Synthetic Biology Investment Report 2019 Q2

synbiobeta

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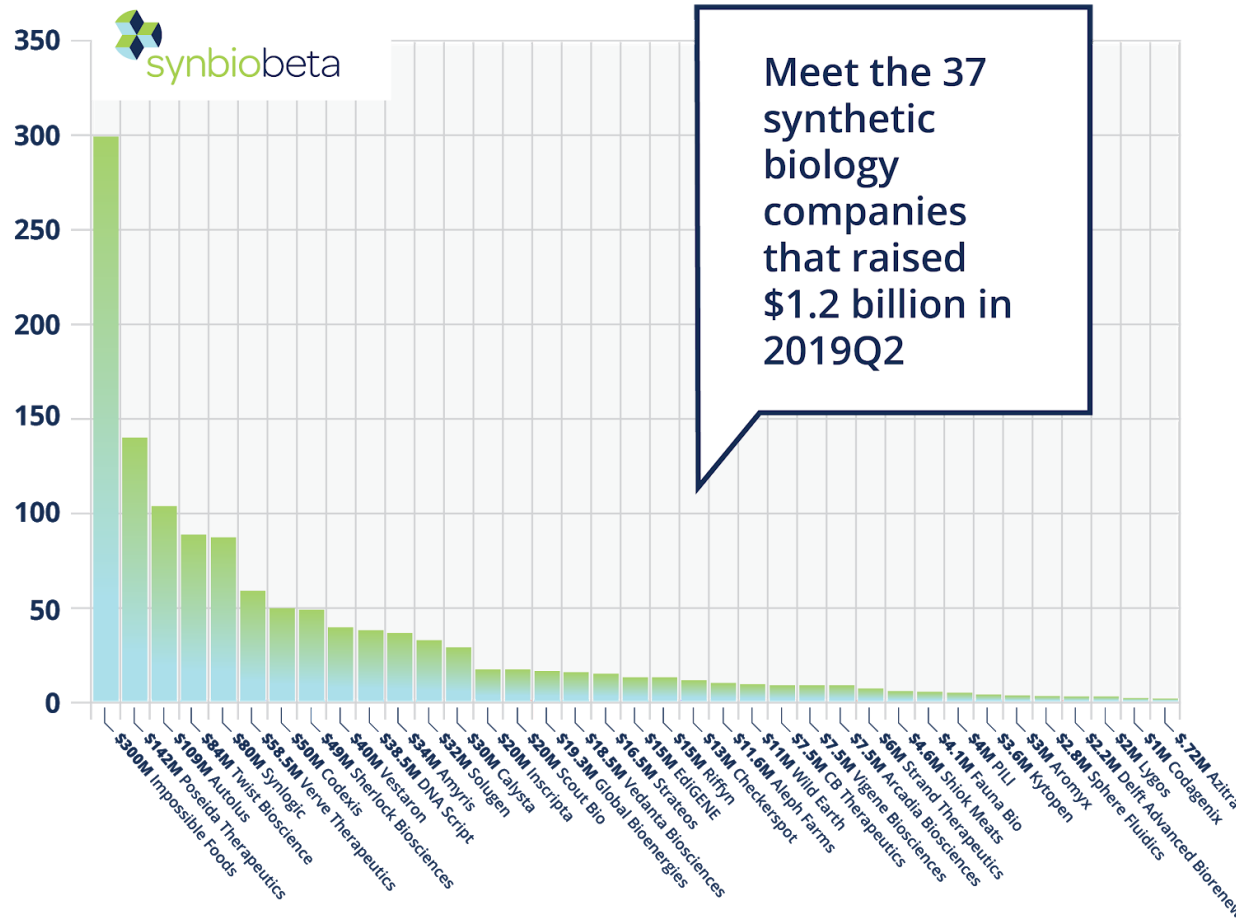
Table of contents

Meet the 37 synthetic biology companies that raised $1.2B this quarter



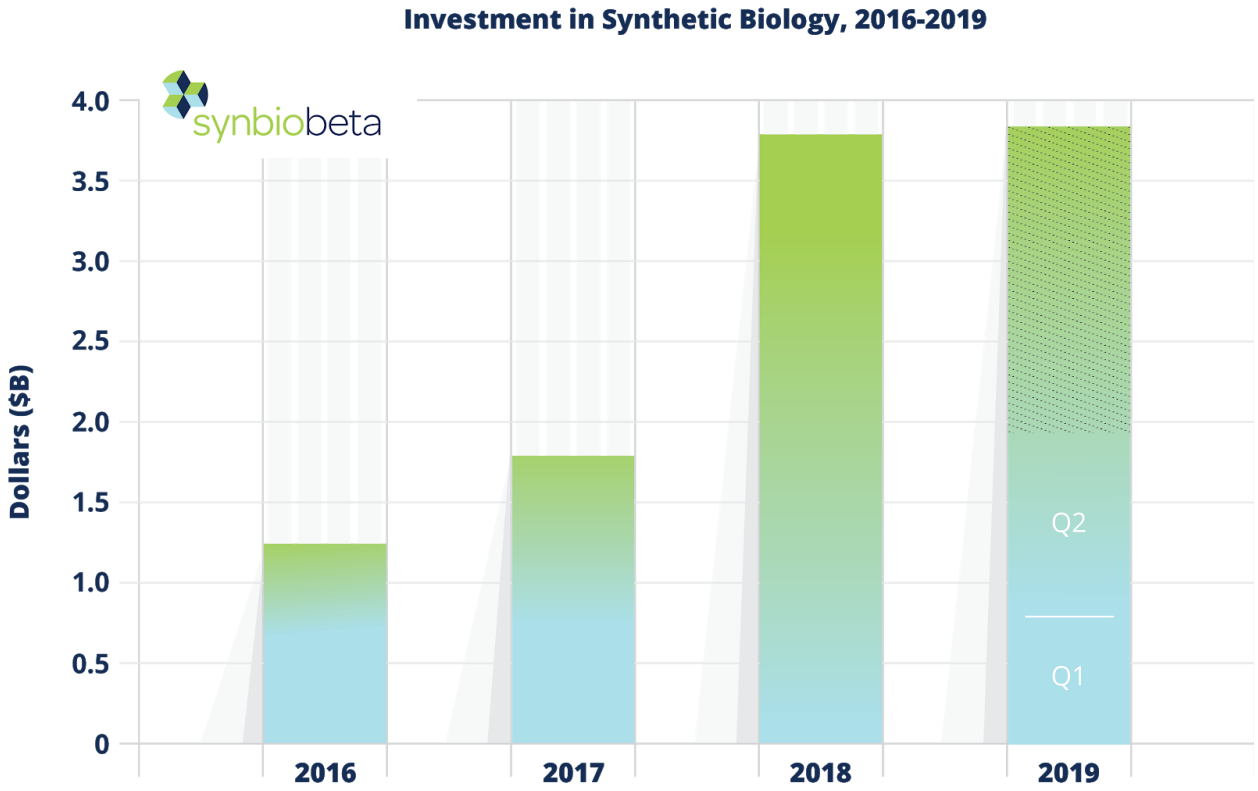
A strong second quarter put the synthetic biology industry on track to match 2019's record breaking year of investment, with about one-third more companies getting a piece of the pie. Image: SynBioBeta.

Executive summary

Crunchbase reports that startup funding is flat this quarter. But the synthetic biology industry doesn't seem to have gotten the memo.

After the first quarter, the field was on track to set a record for the total number of investment deals, although the total amount of money being invested was not projected to beat out 2018's staggering sum of $3.8 billion. But the second quarter of the year was the best on record, putting even better than the first, demonstrating that investor interest in both the public and private markets is strong and growing.

Through the first half of 2019, 65 synthetic biology companies raised $1.9 billion in funding. Both of these numbers would be higher than any full year except for last year, which goes to show just how fast the field is growing. If investing keeps up at this pace, 2019 will see 33% more investment rounds worth about the same as last year -- $3.8 billion.



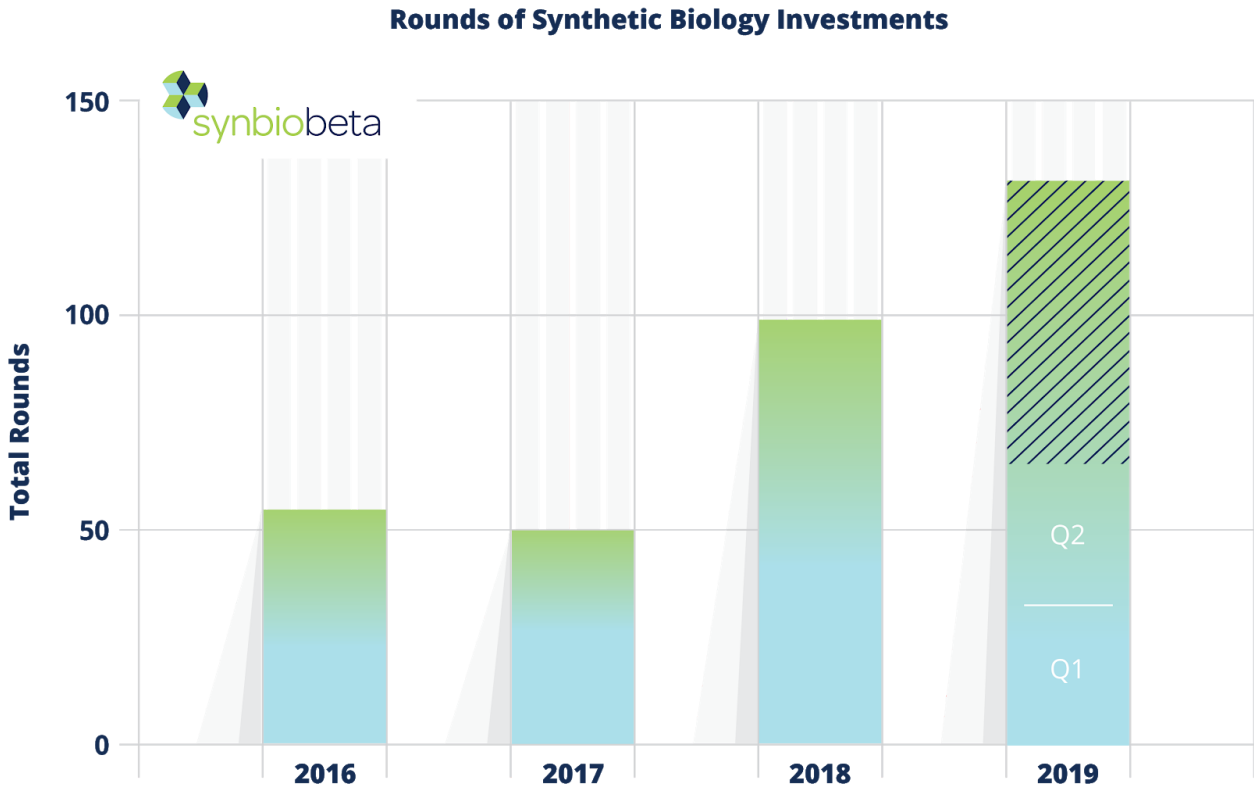
The Class of 2019: Reimagining pharma

Seven of the 37 companies funded this quarter are receiving their first round of investment, and of those seven all but one is related to therapeutic applications. This may be an indication that the tools and technologies of synthetic biology are enabling small, innovative, fast-moving companies to reimagine pharma and pursue market opportunities that were previously inaccessible. More importantly, patients with rare and undertreated diseases also stand to benefit, as small therapeutic markets become more economically viable for both small and large companies alike to pursue.

Newly funded synthetic biology companies in Q2 2019	
Verve Therapeutics	Developing gene editing therapies to reduce risk of coronary artery disease in adults.
Strand Therapeutics	Utilizing synthetic biology to genetically program mRNA to deliver immunotherapies.
Kytopen	Developing platforms to accelerate the discovery and manufacturing of cell therapies.
Fauna Bio	Developing new ways to treat human diseases by adopting mechanisms animals have developed for traits such as hibernation and deep-diving.
Vigene Biosciences	Viral vector-based gene delivery services and products for research and clinical applications.
Shiok Meats	Bringing cell-based crustacean meats (shrimp, crab, lobster) to your table.
Strateos	Automation of chemistry, biology, and tissue analysis into closed loop robotic labs that accelerate drug discovery programs.

More companies are getting a piece of the pie

During a SynBioBeta 2018 investor panel (available online), Alicia Jackson of Genoa Ventures remarked that there is an unlimited amount of money in the world now, but that there is a very limited supply of great entrepreneurs. Despite that, 2019 is on track to fund about one-third more rounds than last year, suggesting that investor support for synthetic biology entrepreneurs and their technology is still high.



Overall, raising a large amount of money in a year is related more to having a few huge fundraising rounds rather than having a large number of companies raise. 2018 had a few of these, like Moderna and Zymergen's combined $1 billion, which contributed to the large leap in dollars raised. Though Impossible Foods had a funding round in this range ($300 million), we will need several more rounds like this in order to continue setting records for funds raised.

Top Five Funded Companies - Q2 2019		
Impossible Foods	**$300M**	The company makes meat, dairy and fish directly from plants.
Poseida Therapeutics	**$142M**	Next-generation CAR-T cell therapies for cancer.
Autolus	**$109M**	T-cell programming and manufacturing technology for the treatment of cancers.
Twist Bioscience	**$84M**	Innovative silicon-based DNA synthesis platform enables the production of high-quality synthetic DNA.
Synlogic	**$80M**	Designing living therapeutics programmed to treat disease in new ways.

As with newly funded companies, therapeutics companies are strongly represented among the top-funded companies in Q2.

Where in the synbio stack is investment going?

Will Canine of Opentrons recently wrote an article at SynBioBeta about the concept of the Synbio stack, a way to abstract synthetic biology products by where they fit into the synthetic biology ecosystem. Towards the bottom of the stack are enabling materials and tools that allow for the quick, easy, and reliable engineering of biological systems for a specific purpose. As we move up the stack, we start to see products that, while still fundamentally based in synthetic biology, have applications in areas that might be outside of the field. These may be products that are fed into other fields for further refinement, like industrial chemicals, or goods that can be sold directly to consumers.

It is important that companies along the whole stack are being funded, as all are essential to building a robust and healthy ecosystem. Synthetic biology has to have applications that can bring about positive impacts in peoples' lives in order to fulfill the promises that we have been making to the public and assuage their fears about genetic engineering. On the

other hand, tools and reagents companies make it so that applications companies can bring their product to market. By breaking down the second quarter's fundraising by where the different companies fall on the stack, we can see that all the sections of the stack are receiving attention from investors.

Biological reagents

In order to build products with genetically-engineered biological systems, we need tools to shape the genomes of those systems for our purposes. This is where reagents companies come into play, by providing new systems that make the construction of biology faster, easier, and cheaper. Twist Bioscience is an incredibly important contributor to the biological reagents stack by providing a large fraction of the DNA that is used by synthetic biology companies. They went public in 2018, and recently completed a follow-on offering where they raised $84 million to fund further research and development.

Process execution

One of the driving factors behind the revolution currently underway in synthetic biology is the advancements that have occurred in the automation and optimization of biological processes. These allow for the high-throughput construction and testing of many thousands of biological designs.

Inscripta is developing an unprecedented set of tools for synthetic biology researchers, and raised an additional $20 million in April to add to their Series C. Inscripta is developing the world's first scalable platform for benchtop digital genome engineering. Inscripta recently announced the results of a single, 200,000-edit library experiment consisting of a large variety of edit types to an E. coli biosynthesis pathway, which revealed novel biology in the lysine metabolic pathway.

A major advantage of working with biology is the ability to generate huge amounts of diversity fairly easily, but until recent developments in process execution, that diversity remained largely unexplored. Kytopen is a new company in this space that raised $3.6 million in a seed round in order to commercialize their Flowfect technology. Through their work, the development and manufacture of cell therapies will become significantly simpler, unlocking this style of therapies for a whole new set of indications.

Bio CAD/CAM

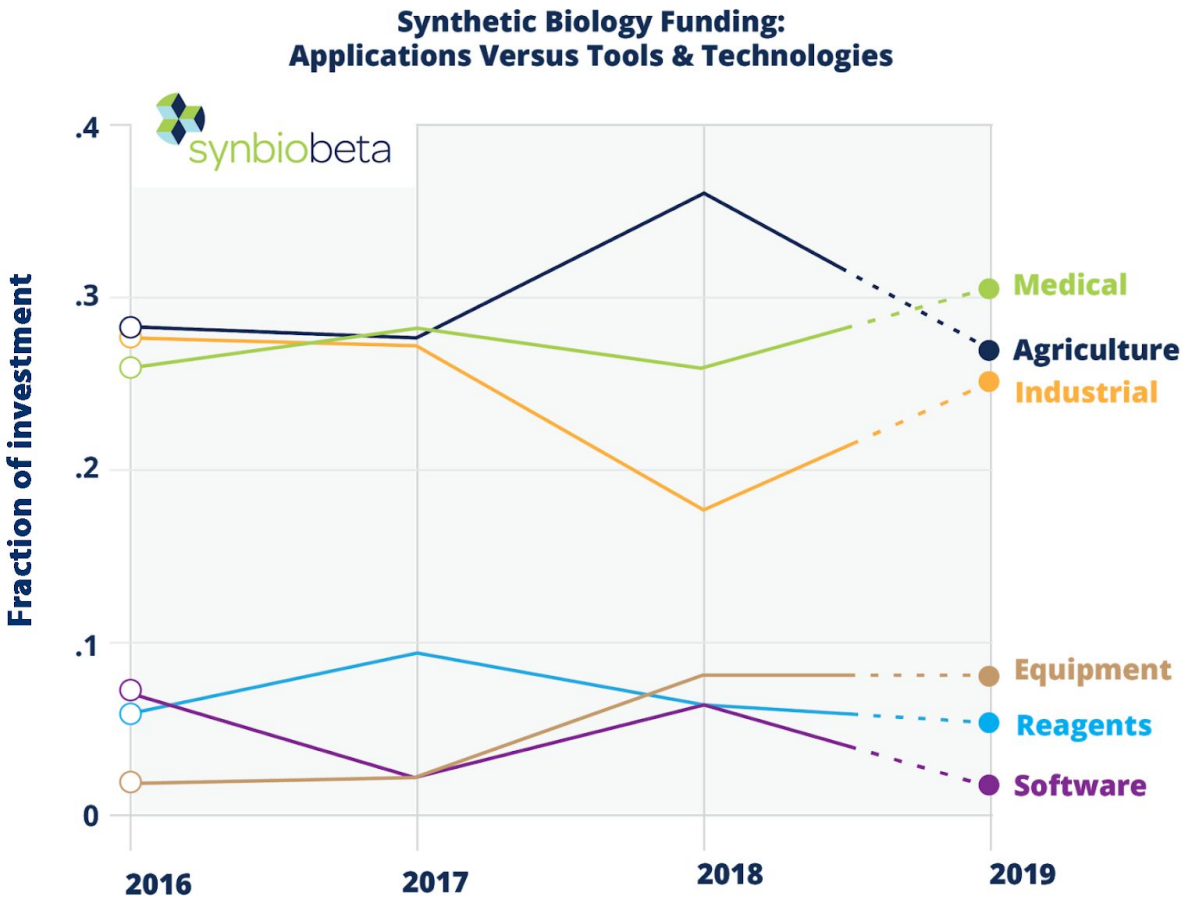
In order to design and track all the experiments that advances in process execution have enabled, software for biology is becoming increasingly important. However, this is one area where there was a marked decrease in investment so far this year. Less than 3% of companies who raised money this year fell into that category, the lowest amount of any recent years. Whether this is due to a decrease in investor appetite for these types of companies or a lack of companies being founded in this space, we will need to keep an eye out in the future in order to make sure that this part of the stack is being maintained.

One company that is doing good work in the space is Riffyn. This company empowers researchers to take the data that they are generating in their experiments and turn those into learnings that can inform the next round of design. In order to support this important work, Riffyn raised a $15 million Series B in May. Hopefully this will spark some more interest in Bio CAD/CAM software and will bring more software solutions into the space.

Applications

Finally, the ultimate reason we have a whole Synbio stack: creating biological devices that provide value to consumers outside of other synthetic biology companies. These applications, while still early, demonstrate the diverse areas in which synthetic biology can be beneficial. The companies in the part of the stack that received funding in the second quarter of 2019 prove this by developing products with applications from health to chemicals to fashion.

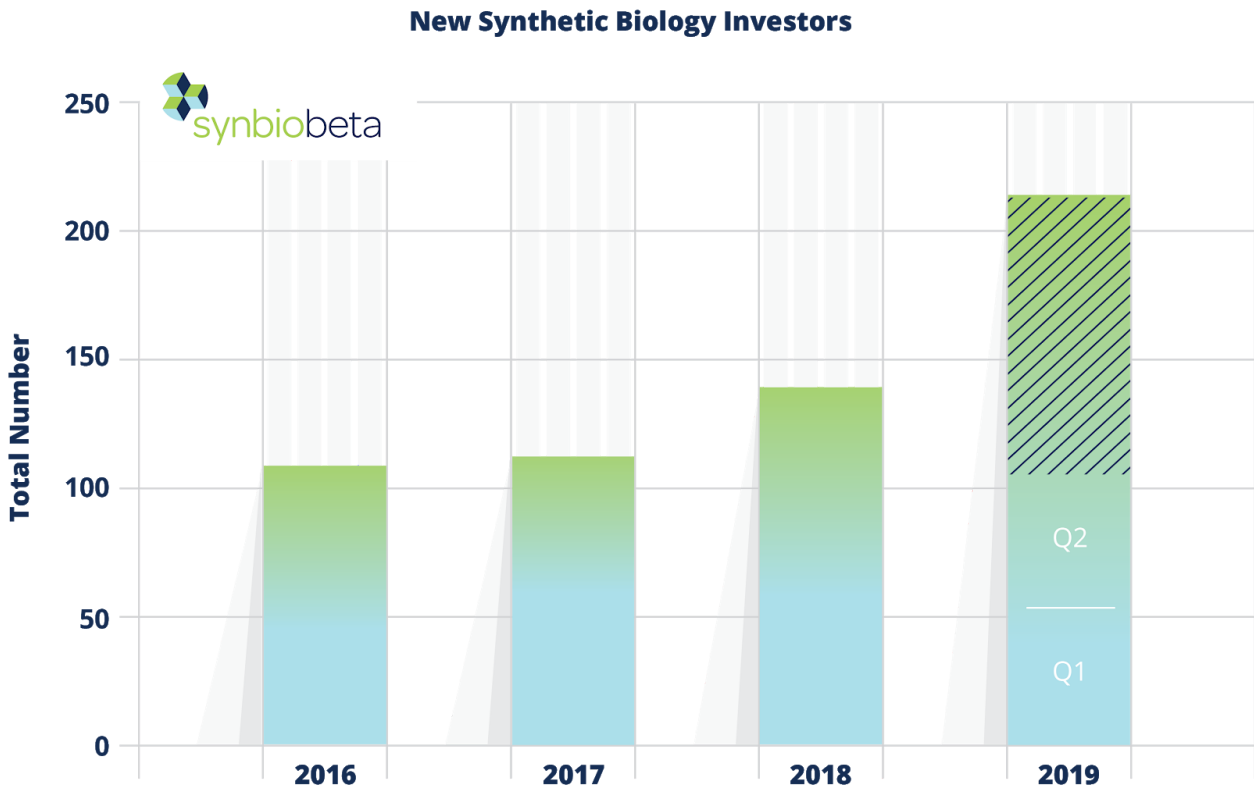
Codexis, a public protein engineering company, raised $50 million in a private placement of shares. Codexis's proteins are used across a broad variety of industries, but recently has done some great work in the development of proteins as a therapeutic, having partnerships with GSK and Merck. Getting away from health applications, Checkerspot is a younger company that uses microalgae in order to produce performance materials and they recently raised $13 million in pursuit of this goal. Checkerspot's technology shows why every company needs to have a bio-strategy: because biology can do things no other field can. Their microbes can produce fatty acids with unique chemical properties found nowhere else.



Checkerspot's materials will likely be available soon in the form of new clothing, but they aren't the only company working to update the fashion industry with the power of biology. Pili is creating biobased dyes that can replace the petroleum-based dyes currently used by textile companies. This is a change that is both beneficial to the environment and consumers, as the biobased dyes are likely to be less toxic. In order to fund this work they announced the closing of a $4 million dollar funding round. SOSV, one of the investors in this round, is a common investor in synthetic biology companies as they can see the huge potential in the field.

Who's investing?

The number of new investors in the space exploded in 2019. This is partially thanks to the Impossible Foods Series E, which brought a bevy of celebrity investors, from Katy Perry to Kirk Cousins. But investors are jumping into the field from all over. Many are traditional venture capital investors coming to synthetic biology from information technology, seeing the potential in combining computation and biology. Others are impact investors like charitable groups or family offices that see the environmental and human impact that can be achieved when synthetic biology companies get their product to the market.



Funding by region

The East and West Coasts have been the historical beneficiaries of new investment in synthetic biology, with the biotech powerhouses of San Francisco/Silicon Valley and Cambridge/Boston taking the lion's share of synthetic biology funding. Last quarter, Boston led the way with $295M in investment. The Midwest actually moved into second place with $162M, with San Francisco coming in third at $64M. This quarter, San Francisco reclaimed

the top spot, bringing in $570M. Boston took second, with companies there raising $230M. Third place actually went to the sunny shores of San Diego, where Posieda Therapeutics's enormous Series C pushed that region's total money raised to $150M.

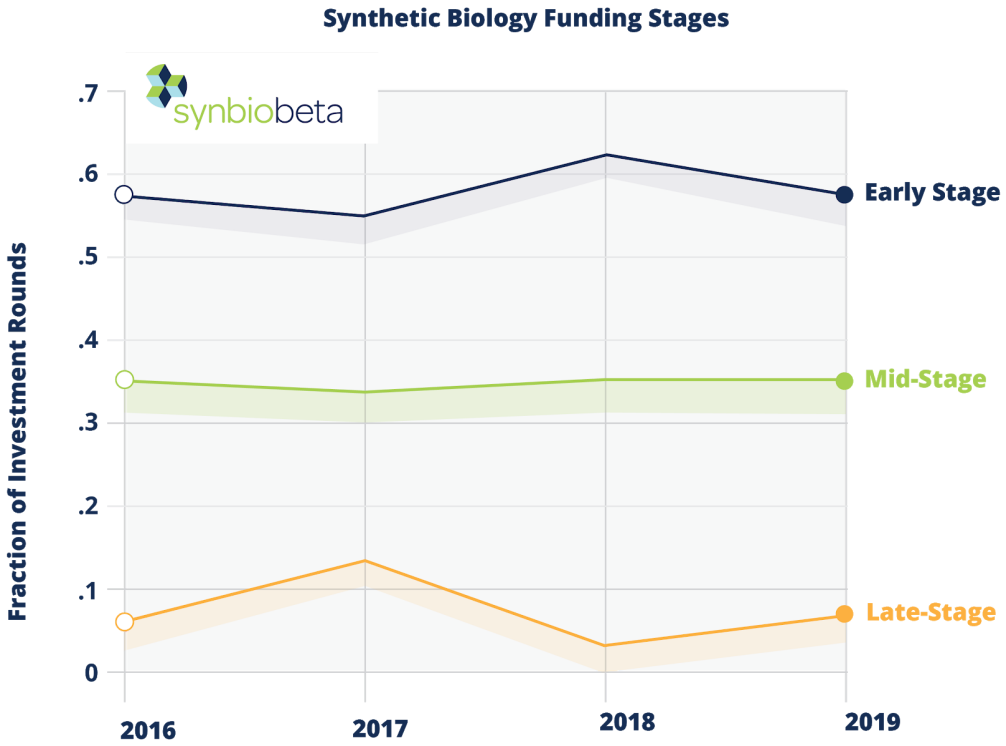
Synthetic biology investment by region. *This quarter, the San Francisco Bay Area led synthetic biology investment at $542M, followed by the Boston region at $230M. The rest of the US totaled $297M, and the rest of the world totaled $147M.*

Analysts such as Dhruv K. Vig, PhD, Senior Associate for Digital Health at Silicon Valley Bank, have pointed out that the life sciences and healthcare industries are starting to see a rise of invested capital and deals within the central regions of the nation, signaling growth outside the established technology hubs on the coasts. In fact, Q1 did see an increase in funding to the central United States, with a few companies in the midwest receiving very large investments. This quarter is a little more typical of historical trends, with the San Francisco Bay Area topping this quarter's regional funding matchup, due in no small part to the big $300M investment in Impossible Foods in Emeryville, CA. It remains to be seen to what degree synthetic biology tools and technologies will lead to biotechnology enterprises that draw capital to new and emerging biotechnology hubs in the middle of the US and throughout the world.

Funding by company stage

One trend that has been occuring in the general startup market is that a greater fraction of investments are going to companies in later stages. These fundraises are usually much larger, which results in an increase in the total amount of funds raised while the total

number of companies getting funded decreases. The broad increase of funds going to startups is obscuring the details that the market may not be sustainable, due to a lack of new innovation. Funding in synthetic biology has increased over the years -- is the field beginning to experience this phenomenon?



Funding by company stage. *Funding for synthetic biology companies has been consistent across early, mid, or late-stages. The investment blend suggests that new companies continue to enter into the industry at a healthy rate.*

The distribution of early-, mid-, and late-stage raises has not shifted in a significant manner over the past few years. Late-stage companies continue to make up only around 10% of all investments. The increase in total funding to the field has more likely been due to an all-around increase in number the companies raising money, showing that synthetic biology continues to have a healthy influx of new companies.

Summary

Crunchbase reports that, in the broader North American investment market, there are a lot of data indicators pointing in different directions. IPOs were super strong, deal volume is up somewhat, but investment totals were flat. In general, the funding climate appears to be holding firm.

The synthetic biology industry had a record quarter, with investors remaining bullish about the ability of biology to solve important problems, create better products, and drive new markets. And post-IPO performance has also been solid, with companies like Twist and Beyond Meat maintaining valuations well above their initial offering price.

The continued growth of the industry is linked to the broader market, and could be significantly impacted by social and political factors such as a Green New Deal, the adoption of a federal roadmap for strategic investment in synthetic biology, or even our ability as a field to engage with the public and earn trust for bioengineered products. Time will only tell if any or all of these things will come to pass. For the time being, though, it seems the investment community is signalling full speed ahead.