funding levels suggest a record year for synthetic biology investment.
Even if funding into therapeutics slows down as we cross the one-year mark of the COVID-19 pandemic, life science tools and food ingredients investments will likely continue. Biofuels are also likely to grow depending on new regulations imposed by the Biden administration, but growth in that sector has been more modest thus far compared to others.

In summary: 2021 is projected to be yet another unprecedented year for the synthetic biology sector.