Amendment No. 2 to draft registration statement as submitted for confidential review with the Securities and Exchange Commission on August 21, 2018. This draft registration statement has not been publicly filed with the Securities and Exchange Commission and all information herein remains strictly confidential.

Registration No. 333-

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM S-1
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

TWIST BIOSCIENCE CORPORATION
(Exact name of Registrant as specified in its charter)

Delaware	2836	46-2058888
(State or other jurisdiction of incorporation or organization)	(Primary Standard Industrial Classification Code Number)	(I.R.S. Employer Identification Number)

455 Mission Bay Boulevard South, Suite 545
San Francisco, CA 94158
(800) 719-0671
(Address, including zip code, and telephone number, including area code, of Registrant's principal executive offices)

Emily M. Leproust
President and Chief Executive Officer
Twist Bioscience Corporation
455 Mission Bay Boulevard South, Suite 545
San Francisco, CA 94158
(800) 719-0671
(Name, address including zip code, and telephone number including area code, of agent for service)

COPIES TO:

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Approximate date of commencement of proposed sale to the public:
As soon as practicable after this Registration Statement becomes effective.

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, check the following box. ☐

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, please check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. ☐

If this Form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. ☐

If this Form is a post-effective amendment filed pursuant to Rule 462(d) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. ☐

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Securities Exchange Act of 1934 (check one):

Large accelerated filer	☐	Accelerated filer	☐
Non-accelerated filer	☒ (Do not check if a smaller reporting company)	Smaller reporting company	☐
		Emerging growth company	☒

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided to Section 7(a)(2)(B) of the Securities Act. ☒

CALCULATION OF REGISTRATION FEE

Title of each class of securities to be registered	Amount to be registered(1)	Proposed maximum offering price per unit(2)	Proposed maximum aggregate offering price(2)	Amount of registration fee
Common Stock, par value $0.00001 per share		$	$	$

(1) Includes shares of Common Stock issuable upon exercise of the Underwriters' option to purchase additional shares, solely to cover overallotments. See "Underwriting."

(2) Estimated solely for the purpose of computing the amount of the registration fee pursuant to Rule 457(a) under the Securities Act of 1933, as amended.

The Registrant hereby amends this Registration Statement on such date or dates as may be necessary to delay its effective date until the Registrant shall file a further amendment which specifically states that this Registration Statement shall thereafter become effective in accordance with Section 8(a) of the Securities Act of 1933, as amended, or until the Registration Statement shall become effective on such date as the Securities and Exchange Commission, acting pursuant to said Section 8(a), may determine.

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The information in this preliminary prospectus is not complete and may be changed. We may not sell these securities until the registration statement filed with the Securities and Exchange Commission is effective. This preliminary prospectus is not an offer to sell these securities and it is not soliciting an offer to buy these securities in any jurisdiction where the offer or sale is not permitted.

Subject to completion, dated , 2018

PRELIMINARY PROSPECTUS

shares

TWIST BIOSCIENCE

Common stock

This is the initial public offering of shares of common stock of Twist Bioscience Corporation. Prior to this offering, there has been no public market for our common stock. The initial public offering price is expected to be between $ and $ per share.

We intend to apply to list our common stock on the Nasdaq Global Market under the symbol “TWST.”

We are an “emerging growth company,” as defined under the federal securities laws and, as such, we have elected to comply with certain reduced public company reporting requirements for this prospectus and future filings.

	Per Share	Total
Initial public offering price	$	$
Underwriting discounts and commissions(1)	$	$
Proceeds, before expenses, to Twist Bioscience Corporation	$	$

(1) See “Underwriting” for additional disclosure regarding underwriting discounts and commissions and estimated offering expenses.

We have granted the underwriters a 30-day option to purchase up to additional shares of common stock from us at the initial public offering price less the underwriting discounts and commissions, solely to cover overallotments.

Investing in our common stock involves a high degree of risk. See the section entitled “Risk factors” beginning on page 17 to read about factors you should consider before buying shares of our common stock.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the accuracy or adequacy of this prospectus. Any representation to the contrary is a criminal offense.

The underwriters expect to deliver the shares of common stock to purchasers on or about , 2018.

Joint book running managers

J.P. Morgan **Cowen**

Co-managers

Allen & Company LLC **Baird**

, 2018

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NEITHER WE NOR THE UNDERWRITERS HAVE AUTHORIZED ANYONE TO PROVIDE ANY INFORMATION OR TO MAKE ANY REPRESENTATIONS OTHER THAN THOSE CONTAINED IN THIS PROSPECTUS OR IN ANY FREE WRITING PROSPECTUSES WE HAVE PREPARED. NEITHER WE NOR THE UNDERWRITERS TAKE RESPONSIBILITY FOR, AND CAN PROVIDE NO ASSURANCE AS TO THE RELIABILITY OF, ANY OTHER INFORMATION THAT OTHERS MAY GIVE YOU. THIS PROSPECTUS IS AN OFFER TO SELL ONLY THE SHARES OFFERED HEREBY, BUT ONLY UNDER CIRCUMSTANCES AND IN JURISDICTIONS WHERE IT IS LAWFUL TO DO SO. THE INFORMATION CONTAINED IN THIS PROSPECTUS IS CURRENT ONLY AS OF ITS DATE.

For investors outside of the United States: We have not, and the underwriters have not, done anything that would permit this offering or possession or distribution of this prospectus in any jurisdiction where action for that purpose is required, other than the United States. Persons outside of the United States who come into possession of this prospectus must inform themselves about, and observe any restrictions relating to, the offering of the shares of common stock and the distribution of this prospectus outside of the United States.

"Twist Bioscience," and "Sequencespace" are registered trademarks in the U.S. and, in some cases, in certain other countries and our logo is an unregistered trademark of Twist Bioscience Corporation. All other brand names or trademarks appearing in this prospectus are the property of their respective holders. Solely for convenience, the trademarks and trade names in this prospectus are referred to without the ® and ™ symbols, but such references should not be construed as any indicator that their respective owners will not assert, to the fullest extent under applicable law, their rights thereto.

Prospectus summary

This summary highlights information contained in greater detail elsewhere in this prospectus. Before making an investment in our common stock, you should carefully read this entire prospectus, including our consolidated financial statements and the related notes thereto and the information in the sections entitled "Risk factors," "Management's discussion and analysis of financial condition and results of operations" and "Business." The last day of our fiscal year is September 30.

Overview

We are a leading and rapidly growing synthetic biology company that has developed a disruptive DNA synthesis platform to industrialize the engineering of biology. The core of our platform is a proprietary technology that pioneers a new method of manufacturing synthetic DNA by "writing" DNA on a silicon chip. We have combined this technology with proprietary software, scalable commercial infrastructure and an e-commerce platform to create an integrated technology platform that enables us to achieve high levels of quality, precision, automation, and manufacturing throughput at a significantly lower cost than our competitors. We are leveraging our unique technology to manufacture a broad range of synthetic DNA-based products, including synthetic genes, tools for next generation sample preparation, and antibody libraries for drug discovery and development. Additionally, we believe our platform will enable new value-add opportunities, such as discovery partnerships for biologic drugs, and will enable new applications for synthetic DNA, such as digital data storage, which will drive growth in the market for our products. We sell our synthetic DNA and synthetic DNA-based products to a customer base of over 600 customers across a broad range of industries.

DNA is the fundamental building block of biology. The ability to design DNA and engineer biology, a field known as synthetic biology, is growing rapidly, and we believe this field represents one of the most exciting areas of growth and technological innovation in the 21st century. The ability to modify DNA to serve different purposes is leading to a broad range of applications for synthetic DNA and synthetic DNA-based products across multiple industries, including:

- healthcare for the discovery and production of new therapeutics and molecular diagnostics;
- industrial chemicals for cost-effective and sustainable production of new and existing specialty chemicals and materials, such as spider silk, nylon, rubber, fragrances, food flavors and food additives;
- agriculture for more effective and sustainable crop production;
- academic research for a broad range of applications; and
- technology for potential use as an alternative long-term data storage medium.

The synthetic biology market is growing rapidly and is being fueled by increased access to affordable and innovative tools that enable new applications. We believe this is analogous to the trends seen in the next generation sequencing, or NGS, market, where declining costs of sequencing drove adoption, new applications and market expansion. Similarly, tools that combine advanced production technology with modern digital technology and software capabilities, such as our DNA synthesis platform, are driving growth and market creation for synthetic DNA and synthetic DNA-based products. In calendar year 2016, the market for synthetic biology products was approximately $4.0 billion and is expected to grow to $11.0 billion by calendar year 2021. We believe this period of accelerated growth in the synthetic biology industry is in its early stages.

The applications of our DNA synthesis platform are broad. Our mission is to be the leading provider of synthetic genes, which are comprised of strands of synthetic DNA, and to leverage the versatility of our platform to expand our portfolio to include other synthetic DNA-based products and address additional market opportunities, including next generation sequencing sample preparation, biological drug discovery and development and digital data storage.

In April 2016, we launched the first applications of our platform, synthetic genes and high diversity collections of oligonucleotides, or oligo pools, to disrupt the gene synthesis market and make legacy DNA synthesis methods obsolete. We believe that the traditional DNA synthesis methods used by our competitors are inherently limited in scalability and are not optimized to satisfy the rapidly growing demand for high-quality, low-cost synthetic DNA. Our silicon-based chip technology is able to increase DNA production by a factor of 9,600 on a footprint similar to that of traditional DNA synthesis methods. Also, it significantly lowers the volume of required reagents, specifically the most expensive reagent by a factor of 1,000,000, and improves the precision of the synthesis process relative to legacy methods. This enables us to produce high-quality synthetic DNA on a much larger scale and at lower cost than competitors.

We have rapidly become a leading synthetic DNA provider. Between September 30, 2015 and June 30, 2018, the Company sold its products to more than 600 customers. In fiscal 2017, we served 286 customers including $0.3 million in sales to seven of the top 20 pharmaceutical companies by revenue, $4.3 million in sales to Ginkgo Bioworks, Inc., or Ginkgo Bioworks (which we believe is the largest global purchaser of synthetic DNA), $0.3 million in sales to three of the largest agricultural biotechnology companies, $2.7 million in sales to over 100 academic research institutions worldwide, and $7.3 million in sales to innovative customers using synthetic DNA for new and emerging applications, such as Microsoft Corporation and the University of Washington for use of DNA as a digital data storage medium. We are also an original equipment manufacturer, or OEM, of synthetic DNA to four synthetic DNA manufacturers that also compete with us, which we believe is a strong demonstration of the superiority of our platform.

We have also leveraged the versatility of our platform to expand our product portfolio into other markets in which we believe we have a competitive advantage. In February 2018, we launched an innovative and comprehensive sample preparation kit for next generation sequencing at the Advances in Genome Biology and Technology conference. Our kit leverages our platform to precisely synthesize oligo pools and uniformly amplify the desired target DNA segments, considerably improving the accuracy of the downstream sequencing analysis. We have also commercialized a custom DNA library solution which enables more effective biologic drug discovery and development for our customers. We believe we can further leverage our platform to develop other proprietary tools, such as our anti-G-protein coupled receptor, or GPCR, library and antibody optimization solution, to provide an end-to-end solution in biologics drug discovery and early development, from target to investigational new drug, or IND, application, adding value as a partner to biotechnology and pharmaceutical companies. We also aim to explore development of DNA as a digital data storage medium via internal research and industry partnerships.

Our currently marketed products target the synthetic DNA market, a sub-segment of the synthetic biology market, and NGS sample preparation, a large adjacent market opportunity. We estimate that the combined market opportunity was $1.8 billion in calendar year 2016. We believe that current estimates understate our market potential because they reflect the costly, time-consuming, and cumbersome nature of legacy DNA synthesis technologies. We believe our solution has the potential to materially expand our initial market by providing end users access to high-quality and lower cost tools, encouraging adoption and facilitating new applications for our products.

We have built a scalable commercial platform that enables us to reach a diverse customer base that we estimate consists of over 100,000 synthetic DNA users today. In order to address this diverse customer base, we have employed a multi-channel strategy comprised of a direct sales force targeting synthetic DNA customers, a direct sales force focusing on the NGS market and an e-commerce platform. We launched our proprietary, innovative, and easy-to-use e-commerce platform in October 2017 to existing customers and expanded access to the general public in January 2018. Our platform allows customers to design, validate, and place on-demand orders of customized DNA online. This is a critical part of our strategy to address our large and diverse customer base, as well as drive commercial productivity, enhance the customer experience, and promote loyalty.

Since our formation in 2013, we have grown rapidly and achieved several key milestones that we believe position us for continued growth and success:

- In 2015, we demonstrated the benefits and validated the commercial utility of our proprietary silicon-based platform for DNA synthesis through a proof-of-concept program called the Alpha Access program, which provided initial access to our platform to select customers.
- In 2016, we (i) secured a long-term contract with Ginkgo Bioworks to provide up to 100 million base pairs of DNA, which we believe was the largest agreement for synthetic DNA at that time, (ii) launched our early commercial access program in April called the Beta Access program to select customers and expanded our existing relationship with Ginkgo Bioworks, (iii) acquired Genome Compiler Corporation to add software design capabilities for our e-commerce ordering system, (iv) laid the groundwork to pursue an opportunity in biologics drug discovery though a relationship with Distributed Bio, Inc., or Distributed Bio, and (v) supplied DNA to Microsoft Corporation for its work with the University of Washington to develop DNA as a data storage medium.
- In 2017, we continued to increase penetration with existing customers and expand our customer base, by (i) serving 286 customers (up from 97 customers in 2016), (ii) extending the scope of our relationship with Microsoft Corporation and the University of Washington, (iii) entering into an agreement to supply thousands of genes for public benefit through the BioBricks Foundation, (iv) successfully achieving industry-leading volumes of synthetic DNA shipped every month, (v) becoming an OEM supplier of synthetic DNA to four synthetic DNA manufacturers that also compete with us, (vi) launching our e-commerce platform to existing customers in October 2017, and (vii) shipping over 38,000 genes in the fourth quarter of fiscal 2017 compared to approximately 7,600 for the fourth quarter of fiscal 2016, which represents 400% year-over-year growth.
- In 2018, we continued to experience revenue growth greater than the estimated rate of growth of the synthetic biology market, expanded into new market opportunities for next-generation sequencing and antibody biologics discovery, and enhanced our global distribution capabilities by (i) launching our e-commerce platform to the general public, (ii) launching our NGS target enrichment solutions at a major medical conference, (iii) completing a private financing with funds reserved for building Chinese operations, (iv) signing international distributors in Asia Pacific, (v) expanding our management team to support our entry into the biologics drug discovery and early development, (vi) signing a new agreement with Ginkgo Bioworks to deliver up to approximately 1.3 billion base pairs over a period of four years and (vii) shipping over 71,000 genes in the second quarter of fiscal 2018 compared to approximately 31,000 for the second quarter of fiscal 2017, which represents 230% year-over-year growth.

We generated revenue of $2.3 million in fiscal 2016 and $10.8 million in fiscal 2017, representing 375% year-over-year growth, while incurring net losses of $44.1 million in fiscal 2016 and $59.3 million in fiscal 2017.

Our headquarters and manufacturing facilities are located in San Francisco, California. As of June 30, 2018, we had 221 full-time employees worldwide, including three locations in the San Francisco Bay Area and an international location in Tel Aviv, Israel. We also utilize a team of 14 dedicated commercial consultants across the European Union and the United Kingdom and five dedicated commercial consultants across Asia. We also recently received private funding to establish production facilities and commercial operations in Asia. We plan in begin operations in Asia in 2019. As of June 30, 2018, we have raised a total of $279.5 million in gross proceeds from the sale of equity securities.

The synthetic biology industry

We operate in the field of synthetic biology, which is undergoing an era of rapid innovation and transformation. Synthetic biology is the engineering of biology to build new biological systems or re-design existing biological systems. The ability to design DNA and engineer biology is creating advances and benefits for a broad and growing range of applications for synthetic DNA and synthetic DNA-based products across multiple industries, including:

- healthcare for the discovery and production of new therapeutics and molecular diagnostics;
- industrial chemicals for cost-effective and sustainable production of new and existing specialty chemicals and materials, such as spider silk, nylon, rubber, fragrances food flavors and food additives;
- agriculture for more effective and sustainable crop production;
- academic research for a broad range of applications; and
- technology for potential use as an alternative long-term data storage medium.

According to BCC Research, the overall market for synthetic biology products was approximately $4.0 billion in calendar year 2016 and is expected to grow to over $11.0 billion by calendar year 2021. This industry momentum creates a significant opportunity for us to grow within our existing markets as well as expand our product offering.

Synthetic DNA is the fundamental building block of synthetic biology. Users of synthetic biology can design synthetic DNA to regulate the production of these proteins and molecules to achieve a specific functional purpose. While synthetic DNA has been produced for more than 40 years, the complexities of biology and the production constraints inherent in legacy processes have historically limited the applications and market opportunities for DNA synthesis.

Limitations of existing solutions

Traditional methods of DNA synthesis consist of a two-step process that initially involves the synthesis of oligonucleotides, also referred to as oligos, which are short strands of DNA. These oligos are then combined to create longer strands of DNA. Currently, there are two primary methodologies used by others to create synthetic DNA, the 96-well plate method and the microarray method, each having production limitations that we believe make these technologies sub-optimal to satisfy the rapidly growing demand for synthetic DNA. In addition, because the synthesis of oligos can introduce errors in the sequence order, all DNA synthesis methods require a process called cloning to produce many identical copies of a strand of DNA, such as a clonal gene. Today, all of our competitors use one of these two primary methods of DNA synthesis and require cloning for clonal genes.

96-well plate method of DNA synthesis

Introduced as early as the 1950s, a 96-well plate is a flat plastic plate, roughly the size of two smartphones, with eight rows of 12 wells that are used as small test tubes. Instead of creating one sequence of DNA at a time in a single test tube, the 96-well plate allows researchers to create 96 oligos in parallel, one in each well. While this process successfully achieves DNA synthesis, it requires high volumes of phosphoramidites, an expensive raw material, as well as other ancillary reagents. It also produces excessive amounts of the final product, significantly more than is required for most subsequent processes, resulting in material that is discarded and an unnecessary expense. Additionally, this process is not scalable to produce high volumes, as approximately 100 oligos are needed to assemble one gene and therefore only one gene can be made from each 96-well plate.

Microarray method of DNA synthesis

Unlike a 96-well plate, a microarray is a flat surface made of plastic or glass on which DNA is synthesized directly in an array of discrete locations. Microarrays allow large numbers of oligos to be synthesized in parallel, increasing DNA production by up to four orders of magnitude when compared to the 96-well plate. However, while this method can make 100 genes in parallel, it remains difficult to scale, requires many steps, and results in significant waste of materials.

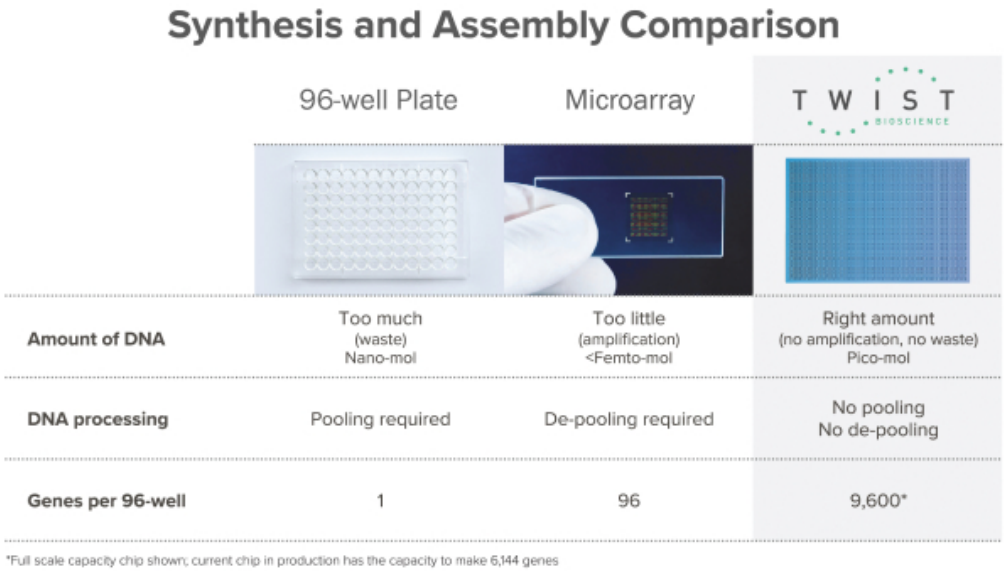
Cloning

Cloning is a tedious process to filter out errors and produce many identical copies of a strand of DNA, such as a gene. While the cloning process results in a precise sequence, it is incredibly slow and labor intensive and generally takes around 10 business days to complete. As a result, it is time consuming, expensive, and, in many cases, not an efficient use of researchers' time. In general, more accurate DNA synthesis technology results in fewer errors in the sequence order and reduces the time and costs required or allocated to the cloning process.

Our platform

We developed the Twist Bioscience DNA synthesis platform to address the limitations of throughput, scalability, and cost inherent in legacy DNA synthesis methods. Our platform stems from extensive analyses of, and improvements to, the existing gene synthesis and assembly workflows. Our core technologies combine expertise in silicon, software, fluidics, chemistry, and motion and vision control to miniaturize thousands of parallel chemical reactions on silicon and write thousands of strands of DNA in parallel. With a footprint that is similar to the size of a 96-well plate that produces one gene, we are able to produce 9,600 genes in parallel. Based on current production needs, we have intentionally designed our latest chip to make 6,144 genes in parallel, but we have the current capability to increase this to 9,600 genes, as needed. We have combined our

DNA synthesis technology with propriety software and a scalable commercial infrastructure to create our vertically integrated DNA synthesis platform capable of delivering very large volumes of high-quality synthetic DNA at low cost.



We believe that buyers of DNA are looking for a product and purchasing experience that delivers on a number of key factors and that our platform is uniquely designed to meet these customer needs and overcome the limitations of legacy DNA synthesis methods in order to support the growing demand for synthetic DNA:

	Customer desires	**Twist Bioscience advantages**
Quality and accuracy	• Quality and accuracy is a basic requirement for all customers. Deviations from customer specifications can render customers' downstream uses less productive or ineffective.	• Synthetic DNA providers are able to supply perfect clonal DNA to the customer. However, existing DNA synthesis technologies require significant cloning and error filtration to produce perfect clonal DNA. We are able to consistently produce high-quality oligos with what we believe is an industry-leading error rate of 1/1000 base pairs. This enables us to reduce the cloning and error filtration necessary to achieve perfect clonal DNA.
Cost	• Cost is a critical consideration for both large and small-scale customers. Large-scale commercial DNA purchasers that outsource their DNA supply are becoming increasingly price sensitive due to their growing demand for DNA.	• Because we miniaturize the chemical reaction on a silicon chip, require lower volumes of reagents, and automate the production process, we are able to dramatically lower the production cost per base pair of DNA and offer our

	Customer desires	Twist Bioscience advantages
	On the other hand, smaller-scale users, particularly academic users, typically have made their own DNA because of limited budgets relative to the prices charged by legacy DNA suppliers.	synthetic DNA at a lower price than competitors. As of November 2017, the publicly available pricing of our competitors for clonal DNA ranged from $0.17—$3.00 per base pair. Our standard pricing for comparable DNA is $0.09 per base pair for genes between 300 and 1,800 base pairs in length. One of the best demonstrations of our cost advantage is that we supply synthetic DNA to four other competing synthetic DNA providers.
Throughput/scale	• As the applications for synthetic biology have expanded, customers are increasingly seeking to purchase large quantities of DNA in relatively short periods of time, which often cannot be supplied by a single synthetic DNA provider due to production capacity constraints. Ordering from multiple suppliers to fulfill large orders can be costly and administratively cumbersome for customers.	• Our silicon chip technology is able to increase DNA production by a factor of 9,600 on a footprint similar to traditional DNA synthesis methods. We currently have the capability to manufacture more than 45,000 genes per month, which we believe is the highest in the industry. We have agreed to supply up to approximately 1.3 billion base pairs to Ginkgo Bioworks over a period of four years, which we believe is the largest volume supply commitment in the industry to date.
Turnaround time	• The time between placement of the order and delivery is a key consideration for customers. For example, pharmaceutical companies are focused on shortening internal R&D timelines and ready availability of high-quality, synthetic DNA to meet their internal timelines.	• Because our platform enables the large-scale production of DNA, our turnaround time is largely independent of order size. We have enhanced our manufacturing capabilities and expect to reduce turnaround time on large commercial quantities of genes (i.e., orders of over 15,000 genes per month) to 10 business days.
Product offering/ complexity	• Customers require a broad range of products including different gene lengths, complicated sequences and a wide range of additional configurations to fulfill a diverse set of applications and uses.	• Because we synthesize each oligonucleotide individually, we can customize orders to almost any customer's specifications. We currently offer genes of up to 3,200 base pairs in length, which we believe satisfies a substantial portion of the market for synthetic DNA today. We expect to offer genes of up to 10,000 base pairs in the future. Unlike traditional DNA synthesis technologies, we can also manufacture a broad range of additional products on our same DNA synthesis platform, including antibody libraries and oligo pools, among others.

	Customer desires	Twist Bioscience advantages
Reliability	• Customers value the reliability of a supplier to deliver on promises of quality and turnaround time to allow them to plan their downstream workflow and hit internal deadlines.	• Due to our throughput capability and proprietary integrated production and ordering process we have been able to consistently meet the specifications and turnaround time that we promise customers.
E-commerce capability	• Customers, particularly smaller-scale customers, value an intuitive, seamless e-commerce experience that tracks orders from placement to delivery to simplify and automate the purchasing process. Some customers also value an application protocol interface, or an API, for electronic integration into their own procurement systems.	• While some synthetic DNA providers have an e-commerce platform for ordering DNA, we believe we offer the most comprehensive e-commerce platform consisting of customized quotes, automated feedback on the feasibility of the sequence and the ability to track orders from placement to delivery. An API is also a core component of our e-commerce system.

Our target markets

Our currently marketed product offering addresses a market opportunity that was approximately $1.8 billion in calendar year 2016. We believe our solution has the potential to materially expand our initial market by providing end-users with access to high-quality and lower cost tools, encouraging adoption and facilitating new applications for our products, such as pharmaceutical biologics drug discovery and digital data storage in DNA.

Synthetic DNA market

We believe that our current market opportunity for synthetic DNA was approximately $1.3 billion in calendar year 2016. The market consists of those who buy DNA, or DNA Buyers, and those who make their own DNA, or DNA Makers. Driven by access to more affordable and high-quality synthetic DNA, we believe that there is a strong trend of DNA Makers converting to DNA Buyers. According to BCC Research, the size of the DNA Buyer market in 2016 was approximately $300 million and is growing at a rate of approximately 20% annually as existing DNA Buyers develop new uses for synthetic DNA and existing DNA Makers convert to DNA Buyers. We estimate our market opportunity in the DNA Maker market to be approximately $950 million. Our market estimate is based on the market sizes for products used in manual DNA synthesis, including the cloning and restriction digestion enzyme market in 2016, according to a report on Molecular Biology by Markets and Markets.

NGS sample preparation market

Our NGS sample preparation kits address the demand for better sample preparation products that improve the sequencing workflow, increase sequencing accuracy and lower sequencing costs. We offer kits consisting of double-stranded DNA probes and a comprehensive target enrichment kit that are used for exome sequencing and custom targeted sequencing. Kalorama Information, a division of marketresearch.com, estimates the market for sample preparation for next generation sequencing was approximately $500 million in calendar year 2016 and growing at approximately 20% annually.

Pharmaceutical biologics drug discovery

We believe we are uniquely positioned to capture a larger portion of the drug discovery value chain given that our synthetic DNA products are already used by our pharmaceutical partners throughout the drug development process. As part of our effort in this market, we recently launched our custom DNA library solution which facilitates biologic drug discovery and development. We are already in agreement with a top three pharmaceutical company by revenue to supply our custom DNA libraries instead of them producing their own. In addition to our custom DNA libraries, we are also developing other proprietary tools, such as a wholly-owned anti-GPCR library and an antibody optimization solution, that we believe will enable us to provide an end-to-end solution in biologics drug discovery and early development, from target to investigational new drug, or IND, application, and adding value as a partner to biotechnology and pharmaceutical companies. These partnerships may include upfront, milestone and royalty payments.

Digital data storage in DNA

Due to the explosion of data across many industries, finding efficient means of storage has become more important. Through the Semiconductor Research Corporation, many leading semiconductor companies, including Microsoft Corporation, IBM Corporation, Micron Technology, Inc., Autodesk Inc., Mentor Graphics Corporation and GLOBALFOUNDRIES Inc., are exploring DNA as a data storage medium. We have strategic relationships with Microsoft Corporation and the University of Washington through which we have demonstrated the feasibility of storing data on DNA and the unique benefits of longevity, density, and universality of this format. We believe that over time our technology will develop to allow data storage in DNA to become cost competitive with traditional storage media and enable us to target several large markets within data storage. The market for digital data storage is more than $35 billion and we believe DNA can address several segments within this market.

Our growth strategy

Our objective is to be the leading provider of synthetic DNA worldwide and to leverage the versatility of our platform to build a leadership position in other synthetic DNA-based product markets in which we have a competitive advantage. We intend to accomplish this objective by executing on the following:

- Maintain and expand our position as the provider of choice for high-quality, affordable synthetic genes and DNA to customers across multiple industries;
- Become a leading supplier of NGS sample preparation products;
- Conduct antibody therapeutic discovery and optimization for our current customers and future partners;
- Continue to explore development of DNA as a digital data storage medium via internal research and government and industry partnerships; and
- Expand our global presence.

Beyond these opportunities, we are working with industry partners to create new markets for our products by leveraging the versatility of our platform.

Risks related to our business

Investing in our common stock involves substantial risk. You should carefully consider all of the information in this prospectus prior to investing in our common stock. There are several risks related to our business that are described under “Risk factors” elsewhere in this prospectus. Among these important risks are the following:

- We are an early stage company with limited operating history, which may make it difficult to evaluate our current business and predict our future performance;
- We have incurred net losses in every period to date, and we expect to continue to incur significant losses as we develop our business and may never achieve profitability;
- Our consolidated financial statements contain a going concern qualification and we will require additional financing to achieve our goals;
- If we are unable to attract new customers and retain and grow sales from our existing customers, our business will be materially and adversely affected;
- Rapidly changing technology and extensive competition in synthetic biology could make the products we are developing obsolete or non-competitive unless we continue to develop new and improved products and pursue new market opportunities;
- We and our chief executive officer are currently involved in litigation with Agilent Technologies, Inc., or Agilent, in which Agilent has alleged a claim of trade secret misappropriation against Twist Bioscience and trade secret misappropriation and other related claims against our chief executive officer, and an adverse result could harm our business and results of operations;
- Our revenue, results of operations, cash flows and reputation in the marketplace may suffer upon the loss of a significant customer;
- The continued success of our business relies heavily on our disruptive technologies and products and our position in the market as a leading provider of synthetic DNA using a silicon chip; and
- If we are unable to obtain, maintain and enforce intellectual property protection, others may be able to make, use, or sell products and technologies substantially the same as ours, which could adversely affect our ability to compete in the market.

Corporate information

We were incorporated in Delaware on February 4, 2013. Our principal executive offices are located at 455 Mission Bay Boulevard South, Suite 545, San Francisco, CA 94158. Our telephone number at that location is (800) 719-0671. References in the prospectus to “we,” “our,” “us,” “Twist Bioscience” and the “Company” refer to Twist Bioscience Corporation and, where appropriate, its wholly-owned subsidiaries unless the context requires otherwise. Our corporate website address is www.twistbioscience.com. The information contained on our website is not incorporated by reference into this prospectus, and you should not consider any information contained on, or that can be accessed through, our website to be part of this prospectus. We have included our website address only as an inactive textual reference and do not intend it to be an active link to our website.

Implications of being an emerging growth company

We qualify as an “emerging growth company,” as defined in Section 2(a) of the Securities Act of 1933, as amended, or the Securities Act, as modified by the Jumpstart Our Business Startups Act of 2012, or the JOBS

Act. As such, we are eligible to take advantage of certain exemptions from various reporting requirements that are applicable to other public companies that are not "emerging growth companies" including, but not limited to:

- an exemption from complying with the auditor attestation requirements of Section 404 of the Sarbanes Oxley Act of 2002, as amended, or Section 404;
- a requirement to have only two years of audited financial statements and only two years of related selected financial data and management's discussion and analysis of financial condition and results of operations disclosure;
- reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements; and
- an exemption from the requirement to seek non-binding advisory votes on executive compensation.

We have not made a decision regarding whether to take advantage of these exemptions. If we do take advantage of any of these exemptions, we do not know if some investors will find our common stock less attractive as a result. The result may be a less active trading market for our common stock and our stock price may be more volatile.

In addition, Section 107 of the JOBS Act provides that an "emerging growth company" can take advantage of the extended transition period provided in Section 7(a)(2)(B) of the Securities Act for complying with new or revised accounting standards. In other words, an "emerging growth company" can delay the adoption of certain accounting standards until those standards would otherwise apply to private companies. We have irrevocably opted out of the extended transition period for complying with new or revised accounting standards pursuant to Section 107(b) of the JOBS Act.

We could remain an "emerging growth company" for up to five years, or until the earliest of (a) the last day of the first fiscal year in which our annual gross revenues exceed $1.07 billion, (b) the date that we become a "large accelerated filer" as defined in Rule 12b-2 under the Securities Exchange Act of 1934, as amended, or the Exchange Act, which would occur if the market value of our common stock that is held by non-affiliates exceeds $700 million as of the last business day of our most recently completed second fiscal quarter and (c) the date on which we have issued more than $1 billion in non-convertible debt during the preceding three-year period.

The offering

The following information assumes that the underwriters do not exercise their option to purchase additional shares in the offering. See "Underwriting."

Common stock offered by us	shares
Common stock to be outstanding after the offering	shares
Option to purchase additional shares of common stock	The underwriters have an option to purchase a maximum of additional shares of common stock from us, solely to cover overallotments. The underwriters can exercise this option at any time within 30 days from the date of this prospectus.
Use of proceeds	We intend to use the net proceeds from this offering primarily to improve and update our platform and core technologies, expand our sales and marketing capabilities in the U.S. and in other geographies, including China, develop and expand into the biologics drug discovery and DNA data storage markets, and for working capital and general corporate purposes. While we have no current agreements, commitments or understandings for any specific strategic acquisitions or in-licenses at this time, we may use a portion of the net proceeds for these purposes. See "Use of proceeds" for more information.
Listing	We intend to apply to list our common stock on the Nasdaq Global Market under the symbol "TWST."
Directed share program	At our request, the underwriters have reserved % of the shares of common stock offered hereby, at the initial public offering price, to directors, officers, employees, business associates and related persons of Twist Bioscience Corporation. The number of shares of common stock available for sale to the general public will be reduced to the extent these individuals purchase such reserved shares. Any reserved shares that are not so purchased will be offered by the underwriters to the general public on the same basis as the other shares offered by this prospectus. Participants in the directed share program who will be subject to a -day lock up with respect to any shares sold to them pursuant to the program. See section captioned "Underwriting."
Material U.S. federal income tax considerations for non-U.S. holders	For a discussion of the material U.S. federal income tax considerations that may be relevant to prospective investors who are non-U.S. holders, please see "Material U.S. federal income tax considerations for non-U.S. holders."

Risk factors	Investing in our common stock involves a high degree of risk. You should carefully read and consider the information set forth under “Risk factors” and all other information in this prospectus before investing in our common stock.

We refer to our Series A redeemable convertible preferred stock, Series B redeemable convertible preferred stock, Series C redeemable convertible preferred stock and Series D redeemable convertible preferred stock as our “convertible preferred stock” in this prospectus, as well as for financial reporting-term purposes and in the financial tables included in this prospectus, as more fully explained in Note 13 to our audited consolidated financial statements. In this prospectus (as well as, for financial reporting-term purposes and in the financial tables included in this prospectus as more fully described in Note 12), we refer to our outstanding warrants as either warrants to purchase shares of redeemable convertible preferred stock or warrants to purchase shares of common stock.

Except as otherwise indicated, all information in this prospectus is based upon 176,612,969 shares of our common stock (including 2,047,292 unvested shares of restricted common stock subject to our repurchase right) outstanding as of September 30, 2017, and excludes:

- 18,017,311 shares of our common stock issuable upon exercise of stock options outstanding as of September 30, 2017, having a weighted-average exercise price of $0.67 per share;
- shares of our common stock issuable upon exercise of stock options granted after September 30, 2017, having a weighted-average exercise price of $ per share;
- shares of common stock reserved for future grant or issuance under our 2018 Equity Incentive Plan, or the 2018 Plan (which includes 6,805,339 shares of our common stock as of September 30, 2017 reserved for future grant under our 2013 Stock Plan, or the 2013 Plan, that will be added to the shares reserved for future issuance under our 2018 Plan upon effectiveness of that plan if the shares are not issued or subject to outstanding grants under the 2013 Plan at that time), which will become effective in connection with this offering and contains provisions that automatically increase its share reserve each year, as more fully described in “Executive compensation—Equity incentive plans;”
- shares of common stock reserved for future grant or issuance under our 2018 Employee Stock Purchase Plan, or the 2018 ESPP, which will become effective in connection with this offering and contains provisions that automatically increase its share reserve each year, as more fully described in “Executive Compensation—Equity incentive plans;”
- 634,921 shares of our common stock issuable upon the exercise of outstanding warrants to purchase our common stock outstanding as of September 30, 2017, having an exercise price of $0.63 per share, and an additional 634,920 shares of our common stock issuable upon the exercise of outstanding warrants to purchase our common stock, having an exercise price of $0.63 per share that would be exercisable upon the drawing down of additional loans under our amended and restated loan and security agreement with Silicon Valley Bank, or SVB, dated September 6, 2017, or credit facility;
- 364,742 shares of our common stock issuable upon the exercise of outstanding warrants to purchase Series A convertible preferred stock outstanding as of September 30, 2017, having an exercise price of $0.329 per share;
- 160,606 shares of our common stock issuable upon the exercise of outstanding warrants to purchase Series B convertible preferred stock outstanding as of September 30, 2017, having an exercise price of $0.792 per share;

- 186,679 shares of our common stock, issuable upon the exercise of outstanding warrants to purchase Series C convertible preferred stock outstanding as of September 30, 2017, having an exercise price of $1.4999 per share; and
- 74,567 shares of our common stock issuable upon the exercise of outstanding warrants to purchase Series D convertible preferred stock outstanding as of September 30, 2017, having an exercise price of $2.1457 per share.

Except as otherwise indicated, all information in this prospectus reflects and assumes:

- the conversion immediately prior to the completion of this offering of all of our outstanding shares of convertible preferred stock into an aggregate of 145,138,924 shares of common stock;
- the automatic conversion of warrants to purchase an aggregate of 786,594 shares of convertible preferred stock into warrants to purchase an aggregate of 786,594 shares of common stock immediately prior to the closing of this offering;
- no exercise or termination of outstanding stock options or warrants after September 30, 2017;
- the filing and effectiveness of our amended and restated certificate of incorporation and the adoption of our amended and restated bylaws immediately prior to the closing of this offering; and
- no exercise by the underwriters of their overallotment option to purchase additional shares of common stock from us.

Summary consolidated financial information

The following table summarizes our historical consolidated financial data and should be read together with our consolidated financial statements, the notes to our consolidated financial statements and the sections titled “Selected consolidated financial data” and “Management’s discussion and analysis of financial condition and results of operations” contained elsewhere in this prospectus.

We derived the summary consolidated statements of operations data and consolidated balance sheet data for the fiscal years ended September 30, 2016 and 2017 from our audited consolidated financial statements included elsewhere in this prospectus. The summary financial data included in this section are not intended to replace the financial statements and related notes included elsewhere in this prospectus. Our historical results are not necessarily indicative of our future performance.

	Years ended September 30,	
(in thousands, except share and per share data)	**2016**	**2017**
Consolidated statements of operations data:		
Revenues	$ 2,269	$ 10,767
Operating expenses:		
Cost of revenues	9,421	24,020
Research and development	18,230	19,169
Selling, general and administrative	18,274	26,060
Total operating expenses	45,925	69,249
Loss from operations	(43,656)	(58,482)
Interest income	241	412
Interest expense	(746)	(905)
Other income (expense), net	73	(55)
Loss before income taxes	(44,088)	(59,030)
Provision for income taxes	—	(280)
Net loss attributable to common stockholders	$ (44,088)	$ (59,310)
Other comprehensive loss		
Change in unrealized gain (loss) on investments	9	(9)
Foreign currency translation adjustment	—	33
Comprehensive loss	$ (44,079)	$ (59,286)
Net loss per share attributable to common stockholders—basic and diluted(1)	$ (2.38)	$ (2.47)
Weighted average shares used in computing net loss per share attributable to common stockholders—basic and diluted(1)	18,511,202	23,982,605
Pro forma net loss per share—basic and diluted(1)		$ (0.39)
Pro forma weighted-average shares used in computing pro forma net loss per share—basic and diluted(1)		152,397,059

(1) See Note 16 of the notes to our consolidated financial statements included elsewhere in this prospectus for a description of the method used to compute basic and diluted net loss per share attributable to common stockholders and pro forma basic and diluted net loss per share.

(In thousands)	As of September 30, 2017 Actual	Pro forma(2)	Pro forma as adjusted(3)
Consolidated balance sheet data:			
Cash, cash equivalents, and short-term investments	$ 62,204	$ 62,204	
Working capital	58,392	58,392	
Total assets	85,657	85,657	
Total liabilities	19,382	18,738	
Convertible preferred stock	199,633	—	
Additional paid-in capital	6,228	206,503	
Accumulated deficit	(139,619)	(139,619)	
Total stockholders' equity (deficit)	(133,358)	66,919	

(2) The pro forma column reflects, effective immediately prior to the closing of this offering, the conversion of all outstanding shares of our convertible preferred stock into an aggregate of 145,138,924 shares of common stock.

(3) The pro forma as adjusted column gives effect to the pro forma adjustments set forth in footnote 2 above and further reflects the sale by us of shares of common stock in this offering at an assumed initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. Each $1.00 increase or decrease in the assumed initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus, would increase or decrease, as applicable, our pro forma as adjusted cash, cash equivalents and short-term investments, working capital, total assets and total stockholders' equity by approximately $ million, assuming that the number of shares of our common stock offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. Each increase or decrease of 1.0 million shares in the number of shares offered by us would increase or decrease the amount of our cash, cash equivalents and short-term investments, working capital, total assets and total stockholders' equity by approximately $ million, assuming an initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us.

Risk factors

Investing in our common stock involves a high degree of risk. You should consider carefully the risks and uncertainties described below, together with all of the other information in this prospectus, including our consolidated financial statements and related notes, before deciding whether to purchase shares of our common stock. If any of the following risks is realized, our business, financial condition, results of operations and prospects could be materially and adversely affected. In that event, the price of our common stock could decline, and you could lose part or all of your investment.

Risks related to our business

We are an early stage company with limited operating history, which may make it difficult to evaluate our current business and predict our future performance.

We are an early stage company and have a limited operating history. We were incorporated in February 2013 and began commercial operations in April 2016. Prior to engaging in commercial operations, we focused on research and development of DNA synthesis. Our revenue for the fiscal years ended September 30, 2016 and 2017 was $2.3 million and $10.8 million, respectively. We may never achieve commercial success and we have limited historical financial data upon which we may base our projected revenue. We also have limited historical financial data upon which we may base our planned operating expense or upon which you may evaluate our business and our prospects. Based on our limited experience in developing and marketing new products, we may not be able to effectively:

- drive adoption of our products;
- attract and retain customers for our products;
- anticipate and adapt to changes in our the existing and emerging markets in which we operate;
- focus our research and development efforts in areas that generate returns on these efforts;
- maintain and develop strategic relationships with suppliers to acquire necessary materials and equipment for the production of our products on appropriate timelines, or at all;
- implement an effective marketing strategy to promote awareness of our products with potential customers;
- scale our manufacturing activities to meet potential demand at a reasonable costs;
- avoid infringement of third-party intellectual property;
- obtain licenses on commercially reasonable terms to third-party intellectual property, as needed;
- obtain valid and enforceable patents that give us a competitive advantage;
- protect our proprietary technology;
- provide appropriate levels of customer training and support for our products; and
- attract, retain and motivate qualified personnel.

In addition, a high percentage of our expenses have been and will continue to be fixed. Accordingly, if we do not generate revenue as and when anticipated, our losses may be greater than expected and our operating results will suffer. You should consider the risks and difficulties frequently encountered by companies like ours in new and rapidly evolving markets when making a decision to invest in our common stock.

We have incurred net losses in every period to date, and we expect to continue to incur significant losses as we develop our business and may never achieve profitability.

We have incurred net losses in each year since inception and have generated limited revenue from product sales to date. We expect to incur increasing costs as we grow our business. We cannot be certain if or when we will produce sufficient revenue from our operations to support our costs. Even if profitability is achieved, we may not be able to sustain profitability. We incurred net losses of $44.1 million and $59.3 million for the years ended September 30, 2016 and 2017, respectively. As of September 30, 2017, we had an accumulated deficit of $139.6 million. We expect to incur substantial losses and negative cash flow for the foreseeable future. In addition, as a public company, we will incur significant legal, accounting, and other expenses that we did not incur as a private company. These increased expenses will make it harder for us to achieve and sustain future profitability. We may incur significant losses in the future for a number of reasons, many of which are beyond our control, including the other risks described in this prospectus, the market acceptance of our products, future product development and our market penetration and margins.

Our consolidated financial statements contain a going concern qualification.

Our annual audited consolidated financial statements contain a going concern qualification. We have incurred net losses and used significant cash in operating activities since inception and have an accumulated deficit of $139.6 million and working capital of $58.4 million as of September 30, 2017. These factors raise substantial doubt about our ability to continue as a going concern. Our ability to continue as a going concern is dependent on our ability to raise adequate capital to fund operating losses until we are able to engage in profitable business operations. To the extent financing is not available, we may not be able to develop, or may be delayed in developing, our products and meeting our obligations. There can be no assurance that we will be able to obtain additional debt or equity capital required in order to continue our operations on terms acceptable to us or at all.

We will require additional financing to achieve our goals, and a failure to obtain this necessary capital when needed on acceptable terms, or at all, could force us to delay, limit, reduce or terminate our product manufacturing and development and other operations.

Since our inception, substantially all of our resources have been dedicated to the development of our DNA synthesis platform. Net cash used in operating activities was $38.6 million and $51.3 million for the years ended September 30, 2016 and 2017, respectively. As of September 30, 2017, we had working capital of $58.4 million and capital resources consisting of cash, cash equivalents and short-term investments of $62.2 million. We believe that we will continue to expend substantial resources for the foreseeable future as we expand into additional markets we may choose to pursue. These expenditures are expected to include costs associated with research and development, manufacturing and supply as well as marketing and selling existing and new products. In addition, other unanticipated costs may arise.

After giving effect to the anticipated net proceeds from this offering, we expect that our existing cash, cash equivalents and short-term investments will be sufficient to fund our planned operating expenses, capital expenditure requirements and debt service payments through at least the next 12 months. However, our operating plan may change as a result of factors currently unknown to us, and we may need to seek additional funds sooner than planned, through public or private equity or debt financings or other sources, such as strategic collaborations. Such financing may result in dilution to stockholders, imposition of debt covenants and repayment obligations, or other restrictions that may adversely affect our business. In addition, we may seek additional capital due to favorable market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans.

Our future capital requirements depend on many factors, including:

- the number and characteristics of any additional products or manufacturing processes we develop or acquire to serve new or existing markets;
- the scope, progress, results and costs of researching and developing future products or improvements to existing products or manufacturing processes;
- the cost of manufacturing our DNA synthesis equipment and tools and any future products we successfully commercialize;
- our ability to establish and maintain strategic collaborations, licensing or other arrangements and the financial terms of such agreements;
- any lawsuits related to our products or commenced against us, including the costs associated with our current litigation with Agilent;
- the expenses needed to attract and retain skilled personnel;
- the costs associated with being a public company;
- the costs involved in preparing, filing, prosecuting, maintaining, defending and enforcing patent claims, including litigation costs and the outcome of such litigation; and
- the timing, receipt and amount of sales of, or royalties on, any future approved products, if any.

Additional funds may not be available when we need them, on terms that are acceptable to us, or at all. If adequate funds are not available to us on a timely basis, we may be required to:

- delay, limit, reduce or terminate our manufacturing, research and development activities; or
- delay, limit, reduce or terminate our establishment of sales and marketing capabilities or other activities that may be necessary to generate revenue and achieve profitability.

If we are unable to maintain adequate revenue growth or do not successfully manage such growth, our business and growth prospects will be harmed.

We have experienced significant revenue growth in a short period of time. We may not achieve similar growth rates in future periods. Investors should not rely on our operating results for any prior periods as an indication of our future operating performance. To effectively manage our anticipated future growth, we must continue to maintain and enhance our manufacturing, sales, financial and customer support administration systems, processes and controls. Failure to effectively manage our anticipated growth could lead us to over-invest or under-invest in development, operational, and administrative infrastructure; result in weaknesses in our infrastructure, systems, or controls; give rise to operational mistakes, losses, loss of customers, productivity or business opportunities; and result in loss of employees and reduced productivity of remaining employees.

Our continued growth could require significant capital expenditures and might divert financial resources from other projects such as the development of new products and services. As additional products are commercialized, we may need to incorporate new equipment, implement new technology systems, or hire new personnel with different qualifications. Failure to manage this growth or transition could result in turnaround time delays, higher manufacturing costs, declining product quality, deteriorating customer service, and slower responses to competitive challenges. A failure in any one of these areas could make it difficult for us to meet market expectations for our products, and could damage our reputation and the prospects for our business.

If our management is unable to effectively manage our anticipated growth, our expenses may increase more than expected, our revenue could decline or grow more slowly than expected and we may be unable to implement our business strategy. The quality of our products may suffer, which could negatively affect our reputation and harm our ability to retain and attract customers.

The estimates of market opportunity and forecasts of market growth included in this prospectus may prove to be inaccurate, and even if the market in which we compete achieves the forecasted growth, our business could fail to grow at similar rates, if at all.

Market opportunity estimates and growth forecasts are subject to significant uncertainty and are based on assumptions and estimates that may not prove to be accurate. For example, several of the reports rely on discussions with industry thought leaders, employ projections of future applications of synthetic biology and next generation sequencing technology in major end-user market segments and by technology type, and incorporate data from secondary sources such as company websites as well as industry, trade and government publications. The estimates and forecasts in this prospectus relating to the size and expected growth of our market may prove to be inaccurate. Even if the market in which we compete meets the size estimates and growth forecasted in this prospectus, our business could fail to grow at the rate we anticipate, if at all.

Our quarterly and annual operating results and cash flows have fluctuated in the past and might continue to fluctuate, causing the value of our common stock to decline substantially.

Numerous factors, many of which are outside our control, may cause or contribute to significant fluctuations in our quarterly and annual operating results. These fluctuations may make financial planning and forecasting difficult. In addition, these fluctuations may result in unanticipated decreases in our available cash, which could negatively affect our business and prospects. In addition, one or more of such factors may cause our revenue or operating expenses in one period to be disproportionately higher or lower relative to the others. As a result, comparing our operating results on a period-to-period basis might not be meaningful. You should not rely on our past results as indicative of our future performance. Moreover, our stock price might be based on expectations of future performance that are unrealistic or that we might not meet and, if our revenue or operating results fall below the expectations of investors or securities analysts, the price of our common stock could decline substantially.

Our operating results have varied in the past. As a result, our operating results could be unpredictable, particularly on a quarterly basis. In addition to other risk factors listed in this section, some of the important factors that may cause fluctuations in our quarterly and annual operating results are further described in “Risk factors—Risks relating to owning our stock and this offering.”

In addition, a significant portion of our operating expense is relatively fixed in nature, and planned expenditures are based in part on expectations regarding future revenue. Accordingly, unexpected revenue shortfalls might decrease our gross margins and could cause significant changes in our operating results from quarter to quarter. If this occurs, the trading price of our common stock could fall substantially.

If we are unable to attract new customers and retain and grow sales from our existing customers, our business will be materially and adversely affected.

In order to grow our business, we must continue to attract new customers and retain and grow sales from our existing customers on a cost-effective basis. To do this, we aim to attract new and existing buyers of synthetic DNA, convert makers of synthetic DNA into buyers of synthetic DNA, and achieve widespread market acceptance by delivering both our current product offerings and new products and technologies at low-cost, with high-quality, reliable turn-around times and throughput, superior e-commerce services and effective technical support. For additional information on our growth strategy, see the section of this prospectus

captioned “Business—Business strategy.” We cannot guarantee that our efforts to provide these key requirements will be consistently acceptable to, and meet the performance expectations of, our customers and potential customers. If we are unable to successfully attract and retain customers, our business, financial position and results of operations would be negatively impacted.

Internet security poses a risk to our e-commerce sales.

We currently generate a small portion of our revenue through sales on our e-commerce platform. However, as part of our growth strategy, we intend to increase the level of customer traffic and volume of customer purchases through our e-commerce platform which we formally launched to the general public in January 2018. We manage our website and e-commerce platform internally and as a result any compromise of our security or misappropriation of proprietary information could have a material adverse effect on our business, financial condition and results of operations. We rely on encryption and authentication technology licensed from third parties to provide the security and authentication necessary to effect secure Internet transmission of confidential information, such as credit and other proprietary information. Advances in computer capabilities, new discoveries in the field of cryptography or other events or developments may result in a compromise or breach of the technology used by us to protect customer transaction data. Anyone who is able to circumvent our security measures could misappropriate proprietary information or cause material interruptions in our operations. We may be required to expend significant capital and other resources to protect against security breaches or to minimize problems caused by security breaches. To the extent that our activities or the activities of others involve the storage and transmission of proprietary information, security breaches could damage our reputation and expose us to a risk of loss and/or litigation. Our security measures may not prevent security breaches. Our failure to prevent these security breaches may result in consumer distrust and may adversely affect our business, results of operations and financial condition.

Our actual operating results may differ significantly from our guidance.

From time to time, we plan to release guidance in our quarterly earnings conference calls, quarterly earnings releases, or otherwise, regarding our future performance that represents our management’s estimates as of the date of release. This guidance, which will include forward-looking statements, will be based on projections prepared by our management. These projections will not be prepared with a view toward compliance with published guidelines of the American Institute of Certified Public Accountants, or AICPA, and neither our registered public accountants nor any other independent expert or outside party compiles or examines the projections. Accordingly, no such person will express any opinion or any other form of assurance with respect to the projections.

Projections are based upon a number of assumptions and estimates that, while presented with numerical specificity, are inherently subject to significant business, economic and competitive uncertainties and contingencies, many of which are beyond our control and are based upon specific assumptions with respect to future business decisions, some of which will change. We intend to state possible outcomes as high and low ranges which are intended to provide a sensitivity analysis as variables are changed but are not intended to imply that actual results could not fall outside of the suggested ranges. The principal reason that we release guidance is to provide a basis for our management to discuss our business outlook with analysts and investors. We do not accept any responsibility for any projections or reports published by any such third parties.

Guidance is necessarily speculative in nature, and it can be expected that some or all of the assumptions underlying the guidance furnished by us will not materialize or will vary significantly from actual results. Accordingly, our guidance is only an estimate of what management believes is realizable as of the date of release. Actual results may vary from our guidance and the variations may be material. In light of the foregoing, investors are urged not to rely upon our guidance in making an investment decision regarding our common stock.

Any failure to successfully implement our operating strategy or the occurrence of any of the events or circumstances set forth in this "Risk factors" section in this prospectus could result in the actual operating results being different from our guidance, and the differences may be adverse and material.

Rapidly changing technology and extensive competition in synthetic biology could make the products we are developing and producing obsolete or non-competitive unless we continue to develop and manufacture new and improved products and pursue new market opportunities.

The synthetic biology industry is characterized by rapid and significant technological changes, frequent new product introductions and enhancements and evolving industry demands and standards. Our future success will depend on our ability to continually improve the products we are developing and producing, to develop and introduce new products that address the evolving needs of our customers on a timely and cost-effective basis and to pursue new market opportunities that develop as a result of technological and scientific advances. These new market opportunities may be outside the scope of our proven expertise or in areas which have unproven market demand, and the utility and value of new products and services developed by us may not be accepted in the markets served by the new products. Our inability to gain market acceptance of existing products in new markets or market acceptance of new products could harm our future operating results. Our future success also depends on our ability to manufacture these new and improved products to meet customer demand in a timely and cost-effective manner, including our ability to resolve manufacturing issues that may arise as we commence production of any new products we develop. Unanticipated difficulties or delays in replacing existing products with new products we introduce or in manufacturing improved or new products in sufficient quantities to meet customer demand could diminish future demand for our products and harm our future operating results.

In addition, there is extensive competition in the synthetic biology industry, and our future success will depend on our ability to maintain a competitive position with respect to technological advances. Technological development by others may result in our technologies, as well as products developed using our technologies, becoming obsolete. Our ability to compete successfully will depend on our ability to develop proprietary technologies and products that are technologically superior to and/or are less expensive than our competitors' technologies and products. Our competitors may be able to develop competing and/or superior technologies and processes, and compete more aggressively and sustain that competition over a longer period of time.

The continued success of our business relies heavily on our disruptive technologies and products and our position in the market as a leading provider or synthetic DNA using a silicon chip.

Our future profitability will depend on our ability to successfully execute and maintain a sustainable business model and generate continuous streams of revenue. Our business model is premised on the fact that we are the only DNA synthesis provider to synthesize DNA on a silicon chip and the competitive advantages this creates. Our DNA synthesis methods, among other things, reduce the amount of raw materials required, speed up the synthesis process and deliver large volumes of high-quality synthetic DNA at low unit cost. However, if other competitors develop and commercialize a manufacturing process using a silicon chip or other similar technologies providing for the development of competitive synthetic DNA products at scale, this could be disruptive to our business model and could adversely affect our business prospects, financial condition and results of operations. If we are unable to convert sufficient number of current manufacturers of synthetic DNA to buyers of our synthetic DNA, surpass our competitors regarding certain industry-related data points, and effectively implement our e-commerce platform which facilitates efficient order entry and fulfillment for our customers, our business, prospects, financial condition and results of operation will be adversely affected.

If we are unable to expand into adjacent addressable markets, our business may be materially and adversely affected.

Our future revenue growth and market potential may depend on our ability to leverage our DNA synthesis platform together with our custom libraries and other proprietary tools, such as our anti-GPCR library and antibody optimization solution, in adjacent businesses such as pharmaceutical biologics drug discovery and digital data storage in DNA. However, we may not be able to validate that our antibody libraries will accelerate the lead identification and lead optimization steps of antibody discovery or will allow us to discover more effective antibody drugs. In addition, our technology may not develop in a way that allows data storage in DNA to become cost competitive with traditional data storage media or in a way that otherwise enables us to address the markets opportunities that we believe exist. If we are unable to expand into adjacent addressable markets, our business, financial position and results of operations could be negatively impacted.

A significant portion of our sales depends on customers' capital spending budgets that may be subject to significant and unexpected variation, including seasonality.

Our customers' spending on research and development impacts our sales and profitability. Our customers and potential customers include healthcare, agriculture, industrial chemicals and academic research sectors, and their capital spending budgets can have a significant effect on the demand for our products. Their research and development budgets are based on a wide variety of factors, including factors beyond our control, such as:

- the allocation of available resources to make purchases;
- funding from government sources;
- changes in government programs that provide funding to research institutions and companies;
- the spending priorities among various types of research equipment;
- policies regarding capital expenditures during recessionary periods;
- macroeconomic conditions and the political climate;
- changes in the regulatory environment;
- differences in budgetary cycles; and
- market acceptance of relatively new technologies, such as ours.

Any decrease in capital spending or change in spending priorities of our customers and potential customers could significantly reduce the demand for our products. As we expand into new geographic markets, our revenue may be impacted by seasonal trends in the different regions, the seasonality of customer capital budgets in those regions and the mix of domestic versus international sales. Moreover, we have no control over the timing and amount of purchases by these customers and potential customers, and as a result, revenue from these sources may vary significantly due to factors that can be difficult to forecast. Any delay or reduction in purchases by customers and potential customers or our inability to forecast fluctuations in demand could harm our future operating results.

We generally do not have long-term contracts with our customers requiring them to purchase any specified quantities from us.

We generally do not have long-term contracts with our customers requiring them to purchase any specified quantities from us and without such contracts our customers are not obligated to order or reorder our products. As a result, we cannot accurately predict our customers' decisions to reduce or cease purchasing our

products. Additionally, even where we enter into contracts with our customers, there is no guarantee that such agreements will be negotiated on terms that are commercially favorable to us in the long-term. Therefore, if many of our customers were to substantially reduce their transaction volume or cease ordering products from us, this could materially and adversely affect our financial performance.

We have limited experience in sales and marketing of our products and, as a result, may be unable to successfully increase our market share and expand our customer base.

We have limited experience in sales and marketing of our products. Our ability to achieve profitability depends on our being able to increase our market share and expand our customer base. Although members of our sales and marketing teams have considerable industry experience and have engaged in marketing activities for our products, in the future we must expand our sales, marketing, distribution and customer support capabilities with the appropriate technical expertise to effectively market our products. To perform sales, marketing, distribution and customer support successfully, we will face a number of risks, including:

- we may not be able to attract, retain and manage the sales, marketing and service force necessary to publicize and gain broader market acceptance for our technology;
- the time and cost of establishing a specialized sales, marketing and service force for a particular product or service, which may be difficult to justify in light of the revenue generated; and
- our sales, marketing and service force may be unable to initiate and execute successful commercialization activities with respect to new products or markets we may seek to enter.

If our sales and marketing efforts, or those of any third-party sales and distribution partners, are not successful, our new technologies and products may not gain market acceptance, which could materially impact our business operations.

We have limited experience in manufacturing our DNA synthesis equipment and tools. If we are unable to expand our DNA synthesis manufacturing capacity, this would result in lost revenue and harm our business.

In order to expand our manufacturing capacity of new and existing products, we need to either build additional internal manufacturing capacity, contract with one or more partners, or both. Our technology and the production process for our DNA synthesis equipment and tools are complex, involving specialized parts, and we may encounter unexpected difficulties in manufacturing our DNA synthesis equipment and tools. There is no assurance that we will be able to continue to build manufacturing capacity internally or find one or more suitable partners, or both, to meet the volume and quality requirements necessary to be successful in our existing and potential markets. Manufacturing and product quality issues may arise as we increase the scale of our production. If our DNA synthesis equipment and tools do not consistently produce DNA products that meet our customers' performance expectations, our reputation may be harmed, and we may be unable to generate sufficient revenue to become profitable. Any delay or inability in establishing or expanding our manufacturing capacity could diminish our ability to develop or sell our products, which could result in lost revenue and materially harm our business, financial condition and results of operations.

We are substantially dependent on the success of our synthetic DNA products.

To date, we have invested nearly all of our efforts and financial resources in the research and development of our synthetic DNA products. The DNA synthesis business is very capital intensive, particularly for early stage companies that do not have significant off-setting revenues.

Our financial results are dependent on strengthening our core business while diversifying into other developing sectors such as pharmaceutical biologics drug discovery and data storage. Substantially all of our revenue generated to date is from our synthetic DNA products.

Our near-term prospects, including our ability to finance our Company and enter into strategic collaborations, will depend heavily on the successful development and commercialization of our synthetic DNA products. These initiatives will be substantially dependent on our ability to generate revenue from our synthetic DNA products and obtain other funding necessary to support these initiatives. Our inability to continue these initiatives and initiate new research and development efforts could result in a failure to develop new products, improve upon existing products such that sectors like pharmaceutical biologics drug discovery and data storage may never be fully developed, and expand our addressable market which could have a material and adverse impact on our sales, business, financial position and results of operations.

We and our chief executive officer are currently involved in litigation with Agilent Technologies, Inc., in which Agilent has alleged a claim of trade secret misappropriation against Twist Bioscience and trade secret misappropriation and other related claims against our chief executive officer, and an adverse result could harm our business and results of operations.

We and our chief executive officer are currently involved in litigation with Agilent in which Agilent has alleged a claim of trade secret misappropriation against our Company and trade secret misappropriation and other related claims against our chief executive officer. This litigation with Agilent could result in significant expense. Agilent has considerable resources available to it; we, on the other hand, are an early-stage commercial company with comparatively few resources available to us to engage in costly and protracted litigation. Intellectual property infringement claims asserted against us could be costly to defend and could limit our ability to use some technologies in the future. They will be time consuming, will divert our chief executive officer's, management's and scientific personnel's attention and may result in liability for substantial damages. For example, we have incurred and anticipate that we will continue to incur significant expense and substantial time in defending against our current intellectual property infringement dispute with Agilent.

An adverse judgment in the Agilent proceeding could require us to pay damages, attorneys' fees, costs and expenses, or result in injunctive relief, any of which could materially adversely affect our business, financial condition, results of operations and prospects. For more information on our current legal and regulatory proceedings, see the section of this prospectus captioned "Business — Legal proceedings." And for other risks related to our intellectual property, see the section of this prospectus captioned "Risks related to our intellectual property." We may also in the future be involved with other litigation. We expect that the number of such claims may increase as our scale and the level of competition in our industry segments grows.

We depend on one single-source supplier for a critical component for our DNA synthesis process. The loss of this supplier or its failure to supply us with the necessary component on a timely basis, could cause delays in the future capacity of our DNA synthesis process and adversely affect our business.

We depend on one single-source supplier for a critical component for our DNA synthesis process. We do not currently have the infrastructure or capability internally to manufacture this component. Although we have a substantial reserve of supplies and although alternative suppliers exist for this critical component of our synthesis process, our existing DNA synthesis manufacturing process has been designed based on the functions, limitations, features and specifications of the components that we currently utilize. We have a supply agreement in place with this component supplier. However, there can be no assurance that our supply of this component will not be limited, interrupted, or of satisfactory quality or continue to be available at acceptable prices. Additionally, we do not have any control over the process or timing of the acquisition or manufacture of materials by our manufacturer, and cannot ensure that it will deliver to us the component we order on time, or at all.

The loss of this component provided by this supplier could require us to change the design of our manufacturing process based on the functions, limitations, features and specifications of the replacement components.

In addition, the lead time needed to establish a relationship with a new supplier can be lengthy, and we may experience delays in meeting demand in the event we must switch to a new supplier. The time and effort to qualify a new supplier could result in additional costs, diversion of resources or reduced manufacturing yields, any of which would negatively impact our operating results. Further, we may be unable to enter into agreements with a new supplier on commercially reasonable terms, which could have a material adverse impact on our business. Our dependence on this single-source supplier exposes us to certain risks, including the following:

- our supplier may cease or reduce production or deliveries, raise prices or renegotiate terms;
- we may be unable to locate a suitable replacement on acceptable terms or on a timely basis, if at all;
- if there is a disruption to our single-source supplier's operations, and if we are unable to enter into arrangements with alternative suppliers, we will have no other means of completing our synthesis process until they restore the affected facilities or we or they procure alternative manufacturing facilities or sources of supply;
- delays caused by supply issues may harm our reputation, frustrate our customers and cause them to turn to our competitors for future projects; and
- our ability to progress our DNA synthesis products could be materially and adversely impacted if the single-source supplier upon which we rely were to experience a significant business challenge, disruption or failure due to issues such as financial difficulties or bankruptcy, issues relating to other customers such as regulatory or quality compliance issues, or other financial, legal, regulatory or reputational issues.

Moreover, to meet anticipated market demand, our single-source supplier may need to increase manufacturing capacity, which could involve significant challenges. This may require us and our supplier to invest substantial additional funds and hire and retain the technical personnel who have the necessary experience. Neither we nor our supplier may successfully complete any required increase to existing manufacturing capacity in a timely manner, or at all. For additional information on our single-source and other suppliers, see the section of this prospectus captioned "Business — Suppliers."

We must continue to secure and maintain sufficient and stable supplies of raw materials.

Although historically we have not experienced price increases due to unexpected raw material shortages and other unanticipated events, there is no assurance that our supply of raw materials will not be significantly adversely affected in the future, adversely affecting our business, prospects, financial condition and results of operation.

In addition, as we grow, our existing suppliers may not be able to meet our increasing demand, and we may need to find additional suppliers. There is no assurance that we will always be able to secure suppliers who provide raw materials at the specification, quantity and quality levels that we demand (or at all) or be able to negotiate acceptable fees and terms of services with any such suppliers. Identifying a suitable supplier is an involved process that requires us to become satisfied with their quality control, responsiveness and service, financial stability and labor and other ethical practices. Even if we are able to expand existing sources, we may encounter delays in production and added costs as a result of the time it takes to train suppliers in our methods, products and quality control standards.

We typically do not enter into agreements with our suppliers but secure our raw materials on a purchase order basis. Our suppliers may reduce or cease their supply of raw materials and outsourced services and products to us at any time in the future. If the supply of raw materials and the outsourced services and products is interrupted, our production processes may be delayed. If any such event occurs, our operation and financial position may be adversely affected.

A deterioration of our relationship with any of our suppliers, or problems experienced by these suppliers, could lead to shortages in our production capacity for some or all of our products. In such case, we may not be able to fulfill the demand of existing customers or supply new customers. A raw material shortage or an increase in the cost of the raw materials we use could result in decreased revenue or could impair our ability to maintain or expand our business.

For the years ended September 30, 2016 and 2017, our cost of raw materials accounted for approximately 27%, and 30%, respectively, of our total cost of revenues. In the event of significant price increases for raw materials, we may have to pass the increased raw materials costs to our customers. However, we cannot assure you that we will be able to raise the prices of our products sufficiently to cover increased costs resulting from increases in the cost of our raw materials or overcome the interruption of a sufficient supply of qualified raw materials for our products. As a result, a price increase for our raw materials may negatively impact our business, financial position and results of operations.

We may encounter difficulties in managing our growth, and these difficulties could impair our profitability.

Currently, we are working simultaneously on multiple projects targeting several market sectors, including activities in the healthcare, agriculture, industrial chemicals and academic sectors. These diversified operations place significant demands on our limited resources and require us to substantially expand the capabilities of our technical, administrative and operational resources.

If we are unable to manage this growth effectively, our business and operating results could suffer. Our ability to manage our operations and costs, including research and development, costs of components, manufacturing, sales and marketing, requires us to continue to enhance our operational, financial and management controls, reporting systems and procedures and to attract and retain sufficient numbers of talented employees. Failure to attract and retain sufficient numbers of talented employees will further strain our human resources and could impede our growth.

Our revenue, results of operations, cash flows and reputation in the marketplace may suffer upon the loss of a significant customer.

We have derived, and believe we may continue to derive, a significant portion of our revenues from one large customer or a limited number of large customers. Our largest customer Ginkgo Bioworks accounted for 30% and 40% of our revenue for the years ended September 30, 2016 and 2017. Our customers may buy less of our products depending on their own technological developments, end-user demand for our products and internal budget cycles. In addition, existing customers may choose to produce some or all of their synthetic DNA requirements internally by using or developing manufacturing capabilities organically or by using capabilities from acquisitions of assets or entities from third parties with such capabilities. For example, in January 2017, Ginkgo Bioworks announced the acquisition of Gen9, Inc., which was a DNA synthesis manufacturer. If Ginkgo Bioworks reduces the amount of products it purchases from us and increases the amount of synthetic DNA products it manufactures internally using the capabilities acquired in the Gen9 acquisition or otherwise, it could have a material adverse impact on our revenue, results of operations, cash flows and reputation in the marketplace. The loss of Ginkgo Bioworks as a customer, or the loss of any other significant customer or a significant reduction in the amount of product ordered by Ginkgo Bioworks or any other significant customer would adversely affect our revenue, results of operations, cash flows and reputation in the marketplace.

Our credit facility contains restrictions that limit our flexibility in operating our business.

In September 2017, we entered into an amended and restated loan and security agreement with SVB. Our credit facility contains various covenants that limit our ability to engage in specified types of transactions. These covenants limit our ability to, among other things:

- sell, transfer, lease or otherwise dispose of our assets;
- create, incur or assume additional indebtedness;
- engage in certain changes in business, management, control, or business location;
- encumber or permit liens on certain of our assets;
- make restricted payments, including paying dividends on, repurchasing or making distributions with respect to our common stock;
- make specified investments (including loans and advances);
- consolidate, merge, sell or otherwise dispose of all or substantially all of our assets or acquire other entities;
- make or permit any payment on any subordinated debt; and
- enter into certain transactions with our affiliates.

Our incurrence of this debt, and any future increases in our aggregate level of debt, may adversely affect our operating results and financial condition by, among other things:

- increasing our vulnerability to downturns in our business, to competitive pressures and to adverse economic and industry conditions;
- requiring the dedication of an increased portion of our expected cash flows from operations to service our indebtedness, thereby reducing the amount of expected cash flows available for other purposes, including capital expenditures, acquisitions and dividends; and
- limiting our flexibility in planning for, or reacting to, changes in our business and our industry.

A breach of any of these covenants could result in a default under our credit facility. Upon the occurrence of an event of default under our credit facility, SVB could elect to declare all amounts outstanding under our credit facility to be immediately due and payable and terminate all commitments to extend further credit. If we were unable to repay those amounts, the lenders under our credit facility could proceed against the collateral granted to them to secure such indebtedness. We have pledged substantially all of our assets, other than our intellectual property, as collateral under our credit facility.

We depend on the continuing efforts of our senior management team and other key personnel. If we lose members of our senior management team or other key personnel or are unable to successfully retain, recruit and train qualified researchers, engineering and other personnel, our ability to develop our products could be harmed, and we may be unable to achieve our goals.

Our future success depends upon the continuing services of members of our senior management team and scientific and engineering personnel. We are highly dependent on Emily Leproust, our President and Chief Executive Officer, who is employed “at will,” meaning we or she may terminate the employment relationship at any time. In particular, our researchers and engineers are critical to our future technological and product innovations, and we will need to hire additional qualified personnel. We may not be able to attract and retain qualified personnel on acceptable terms, or at all. In addition, to the extent we hire personnel from

competitors, we may be subject to allegations that they have been improperly solicited or that they have divulged proprietary or other confidential information, or that their former employers own their research output. Our industry, particularly in the San Francisco Bay Area, is characterized by high demand and intense competition for talent, and the turnover rate can be high. We compete for qualified management and scientific personnel with other life science companies, academic institutions and research institutions, particularly those focusing on genomics. Many of these employees could leave our company with little or no prior notice and would be free to work for a competitor. If one or more of our senior executives or other key personnel were unable or unwilling to continue in their present positions, we may not be able to replace them easily or at all, and other senior management may be required to divert attention from other aspects of the business. In addition, we do not have "key person" life insurance policies covering members of our management team or other key personnel except Emily Leproust. The loss of any of these individuals or our inability to attract or retain qualified personnel, including researchers, engineers and others, could prevent us from pursuing collaborations and adversely affect our product development and introductions, business growth prospects, results of operations and financial condition.

We may engage in strategic transactions, including acquisitions that could disrupt our business, cause dilution to our stockholders, reduce our financial resources, or prove not to be successful.

In the future, we may enter into transactions to acquire other businesses, products or technologies and our ability to do so successfully cannot be ensured. In April 2016, we acquired Genome Compiler Corporation, which became a wholly owned subsidiary. This acquisition allowed us to add software design capabilities for our e-commerce ordering system. However, to date, we have not successfully concluded other acquisitions, and we are pursuing opportunities in the life sciences industry that complement and expand our synthetic DNA product, products and markets both locally and internationally. If we identify suitable opportunities, we may not be able to make such acquisitions on favorable terms or at all. Any acquisitions we make may not strengthen our competitive position, and these transactions may be viewed negatively by customers or investors. We may decide to incur debt in connection with an acquisition or issue our common stock or other equity securities to the stockholders of the acquired company, which would reduce the percentage ownership of our existing stockholders. We could incur losses resulting from undiscovered liabilities of the acquired business that are not covered by any indemnification we may obtain from the seller. In addition, we may not be able to successfully integrate the acquired personnel, technologies and operations into our existing business in an effective, timely and non-disruptive manner. Acquisitions may also divert management attention from day-to-day responsibilities, increase our expenses and reduce our cash available for operations and other uses. In addition, we cannot guarantee that we will be able to fully recover the costs of such acquisitions or that we will be successful in leveraging any such strategic transactions into increased business, revenue or profitability. We also cannot predict the number, timing or size of any future acquisitions or the effect that any such transactions might have on our operating results.

From time to time, we may consider other strategic transactions, including collaborations. The competition for collaborators is intense, and the negotiation process is time-consuming and complex. Any new collaboration may be on terms that are not optimal for us, and we may not be able to maintain any new collaboration. Any such collaboration may require us to incur non-recurring or other charges, increase our near- and long-term expenditures and pose significant integration or implementation challenges or disrupt our management or business. These transactions would entail numerous operational and financial risks, including exposure to unknown liabilities, disruption of our business and diversion of our management's time and attention to manage a collaboration, incurrence of substantial debt or dilutive issuances of equity securities to pay transaction consideration or costs, higher than expected collaboration, acquisition or integration costs, write-downs of assets or goodwill or impairment charges, increased amortization expenses, difficulty and cost in facilitating the collaboration or combining the operations and personnel of any acquired business, impairment

of relationships with key suppliers, manufacturers or customers of any acquired business due to changes in management and ownership and the inability to retain key employees of any acquired business. Accordingly, although there can be no assurance that we will undertake or successfully complete any collaborations, any transactions that we do complete may be subject to the foregoing or other risks and have a material and adverse effect on our business, financial condition, results of operations and prospects. Conversely, any failure to enter any collaboration or other strategic transaction that would be beneficial to us could delay the development and potential commercialization of our products and technologies.

As we expand our development and commercialization activities outside of the United States, we will be subject to an increased risk of inadvertently conducting activities in a manner that violates the U.S. Foreign Corrupt Practices Act and similar laws. If that occurs, we may be subject to civil or criminal penalties which could have a material adverse effect on our business, financial condition, results of operations and growth prospects.

We are subject to the U.S. Foreign Corrupt Practices Act, or the FCPA, which prohibits corporations and individuals from paying, offering to pay, or authorizing the payment of anything of value to any foreign government official, government staff member, political party, or political candidate in an attempt to obtain or retain business or to otherwise influence a person working in an official capacity. We are also subject to the UK Anti-Bribery Act, which prohibits both domestic and international bribery, as well as bribery across both public and private sectors.

In the course of establishing and expanding our commercial operations and complying with non-U.S. regulatory requirements, we will need to establish and expand business relationships with various third parties and we will interact more frequently with foreign officials, including regulatory authorities. Expanded programs to maintain compliance with such laws will be costly and may not be effective. Any interactions with any such parties or individuals where compensation is provided that are found to be in violation of such laws could result in substantial fines and penalties and could materially harm our business. Furthermore, any finding of a violation under one country's laws may increase the likelihood that we will be prosecuted and be found to have violated another country's laws. If our business practices outside the United States are found to be in violation of the FCPA, UK Anti-Bribery Act or other similar laws, we may be subject to significant civil and criminal penalties which could have a material adverse effect on our financial condition and results of operations.

We could engage in exporting or related activity that contravenes international trade restraints, or regulatory authorities could promulgate more far reaching international trade restraints, which could give rise to one or more of substantial legal liability, impediments to our business and reputational damage.

Our international business activities must comport with U.S. export controls and other international trade restraints, including the U.S. Department of Commerce's Export Administration Regulations and economic sanctions regulations administered by the U.S. Treasury Department's Office of Foreign Assets Controls.

We have established an international trade compliance program that encompasses best practices for preventing, detecting and addressing noncompliance with international trade restraints. Furthermore, to date our exports have not been licensable under export controls; however, we could fail to observe the compliance program requirements in a manner that leaves us in noncompliance with export controls or other international trade restraints. In addition, authorities could promulgate international trade restraints that impinge on our ability to prosecute our business as planned. One or more of resulting legal penalties, restraints on our business or reputational damage could have material adverse effects on our business and financial condition.

Adverse conditions in the global economy and disruption of financial markets may significantly harm our revenue, profitability and results of operations.

The global economy has a significant impact on our business and volatility and disruption of financial markets could limit our customers' ability to obtain adequate financing or credit to purchase and pay for our products in

a timely manner or to maintain operations, which could result in a decrease in sales volume that could harm our results of operations. General concerns about the fundamental soundness of domestic and international economies may also cause our customers to reduce their purchases. Changes in banking, monetary and fiscal policies to address liquidity and increase credit availability may not be effective. Significant government investment and allocation of resources to assist the economic recovery of sectors which do not include our customers may reduce the resources available for government grants and related funding for life sciences research and development. Continuation or further deterioration of these financial and macroeconomic conditions could significantly harm our sales, profitability and results of operations.

We operate in a highly competitive industry and if we are not able to compete effectively, our business and operating results will likely be harmed.

We face competition from a broad range of providers of core synthetic biology products such as GenScript Biotech Corporation, GENEWIZ, Integrated DNA Technologies, Inc., DNA 2.0 Inc. d/b/a/ ATUM, GeneArt (owned by Thermo Fisher Scientific Inc.), Eurofins Genomics LLC, Sigma-Aldrich Corporation (an indirect wholly owned subsidiary of Merck & Company), Promega Corporation, OriGene Technologies, Inc., Blue Heron Biotech, LLC and others. Additionally, we compete with both large and emerging providers in the life sciences tools and diagnostics industries focused on sample preparation for next generation sequencing such as Thermo Fisher Scientific Inc., Illumina, Inc., Integrated DNA Technologies, Inc., Agilent, and Roche NimbleGen, Inc. In the antibody discovery market, we compete with clinical research organizations, such as LakePharma (mouse hybridoma, llama immune libraries, XOMA phage display library) and Aldevron, LLC (genetic mouse immunization coupled with hybridoma), and antibody discovery biotechnology companies, such as Iontas (human phage display libraries, human phage display library focused on ion channels), Adimab (human synthetic yeast display libraries), and Distributed Bio (human synthetic phage display library, lead optimization libraries). In the field of DNA digital data storage, we compete with Catalog Technologies, Inc., ETH Zurich, Helixworks, Iridia, Inc., North Shore Bio and Roswell. We may not be successful in maintaining our competitive position for a number of reasons. Some of our current competitors, as well as many of our potential competitors, have significant name recognition, substantial intellectual property portfolios, longer operating histories, greater resources to invest in new technologies, substantial experience in new product development and manufacturing capabilities and more established distribution channels to deliver products to customers than we do. These competitors may be able to respond more quickly and effectively than we can to new or changing opportunities, technologies, standards or customer requirements. Our competitors may develop disruptive technologies or products that are comparable or superior to our technologies and products. In light of these advantages, even though we believe our technology is superior to the products offerings of our competitors, current or potential customers might accept competitive products in lieu of purchasing our products. Increased competition is likely to result in continued pricing pressures, which could harm our sales, profitability or market share. Our failure to continue competing effectively or wining additional business with our existing customers could materially and adversely affect our business, financial condition or results of operations.

We may be subject to significant pricing pressures.

Over time, increasing customer demand for lower prices could force us to discount our products and result in lower margins. The impact may be further exacerbated if we are unable to successfully control production costs. Alternatively, if due to rising market prices, our suppliers increase prices or reduce discounts on their supplies, we may be unable to pass on any cost increase to our customers, thereby resulting in reduced margins and profits. Furthermore, changes in our product mix may negatively affect our gross margins. Overall, these pricing pressures may adversely affect our business, financial position and results of operations.

Ethical, legal and social concerns surrounding the use of genetic information could reduce demand for our technology.

Our products may be used to create DNA sequences of humans, agricultural crops and other living organisms. Our products could be used in a variety of applications, which may have underlying ethical, legal and social concerns. Governmental authorities could, for safety, social or other purposes, impose limits on or implement regulation of the use of gene synthesis. Such concerns or governmental restrictions could limit the use of our DNA synthesis products, which could have a material adverse effect on our business, financial condition and results of operations. In addition, public perception about the safety and environmental hazards of, and ethical concerns over, genetically engineered products and processes could influence public acceptance of our technologies, products and processes. These concerns could result in increased expenses, regulatory scrutiny, delays or other impediments to our programs.

We use biological and hazardous materials that require considerable expertise and expense for handling, storage and disposal and may result in claims against us.

We work with materials, including chemicals, biological agents, and compounds and DNA samples that could be hazardous to human health and safety or the environment. Our operations also produce hazardous and biological waste products. Federal, state and local laws and regulations govern the use, generation, manufacture, storage, handling and disposal of these materials and wastes. Compliance with applicable environmental laws and regulations is expensive, and current or future environmental laws and regulations may restrict our operations. If we do not comply with applicable regulations, we may be subject to fines and penalties.

In addition, we cannot eliminate the risk of accidental injury or contamination from these materials or wastes, which could cause an interruption of our commercialization efforts, research and development programs and business operations, as well as environmental damage resulting in costly clean-up and liabilities under applicable laws and regulations. Furthermore, environmental laws and regulations are complex, change frequently and have tended to become more stringent. We cannot predict the impact of such changes and cannot be certain of our future compliance. While our property insurance policy provides limited coverage in the event of contamination from hazardous and biological products and the resulting cleanup costs, we do not currently have any additional insurance coverage for legal liability for claims arising from the handling, storage or disposal of hazardous materials. Accordingly, in the event of contamination or injury, we could be liable for damages or penalized with fines in an amount exceeding our resources and our operations could be suspended or otherwise adversely affected.

We could develop DNA sequences or engage in other activity that contravenes biosecurity requirements, or regulatory authorities could promulgate more far reaching biosecurity requirements that our standard business practices cannot accommodate, which could give rise to substantial legal liability, impediments to our business and reputational damage.

The Federal Select Agent Program, or the FSAP, involves rules administered by the Centers for Disease Control and Prevention and Toxins and the Animal and Plant Health Inspection Service that regulate possession, use and transfer of biological select agents and toxins that have the potential to pose a severe threat to public, animal or plant health or to animal or plant products.

We have established a biosecurity program under which we follow biosafety and biosecurity best practices and avoid DNA synthesis activities that implicate FSAP rules; however, we could err in our observance of compliance program requirements in a manner that leaves us in noncompliance with FSAP or other biosecurity rules. In addition, authorities could promulgate new biosecurity requirements that restrictions our operations. One or

more resulting legal penalties, restraints on our business or reputational damage could have material adverse effects on our business and financial condition.

Third parties may use our products in ways that could damage our reputation.

After our customers have received our products, we do not have any control over their use and our customers may use them in ways that are harmful to our reputation as a supplier of synthetic DNA products. In addition, while we have established a biosecurity program designed to comply with biosafety and biosecurity requirements and perform export control screening in an effort to ensure that third parties do not obtain our products for malevolent purposes, we cannot guarantee that these preventative measures will eliminate or reduce the risk of the domestic and global opportunities for the misuse of our products. Accordingly, in the event of such misuse, our reputation, future revenue and operating results may suffer.

Any damage to our reputation or brand may materially and adversely affect our business, financial condition and results of operations.

We believe that developing and maintaining our brand is important to our success and that our financial success is influenced by the perception of our brand by our customers. Furthermore, the importance of our brand recognition may become even greater to the extent that competitors offer more products similar to ours. Many factors, some of which are beyond our control, are important to maintaining our reputation and brand. These factors include our ability to comply with ethical, social, product, labor and environmental standards. Any actual or perceived failure in compliance with such standards could damage our reputation and brand.

Because we are subject to existing and potential additional governmental regulation, the markets for our products may be narrowed.

We are subject, both directly and indirectly, to the adverse impact of existing and potential future government regulation of our operations and markets. For example, export of our products is subject to strict regulatory control in a number of jurisdictions. The failure to satisfy export control criteria or obtain necessary clearances could delay or prevent shipment of products, which could adversely affect our revenues and profitability. Moreover, the life sciences industry, which is currently the primary market for our technology, has historically been heavily regulated. There are, for example, laws in several jurisdictions restricting research in genetic engineering, which can operate to narrow our markets. Given the evolving nature of this industry, legislative bodies or regulatory authorities may adopt additional regulation that adversely affects our market opportunities. Our business is also directly affected by a wide variety of government regulations applicable to business enterprises generally and to companies operating in the life science industry in particular. Failure to comply with these regulations or obtain or maintain necessary permits and licenses could result in a variety of fines or other censures or an interruption in our business operations which may have a negative impact on our ability to generate revenues and could increase the cost of operating our business.

Our products could in the future be subject to additional regulation by the U.S. Food and Drug Administration or other domestic and international regulatory agencies, which could increase our costs and delay our commercialization efforts, thereby materially and adversely affecting our business and results of operations.

The U.S. Food and Drug Administration, or FDA, regulates medical devices, including in vitro diagnostics, or IVDs. IVDs include reagents, instruments, and systems intended for use in diagnosis of disease or other conditions, including a determination of the state of health, in order to cure, mitigate, treat, or prevent disease or its sequelae. IVDs are intended for use in the collection, preparation, and examination of specimens taken from the human body. A research use only, or RUO, IVD product is an IVD product that is in the laboratory research phase of development and is being shipped or delivered for an investigation that is not subject to FDA's investigational device exemption requirements. As such, an RUO IVD is not intended for use in clinical

investigations or in clinical practice. Such RUO products do not require premarket clearance or approval from the FDA, provided that they be labeled “For Research Use Only. Not for use in diagnostic procedures” pursuant to FDA regulations. Our IVD products are not intended for clinical or diagnostic use, and we market and label them as RUO. Accordingly, we have not sought clearance or approval from the FDA to market our products. However, the FDA may disagree with our assessment that our products are properly marketed as RUO, and may determine that our products are subject to pre-market clearance, approval, or other regulatory requirements. If the FDA determines that our products are subject to such requirements, we could be subject to enforcement action, including administrative and judicial sanctions, and additional regulatory controls and submissions for our tests, all of which could be burdensome.

Further, in the future, certain of our products or related applications could be subject to additional FDA regulation. Even where a product is not subject to FDA clearance or approval requirements, the FDA may impose restrictions as to the types of customers to which we can market and sell our products. Such regulation and restrictions may materially and adversely affect our business, financial condition and results of operations. Other regulatory regimes that do not currently present material challenges but that could in the future present material challenges include export controls and biosecurity.

Similarly, even though our products and services are not currently covered and reimbursed by third-party payors, including government healthcare programs such as Medicare and Medicaid, to the extent our products or related applications become eligible for coverage and reimbursement by such payors, we could be subject to healthcare fraud and abuse laws of both the federal government and the states in which we conduct our business. Because of the breadth of these laws and the narrowness of available statutory and regulatory exceptions, it is possible that some of our business activities could be subject to challenge under one or more of such laws. If we or our operations are found to be in violation of any of the laws described above or any other governmental regulations that apply to us, we may be subject to penalties, including civil and criminal penalties, damages, fines, imprisonment, and the curtailment or restructuring of our operations, any of which could materially adversely affect our ability to operate our business and our financial results.

Many countries have laws and regulations that could affect our products. The number and scope of these requirements are increasing. Unlike many of our competitors, this is an area where we do not have expertise. We may not be able to obtain regulatory approvals in such countries or may incur significant costs in obtaining or maintaining foreign regulatory approvals.

Certain of our potential customers may require that we become certified under the Clinical Laboratory Improvement Amendments of 1988.

Although we are not currently subject to the Clinical Laboratory Improvement Amendment of 1988, or CLIA, we may in the future be required by certain customers to obtain a CLIA certification. CLIA, which extends federal oversight over clinical laboratories by requiring that they be certified by the federal government or by a federally approved accreditation agency, is designed to ensure the quality and reliability of clinical laboratories by mandating specific standards in the areas of personnel qualifications, administration and participation in proficiency testing, patient test management, quality control, quality assurance and inspections. If our customers require a CLIA certification, we will have to continually expend time, money and effort to ensure that we meet the applicable quality and safety requirements, which may divert the attention of management and disrupt our core business operations.

If we experience a significant disruption in, or breach in security of, our information technology systems, or if we fail to implement new systems and software successfully, our business could be adversely affected.

We rely on several centralized information technology systems throughout our company to provide products, keep financial records, process orders, manage inventory, process shipments to customers and operate other

critical functions. Our information technology systems may be susceptible to damage, disruptions or shutdowns due to power outages, hardware failures, computer viruses, attacks by computer hackers, telecommunication failures, user errors, catastrophes or other unforeseen events. Our information technology systems also may experience interruptions, delays or cessations of service or produce errors in connection with system integration, software upgrades or system migration work that takes place from time to time. If we were to experience a prolonged system disruption in the information technology systems that involve our interactions with customers or suppliers, including negatively impacting our order fulfilment and order entry on our e-commerce platform, it could result in the loss of sales and customers and significant incremental costs, which could adversely affect our business. In addition, security breaches of our information technology systems could result in the misappropriation or unauthorized disclosure of confidential information belonging to us or to our employees, partners, customers or suppliers, which could result in our suffering significant financial or reputational damage. Further, such a breach may require notification to governmental agencies, the media or individuals pursuant to various federal and state privacy and security laws. We would also be exposed to a risk of litigation and potential liability, which could materially adversely affect our business, results of operations and financial condition.

Our facilities in California are located near known earthquake faults, and the occurrence of an earthquake or other catastrophic disaster could cause damage to our facilities and equipment, which could require us to cease or curtail operations.

Our facilities in the San Francisco Bay Area are located near known earthquake fault zones and are vulnerable to damage from earthquakes. We are also vulnerable to damage from other types of disasters, including fire, floods, power loss, communications failures and similar events. If any disaster were to occur, our ability to operate our business at our facilities would be seriously, or potentially completely, impaired. In addition, the nature of our activities could cause significant delays in our research programs and commercial activities and make it difficult for us to recover from a disaster. The insurance we maintain may not be adequate to cover our losses resulting from disasters or other business interruptions. Accordingly, an earthquake or other disaster could materially and adversely harm our ability to conduct business.

Delivery of our products could be delayed or disrupted by factors beyond our control, and we could lose customers as a result.

We rely on third-party carriers for the timely delivery of our products. As a result, we are subject to carrier disruptions and increased costs that are beyond our control, including employee strikes, inclement weather and increased fuel costs. Any failure to deliver products to our customers in a timely and accurate manner may damage our reputation and brand and could cause us to lose customers. If our relationship with any of these third-party carriers is terminated or impaired or if any of these third parties is unable to deliver our products, the delivery and acceptance of our products by our customers may be delayed which could harm our business and financial results. The failure to deliver our products in a timely manner may harm our relationship with our customers, increase our costs and otherwise disrupt our operations.

Doing business internationally creates operational and financial risks for our business.

During our fiscal years ended September 30, 2016 and 2017, approximately 22% and 23%, respectively, of our revenue was generated from customers located outside of the United States. In connection with our growth strategy, we intend to further expand in international markets. Conducting and launching operations on an international scale requires close coordination of activities across multiple jurisdictions and time zones and consumes significant management resources. If we fail to coordinate and manage these activities effectively, our business, financial condition or results of operations could be adversely affected. International sales entail a variety of risks, including longer payment cycles and difficulties in collecting accounts receivable outside of

the United States, currency exchange fluctuations, challenges in staffing and managing foreign operations, tariffs and other trade barriers, unexpected changes in legislative or regulatory requirements of foreign countries into which we sell our products, difficulties in obtaining export licenses or in overcoming other trade barriers, laws and business practices favoring local companies, political and economic instability, difficulties protecting or procuring intellectual property rights, and restrictions resulting in delivery delays and significant taxes or other burdens of complying with a variety of foreign laws.

Changes in the value of the relevant currencies may affect the cost of certain items required in our operations. Changes in currency exchange rates may also affect the relative prices at which we are able to sell products in the same market. Our revenue from international customers may be negatively impacted as increases in the U.S. dollar relative to our international customers' local currency could make our products more expensive, impacting our ability to compete. Our costs of materials from international suppliers may increase if in order to continue doing business with us they raise their prices as the value of the U.S. dollar decreases relative to their local currency. Foreign policies and actions regarding currency valuation could result in actions by the United States and other countries to offset the effects of such fluctuations. The recent global financial downturn has led to a high level of volatility in foreign currency exchange rates and that level of volatility may continue, which could adversely affect our business, financial condition or results of operations.

Our ability to use our net operating loss carryforwards to offset future taxable income may be subject to certain limitations.

In general, under Section 382 of the Internal Revenue Code of 1986, as amended, or the Code, a corporation that undergoes an "ownership change" is subject to limitations on its ability to use its pre-change net operating loss carryforwards, or NOLs, to offset future taxable income. If the Internal Revenue Service challenges our analysis that our existing NOLs will not expire before utilization due to previous ownership changes, our ability to use our NOLs could be limited by Section 382 of the Code. Future changes in our stock ownership, some of which are outside of our control, could result in an ownership change under Section 382 of the Code. Furthermore, our ability to use NOLs of companies that we may acquire in the future may be subject to limitations. For these reasons, we may not be able to use a material portion of the NOLs reflected on our balance sheet, even if we attain profitability.

The enactment of legislation implementing changes in taxation of international business activities, the adoption of other corporate tax reform policies, or changes in tax legislation or policies could impact our future financial position and results of operations.

Corporate tax reform, base-erosion efforts and tax transparency continue to be high priorities in many tax jurisdictions where we intend to have business operations. As a result, policies regarding corporate income and other taxes in numerous jurisdictions are under heightened scrutiny and tax reform legislation is being proposed or enacted in a number of jurisdictions. For example, the Tax Cuts and Jobs Act of 2017, or the Tax Act, signed into law on December 22, 2017, adopting broad U.S. corporate income tax reform will, among other things, reduce the U.S. corporate income tax rate, but will impose base-erosion prevention measures on non-U.S. earnings of U.S. entities as well as a one-time mandatory deemed repatriation tax on accumulated non-U.S. earnings of U.S. entities.

In addition, many countries are beginning to implement legislation and other guidance to align their international tax rules with the Organisation for Economic Co-operation's Base Erosion and Profit Shifting recommendations and action plan that aim to standardize and modernize global corporate tax policy, including changes to cross-border tax, transfer-pricing documentation rules, and nexus-based tax incentive practices.

Such legislative initiatives may materially and adversely affect our plans to expand internationally and may negatively impact our financial condition and results of operations generally.

Our inability to collect on our accounts receivable by a significant number of customers may have an adverse effect on our business, financial condition and results of operations.

Sales to our customers are generally made on open credit terms. Management maintains an allowance for potential credit losses. The average days sales outstanding of our trade receivables as of September 30, 2016 and 2017 were 57 and 78 days outstanding, respectively. If our customers' cash flow, working capital, financial conditions or results of operations deteriorate, they may be unable or even unwilling to pay trade receivables owed to us promptly or at all. As a result, we could be exposed to a certain level of credit risk. If a major customer experiences, or a significant number of customers experience, financial difficulties, the effect on us could be material and have an adverse effect on our business, financial condition and results of operations.

Risks related to being a public company

If we fail to maintain proper and effective internal controls, our ability to produce accurate financial statements on a timely basis could be impaired, which would adversely affect our business.

Ensuring that we have adequate internal financial and accounting controls and procedures in place to produce accurate financial statements on a timely basis is a costly and time-consuming effort that needs to be re-evaluated frequently. The rapid growth of our operations and the planned initial public offering has created a need for additional resources within the accounting and finance functions due to the increasing need to produce timely financial information and to ensure the level of segregation of duties customary for a U.S. public company. We have hired additional resources in the accounting and finance function and continue to reassess the sufficiency of finance personnel in response to these increasing demands and expectations.

Our management is responsible for establishing and maintaining adequate internal control over financial reporting to provide reasonable assurance regarding the reliability of our financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. Our management does not expect that our internal control over financial reporting will prevent or detect all errors and all fraud. A control system, no matter how well designed and operated, can provide only reasonable, not absolute, assurance that the control system's objectives will be met. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that misstatements due to error or fraud will not occur or that all control issues and instances of fraud, if any, within our company will have been detected.

Commencing with our fiscal year ending September 30, 2019, we must perform system and process evaluation and testing of our internal control over financial reporting to allow management to report on the effectiveness of our internal control over financial reporting in our Form 10-K filing for that year, as required by Section 404 of the Sarbanes Oxley Act. We expect to expend significant resources in developing the necessary documentation and testing procedures required by Section 404. We cannot be certain that the actions we will be taking to improve our internal controls over financial reporting will be sufficient, or that we will be able to implement our planned processes and procedures in a timely manner. In addition, if we are unable to produce accurate financial statements on a timely basis, investors could lose confidence in the reliability of our financial statements, which could cause the market price of our common stock to decline and make it more difficult for us to finance our operations and growth.

We are an emerging growth company and we cannot be certain if the reduced disclosure requirements applicable to emerging growth companies will make our common stock less attractive to investors.

We are an "emerging growth company" as defined in the JOBS Act. Under the JOBS Act, emerging growth companies can delay adopting new or revised accounting standards until such time as those standards apply to

private companies. We have irrevocably elected not to avail ourselves of this exemption from new or revised accounting standards and, therefore, we will be subject to the same new or revised accounting standards as other public companies that are not “emerging growth companies.”

For as long as we continue to be an emerging growth company, we also intend to take advantage of certain other exemptions from various reporting requirements that are applicable to other public companies including, but not limited to, reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements, and exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved. We cannot predict if investors will find our common stock less attractive because we will rely on these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our stock price may be more volatile.

We will remain an emerging growth company until the earliest of (i) the last day of the fiscal year in which we have total annual gross revenue of $1.07 billion or more; (ii) the last day of our fiscal year following the fifth anniversary of the date of the closing of this offering; (iii) the date on which we have issued more than $1.0 billion in nonconvertible debt during the previous three years; or (iv) the date on which we are deemed to be a large accelerated filer under the rules of the SEC.

The requirements of being a public company may strain our resources, divert management’s attention and affect our ability to attract and retain qualified board members.

As a public company, we will be subject to the reporting requirements of the Exchange Act, the Sarbanes-Oxley Act, the Dodd-Frank Wall Street Reform and Consumer Protection Act, or the Dodd-Frank Act, the listing requirements of the stock exchange on which our common stock is traded and other applicable securities rules and regulations. The SEC and other regulators have continued to adopt new rules and regulations and make additional changes to existing regulations that require our compliance. Stockholder activism, the current political environment, and the current high level of government intervention and regulatory reform may lead to substantial new regulations and disclosure obligations, which may lead to additional compliance costs and impact, in ways we cannot currently anticipate, the manner in which we operate our business. Compliance with these rules and regulations may cause us to incur additional accounting, legal and other expenses that we did not incur as a private company. We also anticipate that we will incur costs associated with corporate governance requirements, including requirements under securities laws, as well as rules and regulations implemented by the SEC and the Nasdaq Global Market, particularly after we are no longer an “emerging growth company.” We expect these rules and regulations to increase our legal and financial compliance costs and to make some activities more time-consuming and costly. Furthermore, these rules and regulations could make it more difficult or more costly for us to obtain certain types of insurance, including director and officer liability insurance, and we may be forced to accept reduced policy limits and coverage or incur substantially higher costs to obtain the same or similar coverage. The impact of these requirements could also make it more difficult for us to attract and retain qualified persons to serve on our board of directors, our board committees or as executive officers. We are currently evaluating and monitoring developments with respect to these rules and regulations, and we cannot predict or estimate the amount of additional costs we may incur or the timing of such costs.

Risks related to our intellectual property

Our ability to protect our intellectual property and proprietary technology through patents and other means is uncertain.

Our commercial success depends in part on our ability to protect our intellectual property and proprietary technologies. We rely on patent protection, where appropriate and available, as well as a combination of

copyright, trade secret and trademark laws, and nondisclosure, confidentiality and other contractual restrictions to protect our proprietary technology. However, these legal means afford only limited protection and may not adequately protect our rights or permit us to gain or keep any competitive advantage. As of June 30, 2018, we own nine issued U.S. patents and two issued international patents in China. There are 81 pending patent applications, including 39 in the United States, 31 international applications and 11 applications filed under the Patent Cooperation Treaty.

Several patent applications covering our technologies have been filed recently. We cannot offer any assurances about which, if any, patents will issue, the breadth of any such patent, or whether any issued patents will be found invalid and unenforceable or will be threatened by third parties. Any successful opposition to these patents or any other patents owned by or, if applicable in the future, licensed to us could deprive us of rights necessary for the practice of our technologies or the successful commercialization of products that we may develop. Since patent applications in the U.S. and most other countries are confidential for a period of time after filing, we cannot be certain that we were the first to file any patent application related to our technologies or products. Furthermore, an interference proceeding can be provoked by a third party or instituted by the U.S. Patent and Trademark Office, or the USPTO, to determine who was the first to invent any of the subject matter covered by the patent claims of our applications.

Patent law can be highly uncertain and involve complex legal and factual questions for which important principles remain unresolved. In the United States and in many international jurisdictions, policy regarding the breadth of claims allowed in patents can be inconsistent. The U.S. Supreme Court and the Court of Appeals for the Federal Circuit have made, and will likely continue to make, changes in how the patent laws of the United States are interpreted. Similarly, international courts have made, and will continue to make, changes in how the patent laws in their respective jurisdictions are interpreted. We cannot predict future changes in the interpretation of patent laws or changes to patent laws that might be enacted into law by U.S. and international legislative bodies.

Moreover, the United States Leahy-Smith American Invents Act, enacted in September 2011, brought significant changes to the U.S. patent system, including a change from a “first to invent” system to a “first to file” system. Under a “first to file” system, assuming the other requirements for patentability are met, the first inventor to file a patent application generally will be entitled to the patent on an invention regardless of whether another inventor had made the invention earlier. Other changes affect the way the patent applications are prosecuted, redefine prior art, and may affect patent litigation. The USPTO developed new regulations and procedures to govern administration of the Leahy-Smith Act, and many of the substantive changes to patent law associated with the Leahy-Smith Act became effective on March 16, 2013. The Leahy-Smith Act and its implementation could increase the uncertainties and costs surrounding the prosecution of our patent applications and the enforcement or defense of our issued patents, which could have a material adverse effect on our business and financial condition.

If we are unable to obtain, maintain and enforce intellectual property protection, others may be able to make, use, or sell products and technologies substantially the same as ours, which could adversely affect our ability to compete in the market.

We may not pursue or maintain patent protection for our products in every country or territory in which we sell our products and technologies. In addition, our pending U.S. and foreign patent applications may not issue as patents or may not issue in a form that will be sufficient to protect our proprietary technology and gain or keep our competitive advantage. Any patents we have obtained or do obtain may be subject to re-examination, reissue, opposition or other administrative proceeding, or may be challenged in litigation, and such challenges could result in a determination that the patent is invalid or unenforceable.

Patents have a limited lifespan. Patent terms may be shortened or lengthened by, for example, terminal disclaimers, patent term adjustments, supplemental protection certificates, and patent term extensions. Although extensions may be available, the life of a patent, and the protection it affords, is limited. Patent term extensions and supplemental protection certificates, and the like, may be impacted by the regulatory process and may not significantly lengthen patent term. Non-payment or delay in payment of patent fees or annuities, delay in patent filings or delay in extension filing, whether intentional or unintentional, may also result in the loss of patent rights important to our business. In such an event, competitors might be able to enter the market earlier than would otherwise have been the case. In addition, certain countries have compulsory licensing laws under which a patent owner may be compelled to grant licenses to other parties. Furthermore, many countries limit the enforceability of patents against other parties, including government agencies or government contractors. In these countries, the patent owner may have limited remedies, which could materially diminish the value of any patents.

We cannot be certain that the steps we have taken will prevent unauthorized use or unauthorized reverse engineering of our technology. In addition, competitors may be able to design alternative methods or devices that avoid infringement of our patents. To the extent our intellectual property, including licensed intellectual property, offers inadequate protection, or is found to be invalid or unenforceable, we are exposed to a greater risk of direct competition. If our intellectual property does not provide adequate protection against our competitors' products, our competitive position could be adversely affected, as could our business. Both the patent application process and the process of managing patent disputes can be time consuming and expensive.

Monitoring unauthorized use of our intellectual property is difficult and costly. From time to time, we review our competitors' products, and may in the future seek to enforce our patents or other rights against potential infringement. However, the steps we have taken to protect our proprietary rights may not be adequate to prevent misappropriation of our intellectual property. We may not be able to detect unauthorized use of, or take appropriate steps to enforce, our intellectual property rights. We cannot guarantee that any of our patent searches or analyses, including but not limited to the identification of relevant patents, the scope of patent claims or the expiration of relevant patents, are complete or thorough, nor can we be certain that we have identified each and every third party patent and pending application in the United States and abroad that is relevant to or necessary for the commercialization of our products in any jurisdiction. For example, U.S. applications filed before November 29, 2000 and certain U.S. applications filed after that date that will not be filed outside the United States remain confidential until patents issue. Patent applications in the United States and elsewhere are published approximately 18 months after the earliest filing for which priority is claimed. Therefore, patent applications covering our product candidates or technologies could have been filed by others without our knowledge. Additionally, pending patent applications that have been published can, subject to certain limitations, be later amended in a manner that could cover our platform technologies, our products or the use of our products or technologies. The scope of a patent claim is determined by an interpretation of the law, the written disclosure in a patent and the patent's prosecution history. Our interpretation of the relevance or the scope of a patent or a pending application may be incorrect, which may negatively impact our ability to market our products. We may incorrectly determine that our products are not covered by a third party patent or may incorrectly predict whether a third party's pending application will issue with claims of relevant scope. Our determination of the expiration date of any patent in the United States or abroad that we consider relevant may be incorrect, which may negatively impact our ability to develop and market our product candidates.

Any inability to meaningfully protect our intellectual property could result in competitors offering products or technologies that incorporate our products or technologies, which could reduce demand for our products or technologies. A court or other judicial body may decide that the patent we seek to enforce is invalid or unenforceable, or may refuse to stop the other party from using the technology at issue on the grounds that the

patent in question does not cover the technology in question. An adverse result in any litigation could put one or more of our patents at risk of being invalidated or interpreted narrowly. Some of our competitors may be able to devote significantly more resources to intellectual property litigation, and may have significantly broader patent portfolios to assert against us if we assert our rights against them.

We cannot predict the breadth of claims that may be allowed or enforced in our patents or in third-party patents. For example:

- we might not have been the first to make the inventions covered by each of our pending patent applications;
- we might not have been the first to file patent applications for these inventions;
- others may independently develop similar or alternative products and technologies or duplicate any of our products and technologies;
- it is possible that none of our pending patent applications will result in issued patents, and even if they issue as patents, they may not provide a basis for commercially viable products, or may not provide us with any competitive advantages, or may be challenged and invalidated by third parties;
- we may not develop additional proprietary products and technologies that are patentable;
- the patents of others may have an adverse effect on our business; and
- we apply for patents covering our products and technologies and uses thereof, as we deem appropriate. However, we may fail to apply for patents on important products and technologies in a timely fashion or at all.

We may not be able to protect our intellectual property rights throughout the world.

Filing, prosecuting and defending patents on our technologies and products in all countries throughout the world would be prohibitively expensive. In addition, the laws of some non-U.S. countries do not protect intellectual property rights to the same extent as the laws of the United States, and many companies have encountered significant problems in protecting and defending such rights in foreign jurisdictions. Consequently, we may not be able to prevent third parties from practicing our inventions in all countries outside the United States, or from selling or importing products made using our inventions in and into the United States or other jurisdictions. Competitors may use our technologies in jurisdictions where we have not obtained patent protection to develop their own technologies and products and further, may export otherwise infringing products to territories where we have patent protection, but enforcement is not as strong as that in the United States. These products may compete with our products, and our patents or other intellectual property rights may not be effective or sufficient enough to prevent them from competing.

The legal systems of certain countries, particularly certain developing countries, do not favor the enforcement of patents and other intellectual property protection, particularly those relating to biotechnology, which could make it difficult for us to stop the infringement of our patents. Proceedings to enforce our patent rights in foreign jurisdictions could result in substantial cost and divert our efforts and attention from other aspects of our business, could put our own patents at risk of being invalidated or interpreted narrowly and our patent applications at risk of not issuing, and could provoke third parties to assert claims against us. We may not prevail in any lawsuits that we initiate and the damages or other remedies awarded, if any, may not be commercially meaningful. Accordingly, our efforts to enforce our intellectual property rights around the world may be inadequate to obtain a significant commercial advantage from the intellectual property that we develop.

If we are unable to protect the confidentiality of our proprietary information and know-how, the value of our technology and products could be adversely affected.

In addition to pursuing patents on our technology, we take steps to protect our intellectual property and proprietary technology by entering into confidentiality agreements and intellectual property assignment agreements with our employees, consultants, corporate partners and, when needed, our advisors. Such agreements may not be enforceable or may not provide meaningful protection for our trade secrets or other proprietary information in the event of unauthorized use or disclosure or other breaches of the agreements, and we may not be able to prevent such unauthorized disclosure. Monitoring unauthorized disclosure is difficult, and we do not know whether the steps we have taken to prevent such disclosure are, or will be, adequate. If we were to enforce a claim that a third party had illegally obtained and was using our trade secrets, it would be expensive and time consuming, and the outcome would be unpredictable. In addition, courts outside the United States may be less willing to protect trade secrets.

Trade secrets and know-how can be difficult to protect as trade secrets, and know-how will over time be disseminated within the industry through independent development, the publication of journal articles, and the movement of personnel skilled in the art from company to company. In addition, because we may rely on third parties in the development of our products, we may, at times, share trade secrets with them. We seek to protect our proprietary technology in part by entering into confidentiality agreements and, if applicable, material transfer agreements, consulting agreements or other similar agreements with third parties prior to beginning research or disclosing proprietary information. These agreements typically limit the rights of the third parties to use or disclose our confidential information, including our trade secrets. Despite the contractual provisions employed when working with third parties, the need to share trade secrets and other confidential information increases the risk that such trade secrets become known by our competitors, are inadvertently incorporated into the technology of others, or are disclosed or used in violation of these agreements. If we are unable to prevent material disclosure of the intellectual property related to our technologies to third parties, we will not be able to establish or maintain a competitive advantage in our market, which could materially adversely affect our business, results of operations and financial condition.

Despite our efforts to protect our trade secrets, our competitors may discover our trade secrets, either lawfully or through breach of our agreements with third parties, independent development or publication of information by any of our third-party collaborators. Competitors could willfully infringe our intellectual property rights, design around our protected technology or develop their own competitive technologies that fall outside of our intellectual property rights. In addition, if any of our trade secrets were to be lawfully obtained or independently developed by a competitor, we would have no right to prevent such competitor from using that technology or information to compete with us, which could harm our competitive position. Given that our proprietary position is based, in part, on our know-how and trade secrets, a competitor's discovery of our trade secrets or other unauthorized use or disclosure would impair our competitive position and may have an adverse effect on our business and results of operations.

We may also be subject to claims that former employees, collaborators or other third parties have an ownership interest in our patents or other intellectual property. Other than the currently pending litigation filed by Agilent, described under the captions "Business – Legal proceedings" and "Risk factors – We and our chief executive officer are currently involved in litigation with Agilent in which Agilent has alleged a claim of trade secret misappropriation against Twist Bioscience and trade secret misappropriation and other related claims against our chief executive officer, and an adverse result could harm our business and results of operations," no legal claims against us are currently pending. Some of our employees were previously employed at universities or biotechnology or biopharmaceutical companies, including our competitors or potential competitors. We may be subject to claims that these employees or we have inadvertently or otherwise used or disclosed trade secrets or other proprietary information of their former employers. Litigation may be necessary

to defend against these and other claims challenging inventorship or ownership. If we fail in defending any such claims, in addition to paying monetary damages, we may lose valuable intellectual property rights. A loss of key research personnel or their work product could hamper our ability to commercialize, or prevent us from commercializing, our products and technologies. Such an outcome could have a material adverse effect on our business. Even if we are successful in defending against such claims, litigation could result in substantial costs and distraction to management and other employees.

We may be involved in lawsuits to protect or enforce our patents and proprietary rights, to determine the scope, coverage and validity of others' proprietary rights, or to defend against third party claims of intellectual property infringement that could require us to spend significant time and money and could prevent us from selling our products or impact our stock price.

Litigation may be necessary for us to enforce our patent and proprietary rights and/or to determine the scope, coverage and validity of others' proprietary rights. Litigation on these matters has been prevalent in our industry and we expect that this will continue. As the biotechnology and synthetic biology industries expand and more patents are issued, the risk increases that there may be patents issued to third parties that relate to our technologies and products of which we are not aware or that we may need to challenge to continue our operations as currently contemplated. In addition, our competitors and others may have patents or may in the future obtain patents and claim that the use of our products or processes infringes these patents. As we move into new markets and applications for our products and processes, incumbent participants in such markets may assert their patents and other proprietary rights against us as a means of slowing our entry into such markets or as a means to extract substantial license and royalty payments from us.

To determine the priority of inventions, we may have to initiate and participate in interference proceedings declared by the USPTO that could result in substantial legal fees and could substantially affect the scope of our patent protection. Also, our intellectual property may be subject to significant administrative and litigation proceedings such as invalidity, unenforceability, re-examination and opposition proceedings against our patents. Whether merited or not, we may additionally face allegations that we have infringed the trademarks, copyrights, patents and other intellectual property rights of third parties, including patents held by our competitors or by non-practicing entities. If we fail to identify and correctly interpret relevant patents, we may be subject to infringement claims. We may also face allegations that our employees have misappropriated the intellectual property rights of their former employers or other third parties. The outcome of any litigation or other proceeding is inherently uncertain and the results might not be favorable to us. For more information on our current legal and regulatory proceedings, see the section of this prospectus captioned "Business — Legal proceedings."

In patent litigation in the United States, defendant counterclaims alleging invalidity or unenforceability are commonplace. Grounds for a validity challenge could be an alleged failure to meet any of several statutory requirements, for example, lack of novelty, obviousness or non-enablement. Grounds for an unenforceability assertion could be an allegation that someone connected with prosecution of the patent withheld relevant information from the USPTO, or made a misleading statement during prosecution. The outcome following legal assertions of invalidity and unenforceability during patent litigation is unpredictable. If a defendant were to prevail on a legal assertion of invalidity or unenforceability, we would lose at least part, and perhaps all, of the patent protection on certain aspects of our platform technology. Such a loss of patent protection could have a material and adverse effect on our business, financial condition, results of operations and prospects.

Patent infringement suits can be expensive, lengthy and disruptive to business operations. We could incur substantial costs and divert the attention of our management and technical personnel in prosecuting or defending against any claims, and may harm our reputation. Some of our competitors may be able to sustain the costs of complex patent litigation more effectively than we can because they have substantially greater

resources. There can be no assurance that we will prevail in any suit initiated against us by third parties, successfully settle or otherwise resolve patent infringement claims. If we are unable to successfully settle claims on terms acceptable to us, we may be required to engage in or continue costly, unpredictable and time-consuming litigation and may be prevented from or experience substantial delays in marketing our technologies and products. Furthermore, parties making claims against us may be able to obtain injunctive or other relief, which could block our ability to develop, commercialize and sell products, and could result in the award of substantial damages against us, including treble damages and attorneys' fees and costs in the event that we are found to be a willful infringer of third party patents.

In the event of a successful claim of infringement against us, we may be required to obtain one or more licenses from third parties, which we may not be able to obtain at a reasonable cost, if at all. We could therefore incur substantial costs related to royalty payments for licenses obtained from third parties, which could negatively affect our gross margins. In addition, we could encounter delays in product introductions while we attempt to develop alternative methods or products to avoid infringing third-party patents or proprietary rights. Defense of any lawsuit or failure to obtain any required licenses on favorable terms could prevent us from commercializing our products, and the risk of a prohibition on the sale of any of our products could adversely affect our ability to grow and gain market acceptance for our products.

Furthermore, because of the substantial amount of discovery required in connection with intellectual property litigation, there is a risk that some of our confidential information could be compromised by disclosure during this type of litigation. In addition, during the course of this kind of litigation, there could be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a substantial adverse effect on the price of our common stock. Such litigation or proceedings could substantially increase our operating losses and reduce the resources available for development activities or any future sales, marketing or distribution activities. Finally, any uncertainties resulting from the initiation and continuation of any litigation could have a material adverse effect on our ability to raise the funds necessary to continue our operations.

In addition, our agreements with some of our suppliers, distributors, customers and other entities with whom we do business may require us to defend or indemnify these parties to the extent they become involved in infringement claims against us, including the claims described above. We could also voluntarily agree to defend or indemnify third parties in instances where we are not obligated to do so if we determine it would be important to our business relationships. If we are required or agree to defend or indemnify any of these third parties in connection with any infringement claims, we could incur significant costs and expenses that could adversely affect our business, operating results, or financial condition.

We may not be successful in obtaining or maintaining necessary rights to our products and technologies through acquisitions and in-licenses, and our intellectual property agreements with third parties may involve unfavorable terms or be subject to disagreements over contract interpretation.

We may find that our programs require the use of proprietary rights held by third parties, and the growth of our business may depend in part on our ability to acquire, in-license or use these proprietary rights. We may be unable to acquire or in-license compositions, methods of use, processes or other third party intellectual property rights from third parties that we identify as necessary for our products and technologies. The licensing and acquisition of third-party intellectual property rights is a competitive area, and other companies may also be pursuing strategies to license or acquire third-party intellectual property rights that we may consider attractive. These companies may have a competitive advantage over us due to their size, financial resources and greater commercialization capabilities. In addition, companies that perceive us to be a competitor may be unwilling to assign or license rights to us. Moreover, collaboration arrangements are complex and time-consuming to negotiate, document, implement and maintain. We may not be successful in our efforts to

establish and implement collaborations or other alternative arrangements should we so choose to enter into such arrangements. We also may be unable to license or acquire third-party intellectual property rights on terms that that would be favorable to us or would allow us to make an appropriate return on our investment.

We engage in discussions regarding other possible commercial and cross-licensing agreements with third parties from time to time. There can be no assurance that these discussions will lead to the execution of commercial license or cross-license agreements or that such agreements will be on terms that are favorable to us. Even if we are able to obtain a license to intellectual property of interest, we may not be able to secure exclusive rights, in which case others could use the same rights and compete with us. In addition, if we enter into cross-licensing agreements, there is no assurance that we will be able to effectively compete against others who are licensed under our patents.

In addition, provisions in our licensing and other intellectual property agreements may be susceptible to multiple interpretations. The resolution of any contract interpretation disagreement that may arise could affect the scope of our rights to the relevant intellectual property or technology, or affect financial or other obligations under the relevant agreement, either of which could have a material adverse effect on our business, financial condition, results of operations and prospects.

We have not yet registered some of our trademarks in all of our potential markets, and failure to secure those registrations could adversely affect our business.

Some of our trademark applications may not be allowed for registration, and our registered trademarks may not be maintained or enforced. In addition, in the U.S. Patent and Trademark Office and in comparable agencies in many foreign jurisdictions, third parties are given an opportunity to oppose pending trademark applications and to seek to cancel registered trademarks. Opposition or cancellation proceedings may be filed against our trademarks, and our trademarks may not survive such proceedings.

In addition, third parties may file first for our trademarks in certain countries. If they succeed in registering such trademarks, and if we are not successful in challenging such third party rights, we may not be able to use these trademarks to market our products and technologies in those countries. Over the long-term, if we are unable to establish name recognition based on our trademarks, then our marketing abilities may be materially adversely impacted.

We depend on certain technologies that are licensed to us. We do not control these technologies and any loss of our rights to them could prevent us from selling our products.

We rely on, or may in the future rely on, licenses in order to be able to use various proprietary technologies that are material to our business. We do not or will not own the patents that underlie these licenses. Our rights to use the technology we license are subject to the negotiation of, continuation of and compliance with the terms of those licenses. In some cases, we do not or will not control the prosecution, maintenance, or filing of the patents to which we hold licenses, or the enforcement of these patents against third parties. Some of our patents and patent applications were either acquired from another company who acquired those patents and patent applications from yet another company, or are licensed from a third party. For example, Twist Bioscience acquired Genome Compiler Corporation in 2016, and Genome Compiler had a non-exclusive license to U.S. Patent No. 7,805,252 owned by DNA 2.0. Thus, these patents and patent applications are not written by us or our attorneys, and we did not have control over the drafting and prosecution. The former patent owners and our licensors might not have given the same attention to the drafting and prosecution of these patents and applications as we would have if we had been the owners of the patents and applications and had control over the drafting and prosecution. We cannot be certain that drafting and/or prosecution of the licensed patents and patent applications by the licensors have been or will be conducted in compliance with applicable laws and regulations or will result in valid and enforceable patents and other intellectual property rights.

Our rights to use the technology we license is subject to the validity of the owner's intellectual property rights. Enforcement of our licensed patents or defense or any claims asserting the invalidity of these patents is often subject to the control or cooperation of our licensors. Legal action could be initiated against the owners of the intellectual property that we license. Even if we are not a party to these legal actions, an adverse outcome could harm our business because it might prevent these other companies or institutions from continuing to license intellectual property that we may need to operate our business.

Our licenses contain or will contain provisions that allow the licensor to terminate the license upon specific conditions. Our rights under the licenses are subject to or will be subject to our continued compliance with the terms of the license, including the payment of royalties due under the license. Termination of these licenses could prevent us from marketing some or all of our products. Because of the complexity of our products and the patents we have licensed, determining the scope of the license and related royalty obligation can be difficult and can lead to disputes between us and the licensor. An unfavorable resolution of such a dispute could lead to an increase in the royalties payable pursuant to the license. If a licensor believed we were not paying the royalties due under the license or were otherwise not in compliance with the terms of the license, the licensor might attempt to revoke the license. If such an attempt were successful, we might be barred from producing and selling some or all of our products.

Risks related to doing business in China

The People's Republic of China, or the PRC, government has the ability to exercise significant influence and control over our proposed wholly owned foreign entity in China.

The PRC plays a significant role in regulating industrial development by imposing business regulations. It also exercises significant control over the country's economic growth through the allocation of resources, controlling payment of foreign currency-denominated obligations, setting monetary policy and providing preferential treatment to particular industries or companies.

Additional factors that we may experience in connection with setting up operations in China that may adversely affect our business and results of operations include:

- our inability to enforce or obtain a remedy under our agreements;
- PRC restrictions on foreign investment that could impair our ability to conduct our business or acquire or contract with other entities in the future;
- restrictions on currency exchange that may limit our ability to use cash flow most effectively or to repatriate our investments;
- fluctuations in currency values;
- increased challenges of defending our intellectual property;
- cultural, language and managerial differences that may reduce our overall performance; and
- political instability in China.

We may not be able to enforce our rights in China.

China's legal and judicial system may negatively impact foreign investors. The legal system in China is evolving rapidly, and enforcement of laws is inconsistent. It may be impossible to obtain swift and equitable enforcement of laws or enforcement of the judgment of one court by a court of another jurisdiction. China's legal system is based on civil law or written statutes and a decision by one judge does not set a legal precedent that must be followed by judges in other cases. In addition, the interpretation of Chinese laws may vary to reflect domestic political changes.

There are substantial uncertainties regarding the interpretation and application to our business of PRC laws and regulations, since many of the rules and regulations that companies face in China are not made public. The effectiveness of newly enacted laws, regulations or amendments may be delayed, resulting in detrimental reliance by foreign investors. We cannot predict what effect the interpretation of existing or new PRC laws or regulations may have on the proposed business of our wholly foreign owned entity.

China is a developing nation governed by a one-party communist government and susceptible to political, economic, and social upheaval that could disrupt the economy.

China is a developing country governed by a one-party government. China is also a country with an extremely large population, wide income gaps between rich and poor and between urban and rural residents, minority ethnic and religious populations, and growing access to information about the different social, economic, and political systems found in other countries. China has also experienced extremely rapid economic growth over the last decade, and its legal and regulatory systems have had to change rapidly to accommodate this growth. If China experiences political or economic upheaval, labor disruptions or other organized protests, nationalization of private businesses, civil strife, strikes, acts of war and insurrections, this may disrupt China's economy and could materially and adversely affect the financial performance of our proposed wholly foreign owned entity.

If relations between China and the U.S. deteriorate, our business in China may be materially and adversely affected.

The relationship between China and the U.S. is subject to periodic tension. Relations may also be compromised if the U.S. becomes a more active advocate of Taiwan or pressures the PRC government regarding its monetary, economic or social policies. Changes in political conditions in China and changes in the state of China-U.S. relations are difficult to predict and could adversely affect the operations or financial condition of our proposed wholly owned foreign owned entity. In addition, because of our involvement in the Chinese market, any deterioration in political or trade relations might cause a public perception in the U.S. or elsewhere that might cause our products to become less attractive. A proposed enhancement of U.S. export controls is expected to apply to U.S. technology exports to China and Chinese companies. We cannot predict what effect any changes
in China-U.S. relations may have on the proposed business of our proposed wholly foreign owned entity.

Governmental control of currency conversion may limit our ability to utilize our revenues effectively and affect the value of your investment.

The PRC government imposes controls on the convertibility of the Chinese currency, Renminbi, into foreign currencies and, in certain cases, the remittance of currency out of China. Under existing PRC foreign exchange regulations, payments of current account items, including profit distributions, interest payments and trade and service-related foreign exchange transactions, can be made in foreign currencies without prior approval of State Administration of Foreign Exchange, or SAFE, by complying with certain procedural requirements. However, in practice sometimes payment of current account items may be subject to delay and other restrictions. Furthermore, approval from or registration with appropriate government authorities is required where Renminbi is to be converted into foreign currency and remitted out of China to pay capital expenses such as the repayment of loans denominated in foreign currencies.

In light of the flood of capital outflows of China in 2016 due to the weakening Renminbi, the PRC government has imposed more restrictive foreign exchange policies and stepped up scrutiny of major outbound capital movement including overseas direct investment. More restrictions and substantial vetting process are put in place by SAFE to regulate cross-border transactions falling under the capital account. The PRC government may at its discretion further restrict access in the future to foreign currencies for current account transactions. Therefore, if we receive revenues in Renminbi by our proposed wholly foreign owned entity or otherwise, due to

China's foreign exchange control, such revenues may not be converted to foreign currency and remitted out of China in a timely manner.

Risks relating to owning our common stock and this offering

Our share price may be volatile, and you maybe unable to sell your shares at or above the offering price.

The market price of our common stock is likely to be volatile and could be subject to wide fluctuations in response to many risk factors listed in this section, and others beyond our control, including:

- actual or anticipated fluctuations in our financial condition and operating results, including fluctuations in our quarterly and annual results;
- announcements of technological innovations by us or our competitors;
- overall conditions in our industry and the markets in which we operate;
- addition or loss of significant customers, or other developments with respect to significant customers;
- changes in laws or regulations applicable to our products;
- actual or anticipated changes in our growth rate relative to our competitors;
- announcements by us or our competitors of significant acquisitions, strategic partnerships, joint ventures or capital commitments;
- additions or departures of key personnel;
- competition from existing products or new products that may emerge;
- issuance of new or updated research or reports by securities analysts;
- fluctuations in the valuation of companies perceived by investors to be comparable to us;
- disputes or other developments related to proprietary rights, including patents, litigation matters including the Agilent litigation, and our ability to obtain intellectual property protection for our technologies;
- announcement or expectation of additional financing efforts;
- sales of our common stock by us or our stockholders;
- share price and volume fluctuations attributable to inconsistent trading volume levels of our shares;
- the expiration of contractual lock-up agreements with our executive officers, directors and stockholders; and
- general economic and market conditions.

Furthermore, the stock markets have experienced price and volume fluctuations that have affected and continue to affect the market prices of equity securities of many companies. These fluctuations often have been unrelated or disproportionate to the operating performance of those companies. These broad market and industry fluctuations, as well as general economic, political and market conditions such as recessions, interest rate changes or international currency fluctuations, may negatively impact the market price of our common stock. If the market price of our common stock after this offering does not exceed the initial public offering price, you may not realize any return on your investment in us and may lose some or all of your investment. In the past, companies that have experienced volatility in the market price of their stock have been subject to

securities class action litigation. We may be the target of this type of litigation in the future. Securities litigation against us could result in substantial costs and divert our management's attention from other business concerns, which could seriously harm our business.

No public market for our common stock currently exists, and an active trading market may not develop or be sustained following this offering.

Prior to this offering, there has been no public market for our common stock. Although we will apply to have our common stock listed on the Nasdaq Global Market, an active trading market may not develop following the closing of this offering or, if developed, may not be sustained. The lack of an active market may impair your ability to sell your shares at the time you wish to sell them or at a price that you consider reasonable. The lack of an active market may also reduce the fair market value of your shares. An inactive market may also impair our ability to raise capital to continue to fund operations by selling shares and may impair our ability to acquire other companies or technologies by using our shares as consideration. The initial public offering price was determined by negotiations between us and the underwriters and may not be indicative of the future prices of our common stock.

If securities or industry analysts do not publish research or reports about our business or publish negative reports about our business, our share price and trading volume could decline.

The trading market for our common stock will depend on the research and reports that securities or industry analysts publish about us or our business. Currently, we do not have any analyst coverage and we may not obtain analyst coverage in the future. In the event we obtain analyst coverage, we will not have any control over such analysts. If one or more of the analysts who cover us downgrade our shares or change their opinion of our shares, our share price would likely decline. If one or more of these analysts cease coverage of our company or fail to regularly publish reports on us, we could lose visibility in the financial markets, which could cause our share price or trading volume to decline.

Future sales and issuances of our common stock or rights to purchase common stock, including pursuant to our equity incentive plans, could result in additional dilution of the percentage ownership of our stockholders and could cause the stock price of our common stock to decline.

We may issue additional securities following the completion of this offering. In the future, we may sell common stock, convertible securities or other equity securities in one or more transactions at prices and in a manner we determine from time to time. We also expect to issue common stock to employees and directors pursuant to our equity incentive plans. If we sell common stock, convertible securities or other equity securities in subsequent transactions, or common stock is issued pursuant to equity incentive plans, investors may be materially diluted. New investors in such subsequent transactions could gain rights, preferences and privileges senior to those of holders of our common stock.

Future sales of our common stock in the public market could cause our share price to fall.

Sales of a substantial number of shares of our common stock in the public market after this offering, or the perception that these sales might occur, could depress the market price of our common stock and could impair our ability to raise capital through the sale of additional equity securities. Based on the number of shares of common stock outstanding as of , upon the closing of this offering, we will have shares of common stock outstanding, assuming no exercise of our outstanding options.

All of the common stock sold in this offering will be freely tradable without restrictions or further registration under the Securities Act of 1933, as amended, or the Securities Act, except for any shares held by our affiliates as defined in Rule 144 under the Securities Act. The remaining shares of common stock outstanding

after this offering, based on shares outstanding as of , will be restricted as a result of securities laws, lock-up agreements or other contractual restrictions that restrict transfers for at least 180 days after the date of this prospectus, subject to certain extensions.

The underwriters may, in their sole discretion, release all or some portion of the shares subject to lock-up agreements with the underwriters prior to expiration of the lock-up period. See also the section of this prospectus captioned “Shares eligible for future sale.” For more information regarding the lock-up agreements with the underwriters see the section of this prospectus captioned “Underwriting.”

The holders of 203,420,957 shares of common stock, or 95.1% based on shares outstanding on an as-converted basis as of June 30, 2018, will be entitled to rights with respect to registration of such shares under the Securities Act pursuant to a registration rights agreement between such holders and us. See “Certain relationships and related party transactions—Registration rights agreement” below. If such holders, by exercising their registration rights, sell a large number of shares, they could adversely affect the market price for our common stock. If we file a registration statement for the purpose of selling additional shares to raise capital and are required to include shares held by these holders pursuant to the exercise of their registration rights, our ability to raise capital may be impaired. We intend to file a registration statement on Form S-8 under the Securities Act to register shares of common stock for issuance under the 2018 Plan, the 2013 Plan and the 2018 ESPP. Both the 2018 Plan and the 2018 ESPP provide for automatic increases in the shares reserved for issuance under the plans which could result in additional dilution to our stockholders. Once we register the shares under these plans, they can be freely sold in the public market upon issuance and vesting, subject to a 180-day lock-up period and other restrictions provided under the terms of the applicable plan and/or the option agreements entered into with option holders.

Our management team may invest or spend the proceeds of this offering in ways with which you may not agree or in ways which may not yield a return.

Our management will have broad discretion in the application of the net proceeds, and you will not have the opportunity, as part of your investment decision, to assess whether the proceeds are being used appropriately. Accordingly, investors will need to rely on our judgment with respect to the use of these proceeds. We currently intend to use the proceeds from this offering primarily to improve and update our platform and core technologies, expand our sales and marketing capabilities in the U.S. and in other geographies, including China, develop and expand into the biologics drug discovery and DNA data storage markets, and for working capital and general corporate purposes. While we have no current agreements, commitments or understandings for any specific strategic acquisitions or in-licenses at this time, we may use a portion of the net proceeds for these purposes. For more information see, “Use of proceeds.” The failure by our management to apply these funds effectively could adversely affect our ability to continue maintaining and expanding our business. Until the net proceeds are used, they may be placed in investments that do not produce significant income or that may lose value.

We have never paid dividends on our capital stock and we do not intend to pay dividends for the foreseeable future. Consequently, any gains from an investment in our common stock will likely depend on whether the price of our common stock increases.

We have never declared or paid any dividends on our common stock and do not intend to pay any dividends in the foreseeable future. We anticipate that we will retain all of our future earnings for use in the operation of our business and for general corporate purposes. Any determination to pay dividends in the future will be at the discretion of our board of directors. Accordingly, investors must rely on sales of their common stock after price appreciation, which may never occur, as the only way to realize any future gains on their investments. Furthermore, we are party to a credit agreement with Silicon Valley Bank which contains negative covenants

that limit our ability to pay dividends. For more information, see the section of this prospectus captioned “Management’s discussion and analysis of financial condition and results of operation – Liquidity and capital resources.” For more information regarding the negative covenants in our loan and security agreement with Silicon Valley Bank, see “Risk factors—Our credit facility contains restrictions that limit our flexibility in operating our business.”

Our charter documents and Delaware law could prevent a takeover that stockholders consider favorable and could also reduce the market price of our stock.

Our amended and restated certificate of incorporation and our amended and restated bylaws will contain provisions that could delay or prevent a change in control of our company. These provisions could also make it more difficult for stockholders to elect directors and take other corporate actions. These provisions include:

- providing for a classified board of directors with staggered, three year terms;
- authorizing our board of directors to issue preferred stock with voting or other rights or preferences that could discourage a takeover attempt or delay changes in control;
- prohibiting cumulative voting in the election of directors;
- providing that vacancies on our board of directors may be filled only by a majority of directors then in office, even though less than a quorum;
- prohibiting the adoption, amendment or repeal of our amended and restated bylaws or the repeal of the provisions of our amended and restated certificate of incorporation regarding the election and removal of directors without the required approval of at least 66.67% of the shares entitled to vote at an election of directors;
- prohibiting stockholder action by written consent;
- limiting the persons who may call special meetings of stockholders; and
- requiring advance notification of stockholder nominations and proposals.

These provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors, which is responsible for appointing the members of our management. In addition, the provisions of Section 203 of the Delaware General Corporate Law, or the DGCL, govern us. These provisions may prohibit large stockholders, in particular those owning 15% or more of our outstanding voting stock, from merging or combining with us for a certain period of time without the consent of our board of directors.

These and other provisions in our amended and restated certificate of incorporation and our amended and restated bylaws and under Delaware law could discourage potential takeover attempts, reduce the price investors might be willing to pay in the future for shares of our common stock and result in the market price of our common stock being lower than it would be without these provisions. For more information, see the section of this prospectus captioned “Description of capital stock—Anti-takeover effects of Delaware law and our amended and restated certificate of incorporation and amended and restated bylaws.”

Insiders have substantial control over us and will be able to influence corporate matters.

As of June 30, 2018, our directors and executive officers and their affiliates will beneficially own, in the aggregate, approximately 35.1% of our outstanding capital stock upon the completion of this offering. As a result, these stockholders will be able to exercise significant influence over all matters requiring stockholder

approval, including the election of directors and approval of significant corporate transactions, such as a merger or other sale of our company or its assets. This concentration of ownership could limit stockholders' ability to influence corporate matters and may have the effect of delaying or preventing a third party from acquiring control over us.

Claims for indemnification by our directors and officers may reduce our available funds to satisfy successful third-party claims against us and may reduce the amount of money available to us.

Our amended and restated certificate of incorporation and amended and restated bylaws provide that we will indemnify our directors and officers, in each case to the fullest extent permitted by Delaware law.

In addition, as permitted by Section 145 of the DGCL, our amended and restated bylaws and our indemnification agreements that we have entered into with our directors and officers provide that:

- We will indemnify our directors and officers for serving us in those capacities or for serving other business enterprises at our request, to the fullest extent permitted by Delaware law. Delaware law provides that a corporation may indemnify such person if such person acted in good faith and in a manner such person reasonably believed to be in or not opposed to the best interests of the registrant and, with respect to any criminal proceeding, had no reasonable cause to believe such person's conduct was unlawful;
- We may, in our discretion, indemnify employees and agents in those circumstances where indemnification is permitted by applicable law;
- We are required to advance expenses, as incurred, to our directors and officers in connection with defending a proceeding, except that such directors or officers shall undertake to repay such advances if it is ultimately determined that such person is not entitled to indemnification;
- We will not be obligated pursuant to our amended and restated bylaws to indemnify a person with respect to proceedings initiated by that person against us or our other indemnitees, except with respect to proceedings authorized by our board of directors or brought to enforce a right to indemnification;
- The rights conferred in our amended and restated bylaws are not exclusive, and we are authorized to enter into indemnification agreements with our directors, officers, employees and agents and to obtain insurance to indemnify such persons; and
- We may not retroactively amend our amended and restated bylaw provisions to reduce our indemnification obligations to directors, officers, employees and agents.

Our amended and restated certificate of incorporation to be in effect upon completion of this offering will provide that the Court of Chancery of the State of Delaware will be the exclusive forum for substantially all disputes between us and our stockholders, which could limit our stockholders' ability to obtain a favorable judicial forum for disputes with us or our directors, officers or other employees.

Our amended and restated certificate of incorporation to be in effect upon completion of this offering provides that the Court of Chancery of the State of Delaware is the sole and exclusive forum for any derivative action or proceeding brought on our behalf, any action asserting a breach of fiduciary duty owed by any of our directors, officers or other employees to us or our stockholders, any action asserting a claim against us arising pursuant to any provisions of the DGCL, our amended and restated certificate of incorporation or our amended and restated bylaws to be in effect upon completion of this offering, or any action asserting a claim against us that is governed by the internal affairs doctrine. The choice of forum provision may limit a stockholder's ability to bring a claim in a judicial forum that it finds favorable for disputes with us or our directors, officers or other employees, which may discourage such lawsuits against us and our directors, officers and other employees. If a

court were to find the choice of forum provision contained in our amended and restated certificate of incorporation to be inapplicable or unenforceable in an action, we may incur additional costs associated with resolving such action in other jurisdictions.

Because the public offering price of our common stock will be substantially higher than the net tangible book value per share of our outstanding common stock following this offering, new investors will experience immediate and substantial dilution.

The public offering price of our common stock is substantially higher than the net tangible book value per share of our common stock immediately following this offering based on the total value of our tangible assets less our total liabilities. Therefore, if you purchase shares of our common stock in this offering, you will experience immediate dilution of approximately $ per share, the difference between the assumed initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus, and the net tangible book value per share of our common stock as of , after giving effect to the issuance of shares of our common stock in this offering. Furthermore, if the underwriters exercise their overallotment option, or outstanding options and warrants are exercised, you could experience further dilution. For a further description of the dilution that you will experience immediately after the offering, see the section of this prospectus captioned “Dilution.”

Special note regarding forward-looking statements

This prospectus includes forward-looking statements within the meaning of the federal securities laws. We have based these forward-looking statements largely on our current expectations and projections about future events and financial trends affecting the operating results and financial condition of our business. Forward-looking statements should not be read as a guarantee of future performance or results, and will not necessarily be accurate indications of the times at, or by, which such performance or results will be achieved. Forward-looking statements are based on information available at the time those statements are made and/or management's good faith belief as of that time with respect to future events, and are subject to risks and uncertainties that could cause actual performance or results to differ materially from those expressed in or suggested by the forward-looking statements. Important factors that could cause such differences include, but are not limited to, statements about:

- our ability to increase our revenue and our revenue growth rate;
- estimates of our expenses, future revenues, capital requirements and our needs for additional financing; our estimates of the size of our market opportunities;
- our expectations regarding our ability to increase DNA production, reduce turnaround times and drive cost reductions for our customers;
- our ability to effectively manage our growth;
- our ability to successfully enter new markets and manage our international expansion;
- our ability to protect our intellectual property, including our proprietary DNA synthesis platform;
- costs associated with defending intellectual property infringement and other claims;
- the effects of increased competition in our business;
- our ability to keep pace with changes in technology and our competitors;
- our ability to successfully identify, evaluate and manage any future acquisitions of businesses, solutions or technologies;
- the success of our marketing efforts;
- significant disruption in, or breach in security of our information technology systems and resultant interruptions in service and any related impact on our reputation;
- the attraction and retention of qualified employees and key personnel;
- the effects of natural or man-made catastrophic events;
- the effectiveness of our internal controls;
- changes in government regulation affecting our business;
- the impact of adverse economic conditions;
- our use of the net proceeds from this offering; and
- other risk factors included under "Risk factors" in this prospectus.

In addition, in this prospectus, the words “believe,” “may,” “will,” “estimate,” “continue,” “anticipate,” “intend,” “expect,” “predict,” “potential” and similar expressions, as they relate to our company, our business and our management, are intended to identify forward-looking statements. In light of these risks and uncertainties, the forward-looking events and circumstances discussed in this prospectus may not occur and actual results could differ materially from those anticipated or implied in the forward-looking statements.

Forward-looking statements speak only as of the date of this prospectus. You should not put undue reliance on any forward-looking statements. We assume no obligation to update forward-looking statements to reflect actual results, changes in assumptions or changes in other factors affecting forward-looking information, except to the extent required by applicable laws. If we update one or more forward-looking statements, no inference should be drawn that we will make additional updates with respect to those or other forward-looking statements.

You should read this prospectus and the documents that we reference in this prospectus and have filed with the Securities and Exchange Commission as exhibits to the registration statement of which this prospectus is a part with the understanding that our actual future results, levels of activity, performance and events and circumstances may be materially different from what we expect.

Industry and market data

This prospectus contains estimates, projections and other information concerning our industry, our business, and the markets for our products, including data regarding our current manufacturing capacity, product features and benefits, product quality, turnaround time, reliability and cost, as well as data regarding market research, estimates and forecasts prepared by our management. Information that is based on estimates, forecasts, projections, market research or similar methodologies is inherently subject to uncertainties and actual events or circumstances may differ materially from events and circumstances that are assumed in this information. Unless otherwise expressly stated, we obtained this industry, business, market and other data from reports, research surveys, studies and similar data prepared by market research firms and other third parties, industry, medical and general publications, government data and similar sources. In some cases, we do not expressly refer to the sources from which this data is derived. In that regard, when we refer to one or more sources of this type of data in any paragraph, you should assume that other data of this type appearing in the same paragraph is derived from the same sources, unless otherwise expressly stated or the context otherwise requires.

Use of proceeds

We estimate that the net proceeds from our issuance and sale of shares of our common stock in this offering will be approximately $ million, assuming an initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus, after deducting estimated underwriting discounts and commissions and estimated offering expenses that the net proceeds from this offering will be approximately $ million.

A $1.00 increase or decrease in the assumed initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus, would increase or decrease our net proceeds from this offering by approximately $ million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. An increase or decrease of 1,000,000 shares in the number of shares offered by us, as set forth on the cover page of this prospectus, would increase or decrease our net proceeds from this offering by approximately $ million, assuming no change in the assumed initial public offering price per share and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. We do not expect that a change in the offering price or the number of shares by these amounts would have a material effect on our intended uses of the net proceeds from this offering, although it may impact the amount of time prior to which we may need to seek additional capital.

As of September 30, 2017, we had cash, cash equivalents and short-term investments of $62.2 million. We currently estimate that we will use the net proceeds from this offering, together with our existing cash, cash equivalents and short-term investments as follows:

- Approximately $ million to $ million to improve and update our platform and core technologies by investing in equipment, expanding our research and development capabilities and establishing new and scalable operation facilities;
- Approximately $ million to $ million to expand our sales and marketing capabilities in the U.S., Europe and Asia;
- Approximately $ million to $ million to develop our manufacturing operations in China;
- Approximately $ million to $ million to develop and expand into the biologics drug discovery and DNA data storage markets; and
- Any proceeds not applied to the foregoing will be used for working capital and general corporate purposes.

We believe opportunities may exist from time to time to expand our current business through strategic acquisitions or in-licenses of complementary companies or technologies. While we have no current agreements, commitments or understandings for any specific strategic acquisitions or in-licenses at this time, we may use a portion of the net proceeds for these purposes.

This expected use of the net proceeds from this offering and our existing cash, cash equivalents and short-term investments represents our intentions based upon our current plans and business conditions, which could change in the future as our plans and business conditions evolve. As of the date of this prospectus, we cannot predict with certainty all of the particular uses for the proceeds to be received upon the completion of this offering or the actual amounts that we will spend on the uses set forth above. As a result, our management will retain broad discretion over the allocation of the net proceeds from this offering.

After giving effect to the anticipated net proceeds from this offering, we expect that our existing cash, cash equivalents and short-term investments will be sufficient to fund our planned operating expenses, capital expenditure requirements and debt service payments through at least the next 12 months. We have based this estimate on assumptions that may prove to be wrong, and we could use our available capital resources sooner than we currently expect. For additional information regarding our potential capital requirements, see “We will require additional financing to achieve our goals, and a failure to obtain this necessary capital when needed on acceptable terms, or at all, could force us to delay, limit, reduce or terminate our product manufacturing and development and other operations” under the heading “Risk factors.”

Pending our use of the net proceeds from this offering, we intend to invest the net proceeds in a variety of capital preservation investments, including short-term, investment-grade, interest-bearing instruments and U.S. government securities.

Dividend policy

We have never declared or paid cash dividends on our capital stock. We currently intend to retain all available funds and any future earnings for use in the operation of our business and do not anticipate paying any cash dividends in the foreseeable future.

Any decision to declare and pay dividends in the future will be made at the discretion of our board of directors and will depend on, among other things, our results of operations, cash requirements, financial condition, contractual restrictions including compliance with covenants under our credit facilities and other factors that our board of directors may deem relevant. In addition, under the terms of our current credit facilities, we are prohibited from paying cash dividends without the prior consent of Silicon Valley Bank.

Capitalization

The following table sets forth our cash, cash equivalents and short-term investments and capitalization as of September 30, 2017 on:

- An actual basis;
- A pro forma basis, to give effect to (i) the conversion of the outstanding shares of our convertible preferred stock as of September 30, 2017 into 145,138,924 shares of our common stock immediately prior to the closing of this offering, (ii) the automatic conversion of warrants to purchase 786,594 shares of our convertible preferred stock into warrants to purchase 786,594 shares of common stock immediately prior to the closing of this offering; and (iii) the effectiveness of our amended and restated certificate of incorporation, as if such conversions, and effectiveness had occurred immediately prior to the closing of this offering; and
- A pro forma as adjusted basis, giving effect to (i) the pro forma adjustments set forth above and (ii) the sale and issuance of shares of our common stock by us in this offering, based upon the assumed initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us.

You should read this table together with the section of this prospectus entitled “Management’s discussion and analysis of financial condition and results of operations” and our consolidated financial statements and related notes included elsewhere in this prospectus.

	As of September 30, 2017		
(In thousands, except share and per share data)	**Actual**	**Pro forma**	**Pro forma as adjusted(1)**
Cash, cash equivalents and short-term investments	$ 62,204	$ 62,204	$
Long-term debt	$ 9,154	$ 9,154	$
Convertible preferred stock warrant liabilities	644	—	
Convertible preferred stock, $0.00001 par value: 150,231,568 shares authorized, 145,138,924 shares issued and outstanding, actual; no shares authorized, no shares issued and outstanding, pro forma and pro forma as adjusted	199,633	—	
Stockholders’ equity (deficit):			
Common stock, $0.00001 par value: 210,000,000 shares authorized, 31,474,045 shares issued and outstanding, actual; shares authorized, shares issued and outstanding, pro forma; shares authorized, shares issued and outstanding, pro forma as adjusted	—	2	
Additional paid-in capital	6,228	206,503	
Accumulated other comprehensive income	33	33	
Accumulated deficit	(139,619)	(139,619)	
Total stockholders’ equity (deficit)	(133,358)	66,919	
Total capitalization	$ 76,073	$ 76,073	$

(1) Each $1.00 increase or decrease in the assumed initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus, would increase or decrease, as applicable, our cash, cash equivalents and short-term investments, working capital, total assets and total stockholders’ equity and total capitalization by approximately $ million, assuming that

the number of shares of our common stock offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. Each increase or decrease of 1.0 million shares in the number of shares offered by us would increase or decrease the amount of our cash, cash equivalents, and short-term investments working capital, total assets and total stockholders' equity by approximately $ million, assuming an initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us.

The total number of shares of our common stock reflected in the discussion and table above is based upon 176,612,969 shares of our common stock outstanding on a pro forma basis as of September 30, 2017, and excludes:

- 2,047,292 unvested shares of restricted common stock subject to our repurchase right;
- 18,017,311 shares of our common stock issuable upon the exercise of options to purchase shares of our common stock outstanding as of September 30, 2017, with a weighted-average exercise price of $0.67 per share;
- shares of our common stock issuable upon the exercise of options to purchase shares of our common stock granted after September 30, 2017, with a weighted-average exercise price of $ per share;
- 634,921 shares of our common stock issuable upon the exercise of outstanding warrants to purchase our common stock outstanding as of September 30, 2017, having an exercise price of $0.63 per share and an additional 634,920 shares of our common stock issuable upon the exercise of outstanding warrants to purchase our common, having an exercise price of $0.63 per share that would be exercisable upon the drawing down of additional loans under our credit facility;
- 364,742 shares of our common stock issuable upon the exercise of outstanding warrants to purchase Series A convertible preferred stock outstanding as of September 30, 2017, having an exercise price of $0.329 per share;
- 160,606 shares of our common stock issuable upon the exercise of outstanding warrants to purchase Series B convertible preferred stock outstanding as of September 30, 2017, having an exercise price of $0.792 per share;
- 186,679 shares of our common stock, issuable upon the exercise of outstanding warrants to purchase Series C convertible preferred stock outstanding as of September 30, 2017, having an exercise price of $1.4999 per share;
- 74,567 shares of our common stock issuable upon the exercise of outstanding warrants to purchase Series D convertible preferred stock outstanding as of September 30, 2017, having an exercise price of $2.1457 per share; and
- shares of common stock reserved for future grants under our stock-based compensation plans, consisting of:
  - 6,805,339 shares of common stock reserved for future grants under the 2013 Plan as of September 30, 2017, which shares will be added to the shares to be reserved under the 2018 Plan, which will become effective upon completion of this offering and contains provisions that automatically increase its share reserve each year, as more fully described in "Executive compensation—Equity incentive plans";
  - shares of common stock reserved for future grants under the 2018 Plan, which will become effective upon completion of this offering; and
  - shares of common stock reserved for future issuance under the 2018 ESPP, which will become effective upon completion of this offering.

Dilution

If you invest in our common stock, your interest will be diluted to the extent of the difference between the public offering price per share of our common stock and the pro forma as adjusted net tangible book value per share of our common stock after this offering. Our historical net tangible book value as of September 30, 2017 was $(135.4) million, or $(4.30) per share of common stock. Our net tangible book value per share represents total tangible assets less total liabilities and convertible preferred stock, divided by the number of shares of common stock outstanding as of September 30, 2017. Our pro forma net tangible book value at September 30, 2017, before giving effect to this offering, was $64.9 million, or $0.36 per share of our common stock. Our pro forma net tangible book value before the issuance of shares in this offering gives effect to the conversion of our outstanding convertible preferred stock into our common stock immediately prior to the completion of this offering and the related reclassification of the convertible preferred stock warrant liability into additional paid-in capital immediately prior to the closing of this offering.

After giving effect to our sale of shares of our common stock in this offering at an assumed initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us, our pro forma as adjusted net tangible book value as of September 30, 2017 would have been $, or $ per share. This represents an immediate increase in net tangible book value of $ per share to our existing stockholders and an immediate dilution of $ per share to new investors purchasing shares of common stock in this offering. The following table illustrates this dilution on a per share basis:

Assumed initial public offering price per share		$
Historical net tangible book value per share as of September 30, 2017	$(4.30)	
Pro forma increase in net tangible book value per share attributable to automatic conversion of convertible preferred stock	4.66	
Pro forma net tangible book value per share as of September 30, 2017 before giving effect to this offering	0.36	
Increase in net tangible book value per share attributable to new investors purchasing shares in this offering	$	
Pro forma as adjusted net tangible book value per share after giving effect to this offering		
Dilution in pro forma net tangible book value per share to new investors in this offering		$

Each $1.00 increase or decrease in the assumed initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus, would increase or decrease, as applicable, our pro forma as adjusted net tangible book value by approximately $ million, or approximately $ per share, and would increase or decrease, as applicable, dilution per share to new investors in this offering by $, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. An increase or decrease of 1,000,000 shares in the number of shares offered by us would increase or decrease, as applicable, our pro forma as adjusted net tangible book value by approximately $ million, or approximately $ per share, and would increase or decrease, as applicable, dilution per share to new investors in this offering by approximately $ per share, assuming an initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus, and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. The pro forma as adjusted information discussed

above is illustrative only and will be adjusted based on the actual public offering price and other terms of this offering determined at pricing. If the underwriters exercise their overallotment option to purchase additional shares in full, the pro forma as adjusted net tangible book value per share would be $ per share, and the dilution per share to new investors in this offering would be $ per share.

The following table summarizes the pro forma on an as adjusted basis as described above, as of September 30, 2017, the differences between the existing stockholders and new investors with respect to the number of shares of common stock purchased from us, the total consideration paid to us and the average price per share paid or to be paid to us at an assumed initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus, before deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us:

	Shares purchased		Total consideration		Weighted Average price per share
	Number	Percent	Amount	Percent	
Existing stockholders		%	$	%	$
New investors		%	$	%	$
Total		100.0%		$100.0%	

Each $1.00 increase or decrease in the assumed initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus, would increase or decrease, as applicable, the total consideration paid to us by new investors and total consideration paid to us by all stockholders by $ million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same, and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. An increase or decrease of 1,000,000 shares in the number of shares offered by us would increase or decrease the total consideration paid to us by new investors and total consideration paid to us by all stockholders by $ million, assuming an initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus, and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us.

If all of the outstanding options and warrants noted below were exercised, (1) the number of shares of our common stock held by existing stockholders would be increased to shares, or % of the total number of shares of our common stock outstanding after this offering, and the percentage of shares of common stock held by new investors participating in the offering would be decreased to % of the total number of shares of our common stock outstanding after this offering, (2) the consideration paid by existing stockholders would be increased to $ million, or % of the total consideration paid by stockholders after this offering, and the percentage of consideration paid by new investors participating in the offering would be decreased to % of the total consideration paid by stockholders after this offering, and (3) the average price per share paid by existing stockholders would decrease to $ per share.

Assuming the exercise of all of our outstanding options and warrants as of , the amounts set forth in the table immediately above would change as follows:

	Shares purchased		Total consideration		Weighted Average price per share
	Number	Percent	Amount	Percent	
Existing stockholders		%	$	%	$
New investors		%	$	%	$
Total		100.0%		100.0%	

The total number of shares of our common stock reflected in the discussion and table above is based upon 176,612,969 shares of our common stock outstanding on a pro forma basis as of September 30, 2017 and excludes:

- 2,047,292 unvested shares of restricted common stock subject to our repurchase rights;
- 18,017,311 shares of our common stock issuable upon exercise of stock options outstanding as of September 30, 2017, having a weighted-average exercise price of $0.67 per share;
- shares of our common stock issuable upon exercise of stock options granted after September 30, 2017, having a weighted-average exercise price of $ per share;
- 634,921 shares of our common stock issuable upon the exercise of outstanding warrants to purchase our common stock outstanding as of September 30, 2017, having an exercise price of $0.63 per share and an additional 634,920 shares of our common stock issuable upon the exercise of outstanding warrants to purchase our common, having an exercise price of $0.63 per share that would be exercisable upon the drawing down of additional loans under our credit facility
- 364,742 shares of our common stock issuable upon the exercise of outstanding warrants to purchase our Series A convertible preferred stock outstanding as of September 30, 2017, having an exercise price of $0.329 per share;
- 160,606 shares of our common stock issuable upon the exercise of outstanding warrants to purchase Series B convertible preferred stock outstanding as of September 30, 2017, having an exercise price of $0.792 per share;
- 186,679 shares of our common stock issuable upon the exercise of outstanding warrants to purchase Series C convertible preferred stock outstanding as of September 30, 2017, having an exercise price of $1.4999 per share; and
- 74,567 shares of our common stock, issuable upon the exercise of outstanding warrants to purchase Series D convertible preferred stock outstanding as of September 30, 2017, having an exercise price of $2.1457 per share.
- shares of common stock reserved for future grants under our stock-based compensation plans, consisting of:
  - 6,805,339 shares of common stock reserved for future grants under the 2013 Plan as of September 30, 2017, which shares will be added to the shares to be reserved under the 2018 Plan, which will become effective upon completion of this offering and contains provisions that automatically increase its share reserve each year, as more fully described in “Executive compensation – Equity incentive plans”;
  - shares of common stock reserved for future grants under the 2018 Plan, which will become effective upon completion of this offering; and
  - shares of common stock reserved for future issuance under the 2018 ESPP, which will become effective upon completion of this offering.

To the extent that any outstanding options or warrants are exercised, new options are issued under our stock-based compensation plans or we issue additional shares of common stock in the future, there will be further dilution to investors participating in this offering.

Selected consolidated financial data

You should read the selected consolidated financial data set forth below in conjunction with our consolidated financial statements, the notes to our consolidated financial statements and “Management’s discussion and analysis of financial condition and results of operations” contained elsewhere in this prospectus.

We derived the selected consolidated statements of operations data and consolidated balance sheet data for the fiscal years ended September 30, 2016 and 2017 from our audited consolidated financial statements included elsewhere in this prospectus. The summary financial data included in this section are not intended to replace the financial statements and related notes included elsewhere in this prospectus. Our historical results are not necessarily indicative of our future performance.

	Years ended September 30,	
(in thousands, except share and per share data)	**2016**	**2017**
Consolidated statements of operations data:		
Revenues	$ 2,269	$ 10,767
Operating expenses:		
Cost of revenues	9,421	24,020
Research and development	18,230	19,169
Selling, general and administrative	18,274	26,060
Total operating expenses	45,925	69,249
Loss from operations	(43,656)	(58,482)
Interest income	241	412
Interest expense	(746)	(905)
Other income (expense), net	73	(55)
Loss before income taxes	(44,088)	(59,030)
Provision for income taxes	—	(280)
Net loss attributable to common stockholders	$ (44,088)	$ (59,310)
Other comprehensive loss:		
Change in unrealized gain (loss) on investments	9	(9)
Foreign currency translation adjustment	—	33
Comprehensive loss	$ (44,079)	$ (59,286)
Net loss per share attributable to common stockholders—basic and diluted(1)	$ (2.38)	$ (2.47)
Weighted average shares used in computing net loss per share attributable to common stockholders—basic and diluted(1)	18,511,202	23,982,605
Pro forma net loss per share—basic and diluted(1)		$ (0.39)
Pro forma weighted-average shares used in computing pro forma net loss per share—basic and diluted(1)		152,397,059

(1) See Note 16 of the notes to our consolidated financial statements included elsewhere in this prospectus for a description of the method used to compute basic and diluted net loss per share attributable to common stockholders and pro forma basic and diluted net loss per share.

(in thousands)	As of September 30, 2016	2017
Consolidated balance sheet data		
Cash, cash equivalents, and short-term investments	$ 55,920	$ 62,204
Working capital	50,361	58,392
Total assets	76,463	85,657
Total liabilities	19,037	19,382
Convertible preferred stock	134,037	199,633
Additional paid-in capital	3,689	6,228
Accumulated deficit	(80,309)	(139,619)
Total stockholders' deficit	(76,611)	(133,358)

Management's discussion and analysis of financial condition and results of operations

The following discussion and analysis of our financial condition and results of operations should be read in conjunction with our consolidated financial statements and the related notes to those statements included elsewhere in this prospectus. In addition to historical financial information, the following discussion and analysis contains forward-looking statements that involve risks, uncertainties and assumptions. Our actual results and timing of selected events may differ materially from those anticipated in these forward-looking statements as a result of many factors, including those discussed under "Risk factors" and elsewhere in this prospectus. The last day of our fiscal year is September 30, and we refer to our fiscal year ended September 30, 2016 as fiscal 2016 or 2016 and our fiscal year ended September 30, 2017 as fiscal 2017 or 2017.

Overview

We are a leading and rapidly growing synthetic biology company that has developed a disruptive DNA synthesis platform to industrialize the engineering of biology. The core of our platform is a proprietary technology that pioneers a new method of manufacturing synthetic DNA by "writing" DNA on a silicon chip. We have combined this technology with proprietary software, scalable commercial infrastructure and an e-commerce platform to create an integrated technology platform that enables us to achieve high levels of quality, precision, automation, and manufacturing throughput at a significantly lower cost than our competitors. We are leveraging our unique technology to manufacture a broad range of synthetic DNA-based products, including synthetic genes, tools for next generation sample preparation, and antibody libraries for drug discovery and development. Additionally, we believe our platform will enable new value-add opportunities, such as discovery partnerships for biologic drugs, and will enable new applications for synthetic DNA, such as digital data storage, which will drive growth in the market for our products. We sell our synthetic DNA and synthetic DNA-based products to a customer base of over 600 customers across a broad range of industries.

We launched the first application of our platform, synthetic genes and oligo pools, in April 2016 to disrupt the gene synthesis market and make legacy DNA synthesis methods obsolete.

In April 2016, we have rapidly become a leading synthetic DNA provider. Between September 30, 2015 and June 30, 2018, the Company sold its products to more than 600 customers. In fiscal 2017, we served 286 customers including $0.3 million in sales to seven of the top 20 pharmaceutical companies by revenue, $4.3 million in sales to Ginkgo Bioworks, Inc., or Ginkgo Bioworks (which we believe is the largest global purchaser of synthetic DNA), $0.3 million in sales to three of the largest agricultural biotechnology companies, $2.7 million in sales to over 100 academic research institutions worldwide, and $7.3 million in sales to innovative customers using synthetic DNA for new and emerging applications, such as Microsoft Corporation and the University of Washington for use of DNA as a digital data storage medium. We are also an original equipment manufacturer, or OEM, of synthetic DNA to four synthetic DNA manufacturers that also compete with us, which we believe is a strong demonstration of the superiority of our platform.

We have also leveraged the versatility of our platform to expand our product portfolio into other markets in which we believe we have a competitive advantage. In February 2018, we launched an innovative and comprehensive preparation kit for next generation sequencing at the Advances in Genome Biology and Technology conference. Our kit leverages our platform to precisely synthesize oligo pools and uniformly amplify the desired target DNA segments, considerably improving the accuracy of the downstream sequencing analysis. We have also commercialized a custom DNA library solution which enables more effective biologic drug discovery and development for our customers. We believe we can further leverage our platform to develop other proprietary tools, such as our anti-GPCR library and antibody optimization solution, to provide an end-to-end solution in biologics drug discovery and early development, from target to Investigational New Drug (IND)

application, adding value as a partner to biotech and pharmaceutical companies. We also aim to explore development of DNA as a digital data storage medium via internal research and industry partnerships.

We have built a scalable commercial platform that enables us to reach a diverse customer base that we believe includes over 100,000 synthetic DNA users today. In order to address this diverse customer base, we have employed a multi-channel strategy comprised of a direct sales force targeting synthetic DNA customers, a direct sales force focusing on the NGS market and an e-commerce platform. We launched our proprietary, innovative, and easy-to-use e-commerce platform in October 2017 to existing customers and expanded access to the general public in January 2018. Our platform allows customers to design, validate, and place on-demand orders of customized DNA online. This is a critical part of our strategy to address our large and diverse customer base, as well as drive commercial productivity, enhance the customer experience, and promote loyalty.

We generated revenues of $2.3 million in fiscal 2016, and $10.8 million in fiscal 2017, while incurring net losses of $44.1 million in fiscal 2016, and $59.3 million in fiscal 2017.

Since our inception, we have incurred significant operating losses. Our ability to generate product revenue sufficient to achieve profitability will depend heavily on the success of our existing products and development and commercialization of additional products in the synthetic biology industry. Our net loss was $44.1 million and $59.3 million for fiscal 2017 and fiscal 2016, respectively. As of September 30, 2017, we had an accumulated deficit of $139.6 million. We expect to continue to incur significant expenses for at least the next several years. Furthermore, upon the closing of this offering, we expect to continue to incur additional costs associated with operating as a public company including accounting, investor relations, legal and other expenses that we did not incur as a private company.

As a result, we will need substantial additional funding to support our continuing operations and pursue our growth strategy. Until such time as we can generate significant revenue from product sales, we expect to finance our operations from revenue from our commercial operations, the sale of equity, debt financings or other capital sources, including collaborations with other companies or other strategic transactions. We may be unable to grow our revenue, raise additional funds or enter into such other agreements or arrangements when needed on favorable terms, or at all. If we fail to raise capital or enter into such agreements as, and when, needed, we may have to significantly delay, scale back or discontinue the development and commercialization of one or more of our product opportunities or delay our pursuit of potential in-licenses or acquisitions.

As of September 30, 2017, we had $62.2 million in cash, cash equivalents and short-term investments and during 2017, we received net cash proceeds of $65.6 million from the sale of shares of Series D convertible preferred stock. We have based these estimates on assumptions that may prove to be wrong, and we could exhaust our available capital resources sooner than we expect. See “Liquidity and capital resources.”

After giving effect to the anticipated net proceeds from this offering, we expect that our existing cash, cash equivalents and short-term investments will be sufficient to fund our planned operating expenses, capital expenditure requirements and debt service payments through at least the next 12 months.

In the future, we expect we will need to raise additional capital to finance our operations which cannot be assured. As of September 30, 2017, without giving effect to the anticipated net proceeds from this offering, we have concluded that this circumstance raises substantial doubt about our ability to continue as a going concern within one year after the issuance date of our consolidated financial statements for the year ended September 30, 2017. See Note 1 to our consolidated financial statements appearing in this prospectus for additional information.

Similarly, in its report on our financial statements for fiscal 2017, our independent registered public accounting firm included an explanatory paragraph stating that our recurring losses from operations since inception and required additional funding to finance our operations raise substantial doubt about our ability to continue as a going concern.

Key factors affecting our performance

We believe that our financial performance has been and in the foreseeable future will continue to be primarily driven by the following factors:

Adoption of our products and solutions by existing and new customers. A key factor to our future success is and will be our ability to increase orders from and sell new solutions to existing customers, and to acquire new customers. To do so, we must offer these customers synthetic DNA-based products with a superior combination of quality, cost, throughput, and scalability, and develop affordable tools for existing and prospective customers that expand the applications of our products and drive higher volume purchases. We must also convince potential customers who currently synthesize their own DNA that our products and solutions are superior and offer greater value to their organizations.

Expansion into new geographic markets. Our revenue is currently generated from customers primarily in the United States. As we begin to expand our global sales efforts, we must be successful in marketing our products and solutions in geographies where we have limited experience. Our revenue may be affected by seasonal trends in some geographies during the calendar year as we expand into new geographic markets.

Expansion into adjacent addressable markets. Our revenue growth and market potential depends on our ability to meet customer needs in adjacent markets, such as in pharmaceutical biologics discovery and development and data storage. By combining our affordable and high-quality synthetic DNA with our proprietary, innovative, and easy-to-use e-commerce platform that allows customers to design, validate, and place on-demand orders of customized DNA online, we believe we will continue to convert those who make DNA, or DNA Makers, into those who buy their own DNA, or DNA Buyers.

Leverage our manufacturing capacity and commercial infrastructure. We have, and will continue to invest significantly in our manufacturing capabilities and commercial infrastructure. With our current operating model and infrastructure, we have the capacity to significantly increase our manufacturing production and commercialize additional products. By doing so, we expect to grow revenue and spread our costs over a larger volume of products, which we believe will further reduce our manufacturing costs on a per-unit basis and improve our operating margins. Our ability to achieve and enhance profitability is dependent upon growing our revenue and further increasing our manufacturing efficiency, among other factors.

Key business metrics

We regularly review the following key business metrics to evaluate our business, measure our performance, identify trends affecting our business, formulate financial projections and make strategic decisions. We believe that the following metrics are representative of our current business; however, we anticipate these will change or may be substituted for additional or different metrics as our business grows.

Value of orders received

We believe that the value of orders we receive is a leading indicator of our ability to generate revenue. We define an order as a contract with a customer or purchase order from a customer, which outlines the promised goods at an agreed upon price. We regularly assess trends relating to the value of orders we receive, including with respect to our customer concentration. For example, we have experienced quarterly growth in the value of orders received from customers other than Ginkgo Bioworks, which has increased by approximately 6.5 times from the quarter ended June 30, 2016 to the quarter ended September 30, 2017.

We received orders from customers other than Ginkgo Bioworks valued at $0.5 million in the quarter ended June 30, 2016 which increased to $0.7 million for the quarter ended September 30, 2016, an increase of 49%.

For the quarter ended December 31, 2016, we received $1.2 million in orders from customers other than Ginkgo Bioworks, an increase of 56% over the prior quarter. For the quarter ended March 31, 2017, we received orders totaling $2.7 million from customers other than Ginkgo Bioworks, an increase of 135% over the prior quarter. We received orders totaling $2.7 million from customers other than Ginkgo Bioworks for the quarter ended June 30, 2017, flat over prior quarter. In the fourth quarter ended September 30, 2017, orders we received from customers other than Ginkgo Bioworks increased 37% over the prior quarter to $3.7 million.

Orders may never convert into actual revenue and the timing of delivery of our orders and recognition of revenue, if any, may vary based on the nature of the order, and there can be no assurance that orders will result in recognized revenue. The following table lists the value of orders received (inclusive of Ginkgo Bioworks orders of $1.9 million in 2016 and $7.3 million in 2017) during the periods indicated:

	Years ended September 30,	
(in thousands)	**2016**	**2017**
Order value	$ 3,814	$ 17,558

Number of customers

We believe that the number of customers who have purchased from us since inception is representative of our ability to drive adoption of our products and convert DNA Makers to DNA Buyers. We define customers as separate legal entities or persons who have purchased and directly paid for our products. This means that if a parent company is a customer of ours, it is counted as one customer, and if its subsidiary also purchases our products from us, and the subsidiary makes a payment directly to us, we count the subsidiary as a separate customer. We apply this methodology of counting customers because it is not possible for our e-commerce platform and other data tracking software to distinguish accurately between affiliated purchasers.

	Years ended September 30,	
	2016	**2017**
Customers	97	286

Percentage of revenue from new vs. repeat customers

We believe that the percentage of revenue that we generate from both new and repeat customers is a leading indicator of our ability to drive adoption of our products amongst existing customers while also generating a robust pipeline of new customers. We define a new customer as a customer who, as a separate legal entity or person, has not previously purchased any products or services from us. We define a repeat customer as any customer who, as a separate legal entity or person, has previously purchased any products or services from us. Because our first commercial shipment was in April 2016, 100% of our revenue for fiscal 2016 was from new customers, therefore we had no revenue from repeat customers in fiscal 2016.

	Years ended September 30,	
	2016	**2017**
Percentage of revenue from repeat customers	0%	63%
Percentage of revenue from new customers	100%	37%

Financial overview

The following table summarizes certain selected historical financial results:

(in thousands)	Years ended September 30, 2016	2017
Revenues	$ 2,269	$ 10,767
Loss from operations	(43,656)	(58,482)
Net loss attributable to common stockholders	(44,088)	(59,310)

Components of the results of operations

Revenues

We generate revenue from sales of synthetic genes, oligo pools, genes, next generation sequencing tools and DNA libraries. We recognize revenue upon delivery to our customers and bill them directly for the shipments. Our ability to increase our revenues will depend on our ability to further penetrate the domestic and international markets, generate sales through our direct sales force, and over time from our e-commerce platform.

Revenues by geography

We have one reportable segment from the sale of synthetic DNA products. The following table shows our revenues by geography, based on our customers' shipping addresses. North America consists of Canada and Mexico; EMEA consists of Europe, Middle East, and Africa; and APAC consists of Japan, China, South Korea, Singapore, Malaysia and Australia.

(in thousands, except percentages)	Years ended September 30, 2016	Percentage	2017	Percentage
United States	$1,769	78%	$ 8,252	77%
EMEA	459	20%	2,059	19%
APAC	41	2%	259	2%
North America	—	0%	197	2%
Total revenues	$2,269	100%	$10,767	100%

Revenues by industry

Revenues by industry were as follows:

(in thousands, except percentages)	Years ended September 30, 2016	Percentage	2017	Percentage
Industrial chemicals	$ 960	42%	$ 6,702	62%
Academic research	830	37%	2,709	25%
Healthcare	461	20%	1,226	12%
Agriculture	18	1%	130	1%
Total revenues	$2,269	100%	$10,767	100%

Revenues by products

The table below sets forth revenues by products:

	Years ended September 30,			
(in thousands, except percentages)	**2016**	**Percentage**	**2017**	**Percentage**
Synthetic genes	$1,087	48%	$ 8,122	75%
Oligo pools	862	38%	2,056	19%
DNA libraries	320	14%	517	5%
NGS tools	—	—	72	1%
Total revenues	$2,269	100%	$10,767	100%

Revenues and accounts receivable concentration

Customer revenues equal to or greater than 10% of total revenues was as follows:

	Years ended September 30,	
	2016	**2017**
Customer A	30%	40%
Customer B	11%	0%

One customer accounted for greater than 10% of net accounts receivable as follows:

	September 30,	
	2016	**2017**
Customer A	41%	35%

Cost of revenues

Cost of revenues reflect the aggregate cost incurred in the production and delivery of our products and consists of: production materials, personnel costs (salaries, benefits, bonuses and stock-based compensation), cost of expensed equipment and consumables, laboratory supplies, depreciation of capitalized equipment, production overhead costs and allocations of IT and facility costs. We expect that our cost of revenues will increase as we increase our revenues with new product developments.

Other operating expenses

Our operating expenses are classified in the following categories: Research and development, and selling, general and administrative. For each category, the largest component is personnel costs, which includes salaries, employee benefit costs, bonuses, and stock-based compensation expenses.

Research and development

Research and development expenses consist primarily of costs incurred for the development of our products, which include personnel costs, laboratory supplies, consulting costs and allocated overhead, including IT and facility costs. We expense our research and development expenses in the period in which they are incurred. We expect to increase our research and development expenses as we continue to develop new products.

Selling, general and administrative

Selling expenses consist of personnel cost, customer service expenses, direct marketing expenses, educational and promotional expense, market research and analysis. General and administrative expenses include

executive, finance and accounting, legal and human resources. These expenses consist of personnel costs, audit and legal expenses, consulting costs and allocated IT and facility costs. We expense all selling, general and administrative expenses as incurred. We expect our selling and marketing cost will continue to increase in absolute dollars, primarily driven by our efforts to expand our commercial capability, with an increased presence both within and outside the United States, and to expand our brand awareness and customer base through targeted marketing initiatives. We expect general and administrative expenses will increase as well as we scale our operations. In addition, we expect to incur additional accounting, legal and other expenses that we did not incur as a private company.

Interest expense

Interest expense is attributable to borrowing under our senior secured term loan and our equipment financing facility.

Interest income

Interest income consists primarily of interest earned on our cash, cash equivalents, and short-term investments.

Other income (expense), net

Other income (expense), net consists of realized gains and losses on sales of short-term investments and stock warrant expense.

Results of operations

	Years ended September 30,	
(in thousands)	**2016**	**2017**
Revenues	$ 2,269	$ 10,767
Operating expenses:		
Cost of revenues	9,421	24,020
Research and development	18,230	19,169
Selling, general and administrative	18,274	26,060
Total operating expenses	45,925	69,249
Loss from operations	(43,656)	(58,482)
Interest income	241	412
Interest expense	(746)	(905)
Other income (expense), net	73	(55)
Provision for income taxes	—	(280)
Net loss attributable to common stockholders	$ (44,088)	$ (59,310)

Revenues

	Years ended September 30,		Change	
(in thousands, except percentages)	**2016**	**2017**	**$**	**%**
Revenues	$2,269	$10,767	$8,498	375%

We commenced selling our products in April 2016. In 2016, we generated revenue of $2.3 million from shipments of our synthetic DNA products, primarily oligonucleotides, clonal and non-clonal synthetic genes, and DNA libraries. Revenue from customers in the United States was 78% and 22% outside the United States.

Revenue increased to $10.8 million in 2017, as we continued to ramp up production capacity and sales of our synthetic DNA products, primarily oligonucleotides, clonal and non-clonal synthetic genes, DNA libraries and oligo pools. In 2017, revenues from customers in the United States accounted for 77% and 23% from customers outside the United States.

Since launching our products in April 2016, we have seen increased adoption by the market and our customer base has grown. In reviewing year-over-year results, our first commercial shipment was in April 2016 as compared to a full year of product shipments to customers in 2017. Revenue from synthetic genes, oligo pools, NGS tools and DNA libraries increased $8.5 million from $2.3 million in 2016 to $10.8 million in 2017, primarily driven by increases in the volume of orders and new customers. Additionally, revenue for 2017 included approximately $4.0 million from new customers, because our customer base increased from 97 customers in 2016 to 286 customers in 2017. In addition, the increase in 2017 revenue was also due to an increase from sales to Gingko Bioworks of $3.6 million in revenue from $0.7 million in 2016 to $4.3 million in 2017.

Cost of revenues

	Years ended September 30,		Change	
(in thousands)	**2016**	**2017**	**$**	**%**
Cost of revenues	$9,421	$24,020	$14,599	155%

Cost of revenues increased by $14.6 million or 155% from $9.4 million in 2016 to $24.0 million in 2017 due to the increase in revenues. Cost of revenues was $9.4 million in 2016, driven by our initial ramp up of production capacity. Cost of revenues was primarily related to payroll of $3.5 million, production and laboratory supplies of $3.2 million, information technology and facilities costs of $1.8 million, consulting and outside services of $0.5 million, and maintenance costs of $0.3 million.

In 2017, total cost of revenues increased to $24.0 million, primarily from $8.2 million of payroll expenses due to an increase in headcount, consumption of reagents and production material of $7.4 million, information technology and facilities costs of $3.8 million, consulting and outside services of $1.1 million, $1.9 million of depreciation expense related to additional equipment for increased production capacity, maintenance costs of $0.7 million, and stock-based compensation expenses of $0.2 million.

Research and development expenses

	Years ended September 30,		Change	
(in thousands)	**2016**	**2017**	**$**	**%**
Research and development	$ 18,230	$ 19,169	$939	5%

Research and development expenses increased by $0.9 million or 5% from $18.2 million in 2016 to $19.2 million in 2017. This was primarily due to increased development activities for new product offerings, materials costs, and information technology and facilities costs. In 2017, information technology and facilities costs increased by $0.9 million compared to 2016 primarily due to the signing of lease agreements for additional facilities located in San Francisco and South San Francisco. Additional research and development expenses of $3.4 million were also incurred in 2017 in connection with the acquisition of Genome Compiler Corporation in the prior fiscal year. In 2016, we received $2.4 million Defense Advanced Research Projects Agency, or DARPA, payments, whereas in

2017 there were no DARPA payments to offset expenses. In 2017, laboratory materials used in research and development increased $0.5 million from $2.7 million to $3.2 million and allocations from facilities and information technology increased $0.9 million.

Selling, general and administrative expenses

	Years ended September 30,		Change	
(in thousands, except percentages)	**2016**	**2017**	**$**	**%**
Selling, general and administrative	$ 18,274	$ 26,060	$7,786	43%

Selling, general and administrative expenses increased by $7.8 million, or 43%, from $18.3 million in 2016 to $26.1 million in 2017 primarily due to increases in payroll related to increased headcount, commercialization of products, professional and legal expenses, information technology and facilities. Salaries and related costs increased by $1.9 million in 2017, as a result of increases in sales headcount. In addition, professional and legal expenses increased by $5.2 million due to commercial expansion of our products.

Interest, and other income (expense), net

	Years ended September 30,		Change	
(in thousands, except percentages)	**2016**	**2017**	**$**	**%**
Interest income	$ 241	$ 412	$(171)	(71)%
Interest expense	(746)	(905)	159	(21)%
Other income (expense)	73	(55)	128	175 %
Total interest, and other income (expense), net	$ (432)	$ (548)	$ 116	(27)%

Interest income was $0.2 million in 2016 and $0.4 million in 2017 resulting from our short-term investments. Other income and expenses were primarily due to the disposal of property and equipment. Interest expense was $0.7 million in 2016 and $0.9 million in 2017 related to our outstanding debt. Stock warrant expense was $(0.1) million in 2016 and $0.3 million in 2017.

Provision for income taxes

	Years ended September 30,		Change	
(in thousands, except percentages)	**2016**	**2017**	**$**	**%**
Provision for income taxes	$ —	$ (280)	$280	100%

We recorded an immaterial provision for income taxes in 2016 and $0.3 million in 2017.

Liquidity and capital resources

Sources of liquidity

To date, we have financed our operations principally through private placements of our convertible preferred stock, borrowings from credit facilities and revenue from our commercial operations.

Since our inception on February 4, 2013 and through September 30, 2017, we have received an aggregate of $200.3 million in gross proceeds from the issuance of equity securities and an aggregate of $10.0 million from debt. As of September 30, 2017, we had a balance of $31.2 million of cash and cash equivalents and $31.0 million of short-term investments.

Preferred stock financings

As of September 30, 2017, we had raised $200.3 million in gross proceeds from the sale of our equity securities, including the sale of 59,743,942 shares of our Series D convertible preferred stock from January 2016 through September 2017 at a purchase price of $2.146 per share for gross proceeds of $128.2 million. On March 19, 2018 and May 29, 2018, we issued 23,302,418 and 9,320,967 shares of Series D convertible preferred stock for an aggregate purchase price of approximately $50.0 million and $20.0 million, respectively. On July 2, 2018 and July 3, 2018, we issued 5,126,530 and 466,048 shares of Series D convertible preferred stock for an aggregate purchase price of $11.0 million and $1.0 million, respectively.

See Note 13 to our consolidated financial statements for a discussion of the terms and provisions of our Series D convertible preferred stock issued in 2016 and 2017.

Debt financings

We have entered into various credit facilities to obtain debt financing from time to time beginning in October 2013.

More recently, in December 2015, we entered into a Second Amended and Restated Loan and Security Agreement, or the Third Loan, for amounts aggregating up to $15.0 million in a series of three advances. The Third A&R Loan contains an acceleration clause under which the loan can become due and payable to SVB in certain events of default, including in the event of a material adverse change in our business. The term of the loan was 41 months with an interest rate equal to the greater of (i) the prime rate or (ii) 3.25%, and there was a final payment fee of 6% of the amount loaned. In addition, we obtained a revolving facility from SVB of $5.0 million for which the principal amount outstanding under the revolving line would accrue interest at a floating per annum rate equal to one percentage point (1.00%) above the Prime Rate, which interest shall be payable monthly.

The first advance, totaling $7.0 million, was drawn in December 2015 and comprised $3.3 million to refinance our prior loan with SVB and a new advance of $3.7 million. The debt provides interest only payments through December 31, 2016 at which time monthly principal payments become due. In connection with this advance, we issued warrants to purchase a total of 186,679 shares of Series C convertible preferred stock at an exercise price of $1.4999 per share. We accounted for this transaction as a debt modification and did not incur any gains or losses relating to the modification. The second advance, totaling $4.0 million, was drawn in March 2016. In connection with this advance, we issued warrants to purchase a total of 74,567 shares of Series D convertible preferred stock at an exercise price of $2.1457 per share.

In September 2017, we entered into a Fourth Amended and Restated Loan and Security Agreement, or the Fourth Loan, with SVB, for amounts aggregating up to $20.0 million in a series of three advances. The first advance provides a principal amount of $10.0 million, the second advance provides a principal amount of $5.0 million and the third advance provides a principal amount of $5.0 million during their respective draw down periods; however, the draw periods for the second and third tranches under this agreement have expired. In connection with the first advance, we issued warrants to purchase 634,921 shares of common stock at an exercise price of $0.63 per share. If we draw down the second and third advances, the warrants would become exercisable for an additional 634,920 shares of common stock at an exercise price of $0.63 per share. The Fourth Loan contains a subjective acceleration clause under which the Fourth Loan could become due and payable to SVB in the event of a material adverse change in our business. The term of the loan was 51 months with an interest rate of prime plus 3.00% and a final payment fee of $0.7 million. We had the ability to draw down the additional second and third advances of the loan and security agreement, subject to achieving various revenue milestones, through January 31, 2018 and June 30, 2018, respectively. In addition, we obtained a

revolving facility from SVB in September 2017 as part of the Fourth Loan and the facility allows us to borrow up to $10.0 million. The principal amount outstanding under the revolving line accrues interest at a floating per annum rate equal to one percentage point (1.00%) above the prime rate, which interest shall be payable monthly. The amounts available under the revolving line are limited by an advance rate which is a percentage of our account receivables balance.

Our credit facilities contain customary representations and warranties and customary affirmative and negative covenants applicable to us and our subsidiaries, including, among other things, restrictions on changes in business, management, ownership or business locations, indebtedness, encumbrances, investments, mergers or acquisitions, dispositions, maintenance of collateral accounts, prepayment of other indebtedness, distributions and transactions with affiliates. The credit facilities contain customary events of default subject in certain cases to grace periods and notice requirements, including (a) failure to pay principal, interest and other obligations when due, (b) material misrepresentations, (c) breach of covenants, conditions or agreements in the credit facilities, (d) default under material indebtedness, (e) certain bankruptcy events, (f) a material adverse change; (g) attachment, levy or restraint on business, (h) default with respect to subordinated debt, (i) cross default under our credit facilities, and (j) government approvals being revoked. As of September 30, 2017, as part of the Fourth Loan, all rights, title and interest to our personal property with the exception of our intellectual property, have been pledged as collateral, including cash and cash equivalents, short-term investments, accounts receivable, contractual rights to payment, license agreements, general intangibles, inventory and equipment. We were in compliance with all covenants under the loan and security agreement as of fiscal 2016 and fiscal 2017.

Future maturities of the loan as of September 30, 2017 are as follows:

(in thousands)	Principal	Interest	Total
Years ending September 30,			
2018	$ —	$ 715	$ 715
2019	2,500	673	3,173
2020	3,333	440	3,773
2021	3,333	194	3,527
2022	834	10	844
	10,000	2,032	12,032
Less: Interest			(2,032)
Total amount of loan principal			10,000
Less unamortized debt discount			(860)
Add accretion of final payment fee			14
			$ 9,154

Capital resources

After giving effect to the anticipated net proceeds from this offering, we expect that our existing cash, cash equivalents and short-term investments will be sufficient to fund our operating expenses, capital expenditure requirements and debt service payments through at least the next 12 months. In the future, we expect we will need to raise additional capital to finance our operations which cannot be assured. As of September 30, 2017, without giving effect to the anticipated net proceeds from this offering, we have concluded that this circumstance raises substantial doubt about our ability to continue as a going concern within one year after the issuance date of our consolidated financial statements for the year ended September 30, 2017. However, our operating plan may change as a result of factors currently unknown to us, and we may need to seek additional funds sooner than planned, through public or private equity or debt financings or other sources, such as

strategic collaborations. Such financing may result in dilution to stockholders, imposition of debt covenants and repayment obligations, or other restrictions that may adversely affect our business. In addition, we may seek additional capital due to favorable market conditions or strategic considerations even if we believe we have sufficient funds for our current or future operating plans. Our future capital requirements will depend on many factors. See “Risk factors—We will require additional financing to achieve our goals, and a failure to obtain this necessary capital when needed on acceptable terms, or at all, could force us to delay, limit, reduce or terminate our product manufacturing and development and other operations.”

Operating capital requirements

Our primary uses of capital are, and we expect will continue to be for the near future, compensation and related expenses, manufacturing costs, laboratory and related supplies, legal and other regulatory expenses and general overhead costs. As of September 30, 2017, we had $1.3 million in commitments for capital expenditures.

Cash flows

The following table summarizes our sources and uses of cash and cash equivalents:

	Years ended September 30,	
(in thousands)	**2016**	**2017**
Net cash used in operating activities	$(38,592)	$(51,301)
Net cash used in investing activities	(33,345)	(9,870)
Net cash provided by financing activities	69,648	63,802
Net increase (decrease) in cash and cash equivalents	$ (2,289)	$ 2,631

Operating activities

Net cash used in operating activities was $38.6 million in 2016 and consisted primarily of a net loss of $44.1 million adjusted for non-cash items including depreciation and amortization expenses of $4.2 million, stock-based compensation expense of $0.9 million, net increase in operating assets and liabilities of approximately $0.2 million, and other non-cash items of $0.2 million.

Net cash used in operating activities was $51.3 million in 2017 and consisted primarily of a net loss of $59.3 million adjusted for non-cash items including depreciation and amortization expenses of $5.0 million, stock-based compensation expense of $1.9 million, a net decrease in operating assets and liabilities of approximately $0.1 million, and a net increase of non-cash items of $1.2 million.

Investing activities

In 2016, our investing activities used net cash of $33.3 million. The use of net cash resulted from the purchases of investments and purchases of laboratory property and equipment.

In 2017, our investing activities used net cash of approximately $9.9 million. The use of net cash resulted primarily from the net impact of purchases and maturity of investments and purchases of laboratory property and equipment and computers.

Financing activities

Net cash provided by financing activities was $69.6 million in 2016, which consisted of $62.3 million from the issuance of convertible preferred stock and $7.7 million from the issuance of debt, partially offset by the repayment of $0.4 million of debt.

Net cash provided by financing activities was $63.8 million in 2017, which consisted of $65.6 million from the issuance of convertible preferred stock, $2.2 million from additional debt, off-set by the repayment of $4.2 million of debt.

Off-Balance Sheet Arrangements

We do not have any off-balance sheet arrangements other than our indemnification agreements as described in Note 8 of the consolidated financial statements.

Contractual obligations and other commitments

The following table summarizes our outstanding contractual obligations as of the payment due date by period as of September 30, 2017:

(in thousands)	Total	Less than 1 Year	Years 1-3	Years 3-5	After 5 Years
Contractual obligations					
Future minimum operating lease payments	$ 3,598	$ 2,133	$1,465	$ —	$ —
Long-term debt obligations	12,032	715	6,946	4,371	—
Total	$15,630	$ 2,848	$8,411	$4,371	$ —

Qualitative and quantitative disclosures about market risk

We are exposed to market risks in the ordinary course of our business. These risks primarily include interest rate risk and foreign currency risk as follows:

Interest rate risk

We had cash and cash equivalents totaling $28.6 million and $31.2 million as of September 30, 2016 and 2017, respectively. We had short-term investments totaling $27.3 million and $31.0 million as of September 30, 2016 and 2017, respectively. Our cash and cash equivalents consist of cash in bank accounts and money market funds, and short-term investments consist of U.S. government agency bonds, corporate bonds, and commercial paper. The primary objectives of our investment activities are to preserve principal and provide liquidity without significantly increasing risk. We do not enter into investments for trading or speculative purposes. Due to the relatively short-term nature of our investment portfolio, a hypothetical 100 basis point change in interest rate would not have a material effect on the fair value of our portfolio for the years presented.

Foreign currency risk

For the years ended in September 30, 2016 and 2017, the majority of our sales and operating expenses were each denominated in U.S. dollars. We therefore have not had material foreign currency risk associated with sales and operating expenses. For the years ended September 30, 2016 and 2017, our operations outside of the United States are not considered material. Therefore, our results of operations and cash flows are minimally subject to fluctuations from changes in foreign currency rates. As we grow our operations, our exposure to foreign currency exchange contracts will likely become more significant. We did not enter into any foreign currency exchange contracts in fiscal 2016 or fiscal 2017. We do, however, anticipate entering into foreign currency exchange contracts for purposes of hedging foreign exchange rate fluctuations on our business operations in future operating periods as our exposures are deemed to be material. For additional discussion on foreign currency risk, see “Risk factors—Doing business internationally creates operational and financial risks” elsewhere in this prospectus.

Critical accounting policies and estimates

Our management's discussion and analysis of our financial condition and results of operations is based on our consolidated financial statements, which have been prepared in conformity with U.S. generally accepted accounting principles, or GAAP. The preparation of financial statements in accordance with GAAP requires management to make estimates and assumptions about future events that affect the amounts of assets and liabilities reported, disclosures about contingent assets and liabilities, and reported amounts of revenues and expenses. These estimates and assumptions are based on management's best estimates and judgment. Management regularly evaluates its estimates and assumptions using historical experience and other factors; however, actual results could differ materially from these estimates and could have an adverse effect on our financial statements. We believe that the accounting policies discussed below are critical to understanding our historical and future performance, as these policies relate to the more significant areas involving management's judgments and estimates.

While our significant accounting policies are described in more detail in Note 2 to our consolidated financial statements appearing in this prospectus, we believe that the following accounting policies are the most critical to the judgments and estimates used in the preparation of our consolidated financial statements.

Revenue recognition

Effective October 1, 2017, we elected to early adopt the requirements of ASC 606 – Revenue from Contracts with Customers using the full retrospective method. We evaluated the impact on revenues, loss from operations, net loss attributable to common stockholders and basic and diluted earnings per share for all periods presented and concluded that there was no material impact on our consolidated financial statements for all periods presented.

Our revenue is generated through the sale of synthetic biology tools, such as synthetic genes, or clonal genes and fragments, oligonucleotide pools, or oligo pools, next generation sequencing, or NGS tools and DNA libraries. We account for a contract when it has approval and commitment from both parties, the rights of the parties are identified, payment terms are identified, the contract has commercial substance and collectability of consideration is probable.

Contracts with customers are generally in the written form of a purchase order or a quotation, which outline the promised goods and the agreed upon price. Such orders are often accompanied by a Master Supply or Distribution Agreement that establishes the terms and conditions, rights of the parties, delivery terms, and pricing. We assess collectability based on a number of factors, including past transaction history and creditworthiness of the customer.

For all of our contracts to date, the customer orders a specified quantity of a synthetic DNA sequence; therefore, the delivery of the ordered quantity per the purchase order is accounted for as one performance obligation. Some contracts may contain prospective discounts when certain order quantities are exceeded; however, these future discounts are either not significant, not deemed to be incremental to the pricing offered to other customers, or not enforceable options to acquire additional goods. As a result, these discounts do not constitute a material right and do not meet the definition of a separate performance obligation. We do not offer retrospective discounts or rebates.

The transaction price is determined based on the agreed upon rates in the purchase order or master supply agreements applied to the quantity of synthetic DNA that was manufactured and shipped to the customer. Our contracts include only one performance obligation—the delivery of the product to the customer. Accordingly, all of the transaction price, net of any discounts, is allocated to the one performance obligation. Therefore, upon

delivery of the product, there are no remaining performance obligations. Our shipping and handling activities are performed before the customer obtains control of the goods and therefore are considered a fulfillment cost. We have elected to exclude all sales and value added taxes from the measurement of the transaction price. We have not adjusted the transaction price for significant financing since the time period between the transfer of goods and payment is less than one year.

We recognize revenue at a point in time when control of the products is transferred to the customer. Management applies judgment in evaluating when a customer obtains control of the promised good which is generally when the product is delivered to the customer. Our customer contracts generally include a standard assurance warranty to guarantee that our products comply with agreed specifications. We reduce revenue by the amount of expected returns which have been insignificant.

We have elected the practical expedient of not disclosing the consideration allocated to remaining performance obligations and an explanation of when those amounts are expected to be recognized as revenue since the duration of our contracts is less than one year.

We do not have any contract assets or contract liabilities as of September 30, 2016 and 2017. For all periods presented, we did not recognize revenue from amounts that were included in the contract liability balance at the beginning of each period. In addition, for all periods presented, there was no revenue recognized in a reporting period from performance obligations satisfied in previous periods.

Based on the nature of our contracts with customers which are recognized over a term of less than 12 months, we have elected to use the practical expedient whereby costs to obtain a contract are expensed as they are incurred.

Stock-based compensation

During the year ended September 30, 2016, we granted stock options to employees and non-employees to purchase 2,441,000 shares of common stock with a weighted average grant date fair value of $0.35. During the year ended September 30, 2017, we granted stock options to employees and non-employees to purchase 8,468,040 shares of common stock with a weighted average grant date fair value of $0.67. We recognized stock-based compensation expense of $0.9 million and $1.9 million, for the years ended September 30, 2016 and 2017, respectively. As of September 30, 2017, there was $6.7 million of total unrecognized compensation expense related to non-vested stock options under the 2013 Plan that is expected to be recognized over a weighted-average period of 3.9 years. As of September 30, 2017, there was $1.2 million of total unrecognized compensation expense related to restricted stock under the 2013 Plan that is expected to be recognized over a weighted-average period of 2.5 years.

Total stock-based compensation expense recognized was as follows:

	Years ended September 30,	
(in thousands)	**2016**	**2017**
Cost of revenues	$ 112	$ 202
Research and development	261	575
Selling, general and administrative	484	1,114
Total stock-based compensation	$ 857	$ 1,891

We use the Black-Scholes option pricing model to calculate the grant date fair value of a stock option. The Black-Scholes model requires various assumptions, including expected volatility, expected term, risk-free interest rate, expected dividend yield and the fair value of our common stock.

The expected volatility of our stock options is estimated from the historical volatility of selected public companies with comparable characteristics to us, including similarity in size and lines of business. The expected term of stock options represents the period that the options are expected to be outstanding before being exercised. The risk-free interest rate is based on the implied yield currently available on U.S. treasury notes with terms approximately equal to the expected life of the option. The expected dividend yield is zero as we currently have no history or expectation of declaring cash dividends on our common stock. The fair value of our common stock is described below under "Determination of the fair value of common stock on grant dates".

The grant date fair value of options granted during the years ended September 30, 2016 and 2017, respectively, were calculated using the weighted average assumptions set forth below:

	Years ended September 30,	
	2016	**2017**
Expected term (years)	6.25	6.25
Expected volatility	64.4%	65.5%
Risk-free interest rate	1.44%	2.02%
Dividend yield	0%	0%

We expect the effect of our stock-based compensation expense to grow in future periods due to the potential increases in the fair value of our common stock and increased number of stock options granted due to anticipated increases in our overall headcount.

As of September 30, 2017, options (vested and unvested) to purchase 18,017,311 shares of our common stock were outstanding. The aggregate intrinsic value of these options was $, assuming an initial public offering price of $ per share, the midpoint of the estimated price range set forth on the cover page of this prospectus, which was calculated based on the following:

	Shares available	**Options outstanding**	**Weighted average exercise price per share**	**Weighted average remaining contractual term**
Outstanding as of September 30, 2015	6,377,752	8,711,502	$ 0.47	8.88
Outstanding as of September 30, 2016	4,659,659	10,233,795	$ 0.50	8.81
Outstanding as of September 30, 2017	6,805,339	18,017,311	$ 0.67	9.14
Vested or expected to vest and exercisable as of September 30, 2017		18,017,311	$ 0.67	9.14

Determination of the fair value of common stock on grant dates

As there has been no public market for our equity instruments to date, the estimated fair value of our shares of common stock has been determined by our board of directors and/or our compensation committee as of the grant date, with input from management, considering our most recently available independent third-party valuation of our common stock and our board of directors' and/or compensation committee's assessment of additional objective and subjective factors that it believed were relevant and which may have changed between the effective date of the most recent valuation and the date of the grant. Following the consummation of this offering, the fair market value of our common stock will be determined based on the quoted market price of our common stock. The independent third-party valuations have generally been performed quarterly in accordance with the guidance outlined in the AICPA Practice Aid, Valuation of Privately-Held Company Equity Securities Issued as Compensation, or AICPA's Practice Aid. In conducting the valuations, the independent third-party

valuation specialist considered all objective and subjective factors that it believed to be relevant for each valuation conducted in accordance with AICPA's Practice Aid, including
management's best estimate of our business condition, prospects and operating performance at each valuation date. Other significant factors included:

- the rights, preferences and privileges of our preferred stock as compared to those of our common stock, including the liquidation preferences of our preferred stock;
- our results of operations, financial position and the status of research and development efforts;
- arms-length transactions involving recent rounds of preferred stock financings;
- the composition of, and changes to, our management team and board of directors;
- the lack of liquidity of our common stock;
- our stage of development and business strategy and the material risks related to our business and industry;
- the valuation of publicly traded companies in the life sciences and biotechnology sectors, as well as recently completed mergers and acquisitions of peer companies;
- any external market conditions affecting the life sciences and biotechnology industry sectors;
- the likelihood of achieving a liquidity event for the holders of our common stock and stock options, such as an initial public offering, or IPO, or a sale of our company, given prevailing market conditions; and
- the state of the IPO market for similarly situated privately held biotechnology companies.

The independent third-party valuations utilized market-based valuation approaches, including the option pricing method, or OPM, the Probability-Weighted Expected Return Method, or PWERM, and a hybrid methodology utilizing both OPM and PWERM.

The OPM treats the rights of the holders of preferred and common stock as equivalent to that of call options on any value of the enterprise above certain break points of value based upon the liquidation preferences of the holders of preferred stock, as well as their rights to participation and conversion. Under OPM, the value of a company's common stock is determined by estimating the value of its portion of each of these call option rights.

Under the PWERM, the value of a company's common stock is estimated based upon an analysis of values for the company assuming various possible future events: IPO, strategic merger or sale, dissolution/no value to common and private company. The per share value of the company's common stock is based upon the probability-weighted present value of expected future equity values, under each of the possible future event scenarios, as well as the rights and preferences of each share class.

Under the hybrid method, the per share values calculated under the OPM and PWERM are weighted appropriately to arrive at a final per share fair value of the company's common stock before the discount for lack of marketability is applied.

The independent third-party valuations covering fiscal year 2016 through March 31, 2017 were prepared utilizing the OPM as the primary valuation method. The material assumptions used in the OPM include recent rounds of preferred stock financing, estimated future revenues, and the valuation of peer companies.

Subsequent to March 31, 2017, the independent third-party valuations were prepared utilizing a hybrid allocation methodology (with both OPM and PWERM used) as the primary allocation method, with the same steps discussed above being applied. The material assumptions used in the hybrid method consist of the

weighting of values determined under the OPM and PWERM. The weighting of the value determined under the PWERM in the hybrid method has increased as the likelihood of an IPO has increased. The material assumptions used in the PWERM include the estimated value, timing and weighting of potential liquidity events.

All of our independent third-party valuations also included appropriate discounts to the value of our common stock for lack of marketability.

Recently issued accounting pronouncements

We have reviewed all recently issued standards and have determined that, other than as disclosed in Note 2 to our consolidated financial statements appearing elsewhere in this prospectus, such standards will not have a material impact on our financial statements or do not otherwise apply to our operations.

Business

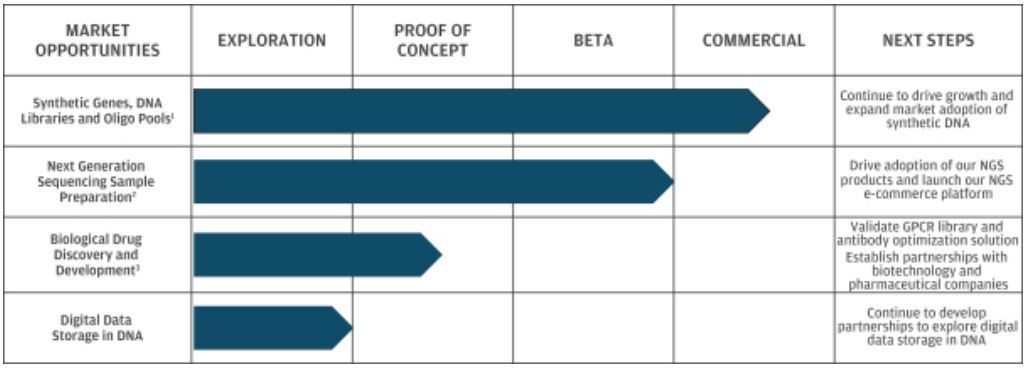
Overview

We are a leading and rapidly growing synthetic biology company that has developed a disruptive DNA synthesis platform to industrialize the engineering of biology. The core of our platform is a proprietary technology that pioneers a new method of manufacturing synthetic DNA by "writing" DNA on a silicon chip. We have combined this technology with proprietary software, scalable commercial infrastructure and an e-commerce platform to create an integrated technology platform that enables us to achieve high levels of quality, precision, automation, and manufacturing throughput at a significantly lower cost than our competitors. We are leveraging our unique technology to manufacture a broad range of synthetic DNA-based products, including synthetic genes, tools for next generation sample preparation, and antibody libraries for drug discovery and development. Additionally, we believe our platform will enable new value-add opportunities, such as discovery partnerships for biologic drugs, and will enable new applications for synthetic DNA, such as digital data storage, which will drive growth in the market for our products. We sell our synthetic DNA and synthetic DNA-based products to a customer base of over 600 customers across a broad range of industries.

DNA is the fundamental building block of biology. The ability to design DNA and engineer biology, a field known as synthetic biology, is growing rapidly and we believe this field represents one of the most exciting areas of growth and technological innovation in the 21st century. The ability to modify DNA to serve different purposes is leading to a broad range of applications for synthetic DNA and synthetic DNA-based products across multiple industries, including:

- healthcare for the discovery and production of new therapeutics and molecular diagnostics;
- industrial chemicals for cost-effective and sustainable production of new and existing specialty chemicals and materials, such as spider silk, nylon, rubber, fragrances, food flavors and food additives;
- agriculture for more effective and sustainable crop production;
- academic research for a broad range of applications; and
- technology for potential use as an alternative long-term data storage medium.

Our mission is to be the leading provider of synthetic genes, which are comprised of strands of synthetic DNA, and to leverage the versatility of our platform to expand our portfolio to include other synthetic DNA-based products and address additional market opportunities. As a leading synthetic DNA provider, we produce an array of different synthetic DNA-based products targeting multiple market opportunities. The following chart represents our target market opportunities:



1 Products addressing this market include clonal, non-clonal genes (gene fragments), oligo pools and DNA libraries

2 Products addressing this market include NGS exome capture and NGS custom capture
3 Products addressing this market include custom DNA libraries, our proprietary GPCR-targeting antibody library and our antibody optimization solution

Synthetic genes, DNA libraries and oligo pools

In April 2016, we launched the first applications of our platform, synthetic genes and oligo pools, to disrupt the gene synthesis market and make legacy DNA synthesis methods obsolete. Soon thereafter, we added DNA libraries for drug discovery and development. We estimate the market for synthetic DNA was approximately $1.3 billion in calendar year 2016. We believe that the traditional DNA synthesis methods used by our competitors are inherently limited in scalability and are not optimized to satisfy the rapidly growing demand for high-quality, low-cost synthetic DNA. Our silicon-based chip technology is able to increase DNA production by a factor of 9,600 on a footprint similar to that of traditional DNA synthesis methods. Also, it significantly lowers the volume of required reagents, specifically the most expensive reagent by a factor of 1,000,000 and improves the precision of the synthesis process relative to legacy methods. This enables us to produce high-quality synthetic DNA on a much larger scale and at a lower cost than competitors. In fiscal 2016, our revenue from synthetic genes was $1.0 million, or approximately 48% of our total revenue, and our revenue from oligo pools was $0.9 million, or approximately 38% of our total revenue.

In fiscal 2017, we served 286 customers including $0.3 million in sales to seven of the top 20 pharmaceutical companies by revenue, $4.3 million in sales to Ginkgo Bioworks which we believe is the largest global purchaser of synthetic DNA, $0.3 million in sales to three of the largest agricultural biotechnology companies, $2.7 million in sales to over 100 academic research institutions worldwide, and $7.3 million in sales to innovative customers using synthetic DNA for new and emerging applications, such as Microsoft Corporation and the University of Washington for use of DNA as a digital data storage medium. To date, we have served over 600 customers across a broad range of industries. In fiscal 2017, our revenue from synthetic genes was $8.1 million, or approximately 75% of our total revenue, and our revenue from oligo pools was $2.0 million, or approximately 19% of our total revenue.

We are also an OEM supplier of synthetic DNA to four synthetic DNA manufacturers that also compete with us, which we believe is a strong demonstration of the superiority of our platform. We entered into a new agreement with Ginkgo Bioworks in March 2018 (the 2018 Agreement), after the agreement entered into by the parties in 2017 expired pursuant to its terms, and we are obligated to deliver to Ginkgo Bioworks synthesized DNA sequences that meet certain agreed upon sequence guidelines pursuant to purchase orders placed by Ginkgo Bioworks during the term of the 2018 Agreement. Under the 2018 Agreement, should Ginkgo Bioworks place an order, they shall provide us with genetic sequences to be synthesized. The 2018 Agreement can only be terminated (i) upon mutual agreement of both parties, (ii) by Ginkgo Bioworks upon a specified change of control, (iii) upon a material breach of the contract by either party, or (iv) unilaterally by us in the event that Ginkgo Bioworks fails to place more than a certain percentage of their required quarterly minimums under the agreement for two consecutive quarters. The purchase minimums in the 2018 Agreement are considered to create an enforceable obligation only in conjunction with each purchase order.

Next Generation Sequencing sample preparation

Synthetic DNA is a key product used for target enrichment during sample preparation in NGS applications. We launched an innovative and comprehensive sample preparation kit for NGS at the Advances in Genome Biology and Technology conference in February 2018. Our kit leverages our platform to precisely synthesize oligo pools and uniformly amplify the desired target DNA segments, considerably improving the accuracy of the downstream sequencing analysis. Our proprietary technology also allows us to quickly and cost-effectively customize our NGS kits and simplify the sequencing workflow. This enables our customers to analyze more

samples per sequencing run, without sacrificing accuracy, saving them time and money. We estimate this market opportunity to be approximately $500 million in calendar year 2016.

Biological drug discovery and development

We believe we can leverage our DNA synthesis platform together with our custom libraries and other proprietary tools, such as our anti-GPCR library and antibody optimization solution, to provide an end-to-end solution in biologics drug discovery and early development, from target to IND application, adding value as a partner to biotechnology and pharmaceutical companies.

Custom DNA libraries

We are developing custom DNA libraries, collections of DNA fragments, which are primarily used by pharmaceutical companies during biological drug discovery and development. Our platform allows customers to customize every antibody variation and construct a library systematically to target the entire region of therapeutic interest, which we believe represents a significant advantage over current methodologies and can accelerate drug development and generate new antibody therapeutics.

GPCR drug discovery and early development

Together with Distributed Bio using in silico design, we have developed a proprietary GPCR-targeting antibody library. GPCRs are cell surface receptors that traditionally have been difficult to target with antibodies or other biological drugs. We believe our proprietary library improves antibody drug discovery against this difficult class of targets. We plan to partner with biotechnology and pharmaceutical companies to discover antibodies against GPCRs or out-license the proprietary library to them.

Antibody optimization solution

Coupling our unique DNA synthesis platform with proprietary software developed by one of our partners, we are now creating and validating a comprehensive antibody optimization solution that may allow us to form value add partnerships with academic institutions as well as biotechnology and pharmaceutical companies to improve their antibody drug candidates. In addition, this solution may allow us to discover “bio-better” antibody drugs, which are antibody therapeutics that are similar to an existing antibody with improved tolerability, clinical and/or commercial properties.

With our custom DNA libraries, proprietary GPCR-targeting antibody library and antibody optimization solutions, we are targeting the biologic drug development market which we believe to be a large market opportunity.

DNA as a data storage media

Due to the explosion of data across many industries, finding efficient long-term storage solutions has become more important. Through the Semiconductor Research Corporation, many leading semiconductor companies, including Microsoft Corporation, IBM Corporation, Micron Technology, Inc., Autodesk Inc., Mentor Graphics Corporation and GLOBAL-FOUNDRIES Inc., are exploring DNA as a long-term, compact form of data storage with very low energy maintenance requirements and universal read technology that will last hundreds of years. We have strategic relationships with Microsoft Corporation and the University of Washington through which we have demonstrated the feasibility of storing data on DNA and the unique benefits of longevity, density, and universality of this format. We believe that over time our technology will develop to allow data storage in DNA to become cost competitive with traditional data storage media, which is necessary to enable us to target several large markets opportunities. The market for digital data storage is more than $35 billion and we believe DNA can address several segments of this market.

We believe the growth of the synthetic DNA market is analogous to the trends seen in the next generation sequencing (NGS) market, where rapid innovation is resulting in the declining costs of sequencing, increased adoption, development of new applications and market expansion. Similarly, tools that combine advanced production technology with modern digital technology and software capabilities, such as our DNA synthesis platform, are driving growth and market creation for synthetic DNA and synthetic DNA-based products. Therefore, we believe that market estimates understate the potential for our products as they reflect a market that has historically been limited by the costly, time-consuming, and cumbersome nature of legacy DNA synthesis methods. We are experiencing rapid growth for synthetic DNA and synthetic DNA-based products as we improve access to affordable tools that encourage adoption of, and foster new applications and markets for, our products.

We have built a scalable commercial platform that enables us to reach a diverse customer base that we estimate consists of over 100,000 synthetic DNA users, and many additional potential customers of our NGS library preparation products today. In order to address this diverse customer base, we have employed a multi-channel strategy comprised of a direct sales force targeting synthetic DNA customers, a direct sales force focusing on the NGS market and an e-commerce platform. Our sales force is focused on customer acquisition, support, and management across industries, and is highly trained on both the technical aspects of our platform and how synthetic DNA can be used in a wide range of industries. We launched our proprietary, innovative, and easy-to-use e-commerce platform in October 2017 to existing customers and expanded access to the general public in January 2018. Our platform allows customers to design, validate, and place on-demand orders of customized DNA online, and enable them to receive real-time customized quotes for their products and track their order status through the manufacturing and delivery process. This is a critical part of our strategy to address our large market and diverse customer base, as well as drive commercial productivity, enhance the customer experience, and promote loyalty.

Since our formation in 2013, we have grown rapidly and achieved several key milestones that we believe position us for continued growth and success:

- In 2015, we demonstrated the benefits and validated the commercial utility of our proprietary silicon-based platform for DNA synthesis through a proof-of-concept program called the Alpha Access program, which provided initial access to our platform to select customers.
- In 2016, we (i) secured a long-term contract with Ginkgo Bioworks to provide up to 100 million base pairs of DNA, which we believe was the largest agreement for synthetic DNA at that time, (ii) launched our early commercial access program in April called the Beta Access program to select customers and expanded our existing relationship with Ginkgo Bioworks, (iii) acquired Genome Compiler Corporation to add software design capabilities for our e-commerce ordering system, (iv) laid the groundwork to pursue an opportunity in biologics drug discovery though a relationship with Distributed Bio, Inc., and (v) supplied DNA to Microsoft Corporation for its work with the University of Washington to develop DNA as a data storage medium.
- In 2017, we continued to increase penetration with existing customers and expand our customer base, by (i) serving 286 customers (up from 97 customers in 2016), (ii) extending the scope of our relationship with Microsoft Corporation and the University of Washington, (iii) entering into an agreement to supply thousands of genes for public benefit through the BioBricks Foundation, (iv) successfully achieving industry-leading volumes of synthetic DNA shipped every month, (v) becoming an OEM supplier of synthetic DNA to four synthetic DNA manufacturers that also compete with us, (vi) launching our e-commerce platform to existing customers in October 2017 and (vii) shipping over 38,000 genes in the fourth quarter of fiscal 2017 compared to approximately 7,600 for the fourth quarter of fiscal 2016, which represents 400% year-over-year growth.
- In 2018, we continued to experience revenue growth greater than the estimated rate of growth of the synthetic biology market, expanded into new market opportunities for next-generation sequencing and

antibody biologics discovery, and enhanced our global distribution capabilities by (i) launching our e-commerce platform to the general public, (ii) launching our NGS target enrichment solutions at a major medical conference, (iii) completing a private financing with funds reserved for building Chinese operations, (iv) signing international distributors in Asia Pacific, (v) expanding our management team to support our entry into the biologics drug discovery and early development, (vi) signing a new agreement with Ginkgo Bioworks to deliver up to approximately 1.3 billion base pairs over a period of four years, and (vii) shipping over 71,000 genes in the second quarter of fiscal 2018 compared to approximately 31,000 for the second quarter of fiscal 2017, which represents 230% year-over-year growth.

We generated revenue of $2.3 million in fiscal 2016 and $10.8 million in fiscal 2017, representing 375% year-over-year growth, while incurring net losses of $44.1 million in fiscal 2016 and $59.3 million in fiscal 2017.

Our headquarters and manufacturing facilities are located in San Francisco, California. As of June 30, 2018, we had 221 full-time employees worldwide, including three locations in the San Francisco Bay Area and an international location in Tel Aviv, Israel. We also utilize a team of 14 dedicated commercial consultants across the European Union and the United Kingdom and five dedicated commercial consultants across Asia. We also recently received private funding to establish production facilities and commercial operations in Asia. We plan in begin operations in Asia in 2019. As of June 30, 2018, we have raised a total of $279.5 million in gross proceeds from the sale of equity securities.

Industry overview

Engineering of Biology Enables Multiple Market Opportunities

We operate in the field of synthetic biology, which is undergoing an era of rapid innovation and transformation. Synthetic biology is the engineering of biology to build new biological systems or re-design existing biological systems and this emerging field is enabling advances across a broad range of end markets and consumers. For example, in healthcare, synthetic biology is being used to develop and enable new drugs, via tools such as CRISPR, as well as to improve targeted molecular diagnostics for personalized medicine. In industrial chemical applications, synthetic biology is enabling the production of renewable, cost-effective chemicals such as nylon, rubber, fragrances, and food flavors or new materials, such as spider silk. In agricultural biotechnology, synthetic biology is being used to improve nutritional content of agricultural goods, eliminate the need for oil-based fertilizers, and maximize crop yields. The applications of synthetic biology are constantly growing and new end markets are emerging, driven by continued innovation, our growing understanding of biology, and access to tools allowing us to modify and build biological systems.

The understanding of, and the ability to use, synthetic biology continues to vastly improve, accelerated by the adoption of modern research tools, technological advancements in bioinformatics, genomics, computation and automation, coupled with a decrease in DNA sequencing and DNA synthesis costs. Furthermore the availability and application of artificial intelligence and big data analysis to enhance biological experiments has led to an acceleration of valuable biological insights in a streamlined, automated, and industrialized manner. This digitization of biology has led to an explosion of new and accessible technologies and has made it possible for small and large organizations alike to conduct synthetic biology research.

According to BCC Research, the overall market for synthetic biology products was approximately $4.0 billion in calendar year 2016 and is expected to grow to over $11.0 billion by calendar year 2021. This industry momentum creates a significant opportunity for us to grow within our existing markets as well as expand our product offering.

The value chain within the synthetic biology market consists of three areas: enabled products, core technologies and products, and enabling technologies.

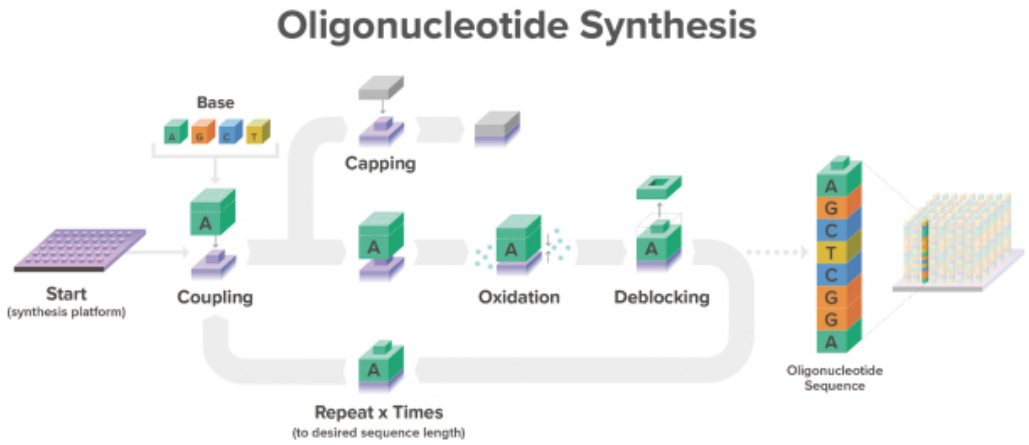
- ***Enabled products*** are the true end products resulting from the use of synthetic biology, which include products such as pharmaceuticals, agricultural crops, industrial chemicals and materials, and molecular diagnostics. Companies that operate in this segment include pharmaceutical and biotechnology companies, large industrial chemical companies, and agriculture companies.
- ***Core technologies and products*** include the biological components, integrated systems, and ingredients that form the building blocks for the enabled products, including synthetic genes and cells, delivery plasmids, and biobrick parts, among others. Companies that operate in this segment include Ginkgo Bioworks and other companies that help engineer biological components to create the enabled products.
- ***Enabling technologies*** are the tools needed to produce both the core technologies and enabled products. These include technologies such as DNA synthesis, DNA sequencing, gene editing, workflow automation technologies, bioinformatics, and digital data storage.

Our platform provides flexibility to pursue opportunities across all of these segments. For example, our synthetic gene offering is considered an enabling technology, but our NGS products are considered an enabled product.

Synthetic DNA is the fundamental building block of synthetic biology. Users of synthetic biology can design synthetic DNA to regulate the production of these proteins and molecules to achieve a specific functional purpose. While humans have been slowly altering the genetic coding of DNA in plants and animals for millennia through selective breeding, synthetic biology is the process of rapidly coding man-made DNA to build new biological systems or modify the design of existing biological systems. This is implemented by using powerful computational models and advanced engineering to redesign existing biological systems for new purposes. As the ability to modify DNA has become increasingly accessible, the applications, products, and customer base for synthetic DNA have continued to grow.

Traditional DNA synthesis methods

While synthetic DNA (also referred to as recombinant DNA) has been produced for more than 40 years, the complexities of biology and the production constraints inherent in legacy processes have historically limited the applications and market opportunities for DNA synthesis. DNA synthesis is the process of linking together naturally occurring nucleotides and their phosphodiester analogs to create DNA strands that are chemically identical to naturally occurring DNA. This process is commonly referred to as phosphoramidite chemistry and was first published in 1982. Traditional methods of DNA synthesis consist of a two-step process that initially involves the synthesis of oligos, which are short strands of DNA of up to approximately 200 base pairs (bp) in length. These oligos are then combined to create longer strands of DNA. The length of DNA required for specific research typically depends on the desired end use and can vary from 50bps to more than 100,000bps.



Currently, there are two primary methodologies used by others to create synthetic DNA, the 96-well plate method and the microarray method. Each of these methods has production limitations that we believe make these technologies sub-optimal to satisfy the rapidly growing demand for synthetic DNA. In addition, because the synthesis of oligos can introduce errors in the sequence order, all DNA synthesis methods require a process called cloning to produce many identical copies of a strand of DNA, such as a clonal gene. Today, all of our competitors use one of these two primary methods of DNA synthesis and require cloning for clonal genes.

96-well plate method of DNA synthesis

Introduced as early as the 1950s, a 96-well plate is a flat plastic plate, roughly the size of two smartphones, with 8 rows of 12 wells that are used as small test tubes. This plate has become a standard tool used by researchers in multiple industries to conduct tests and also to manufacture synthetic DNA in the form of oligos. Instead of creating one sequence of DNA at a time in a single test tube, the 96-well plate allows researchers to create 96 oligos in parallel, one in each well. While this process successfully achieves DNA synthesis, it requires high volumes of phosphoramidites, an expensive raw material, as well as other ancillary reagents. It also produces excessive amounts of the final product, significantly more than is required for most subsequent processes, resulting in material that is discarded and an unnecessary expense. Additionally, this process is not scalable to produce high volumes, as approximately 100 oligos are needed to assemble one gene and therefore only one gene can be made from each 96-well plate.

Microarray method of DNA synthesis

Unlike a 96-well plate, a microarray is a flat surface made of plastic or glass, on which DNA is synthesized directly in an array of discrete locations. Microarrays were initially developed as an analysis tool, to detect the identity and quantity of DNA in a sample. Beginning in the early 2000s, researchers began using microarrays to synthesize oligos. Microarrays allow large numbers of oligos to be synthesized in parallel, increasing production by up to four orders of magnitude when compared to the 96-well plate. However, DNA synthesis on microarrays presents other production limitations. In order to assemble the microarray-derived oligos into a gene, the oligos are distributed onto a plastic or glass plate, much like printing, and given unique barcodes for identification. Once printed, the oligos are cleaved off of the array chip into a single large pool of oligos, which are then amplified using polymerase chain reaction (PCR). Amplification is necessary because only small amounts of oligos can be produced on a microarray, not enough to be assembled into genes. Oligos are amplified using corresponding primers for their bar codes for separation into smaller pools of approximately 100 oligos. Separation into smaller pools and bar code removal is an expensive and time-consuming process.

The oligos are then stored in the separate wells of a 96-well plate and are then assembled into a gene. While this method can make 100 genes in parallel, it remains difficult to scale, requires many steps and results in significant waste of materials.

Cloning

Cloning is a tedious process to filter out errors and produce many identical copies of a strand of DNA, such as a gene. While the cloning process results in a precise sequence, it is incredibly slow and labor intensive and generally takes around 10 business days to complete. As a result, it is time consuming, expensive, and, in many cases, not an efficient use of a researcher's time. In general, more accurate DNA synthesis technology results in fewer errors in the sequence order and reduces the time and costs required or allocated to the cloning process.

Example—Cloning Workflow (4 - 10 business days of a researcher's time) compared to Purchase Workflow (10 business day turnaround at Twist Bioscience)

11-Step, Labor-Intensive Cloning Workflow

Steps	Action	Timeline (hours)
1 Design DNA Sequence	Select desired sequence, modify as needed for specific application	<1
2 Generate DNA Sequence	Source physical DNA. Synthesis, PCR or restriction digest	2-100
3 Prepare Vector	Linearize vector with restriction enzymes or prepare for specific cloning technique	1
4 Cloning	Clone gene into vector. Restriction/Ligation, seamless cloning, recombination or other method	1-16
5 Transform Plasmid	Transform plasmid into E. coli via heat shock or electroporation	1
6 Plate E. coli on Selective Media	E. coli plated on selective agar and grown at 37 C overnight. Only E. coli containing the plasmid with the selective marker will grow	16
7 Pick Clones, Grow Culture	Pick colonies from overnight incubation and grow in selective media	24
8 Isolate Plasmid DNA	Isolate DNA using mini prep kit or direct lysis	1
9 Sequence Cloned Gene	Sequence plasmid using Sanger or Next Generation Sequencing	24-72
10 Analyze Sequence	Analyze sequence for correct clone	1
11 Grow Plasmid for Intended Downstream Application	Grow larger scale culture and isolate DNA using large scale preparation Midi, Maxi or Giga prep	24
Total Time		4-10+ Days

Our solution: The Twist Bioscience DNA synthesis platform

We developed the Twist Bioscience DNA synthesis platform to address the limitations of throughput, scalability, and cost inherent in legacy DNA synthesis methods. Our platform stems from extensive analyses of, and improvements to, the existing gene synthesis and assembly workflows. Our core technologies combine expertise in silicon, software, fluidics, chemistry, and motion and vision control to miniaturize thousands of parallel chemical reactions on silicon and write thousands of strands of DNA in parallel. With a footprint that is similar to the size of a 96-well plate that produces one gene, we are able to produce 9,600 genes in parallel. Based on current production needs, we have intentionally designed our latest chip to make 6,144 genes in parallel but we have the current capacity to increase this to 9,600 genes, as needed. We have combined our DNA synthesis technology with propriety software and a scalable commercial infrastructure to create our

vertically integrated DNA synthesis platform capable of delivering very large volumes of high-quality synthetic DNA at low cost.

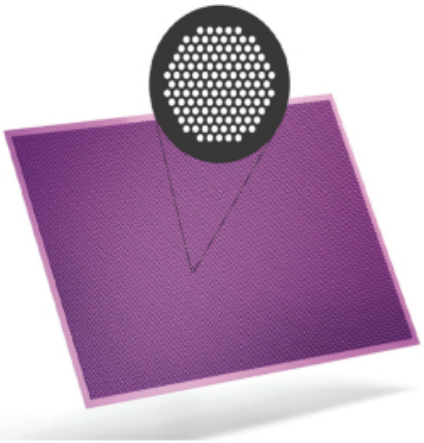
DNA writing on silicon

Silicon is an excellent medium for DNA synthesis because the properties of silicon allow us to miniaturize the chemical reactions of DNA synthesis and precisely control the position of fluid on the silicon surface. Silicon is flat and can be aligned, patterned and imaged. Fluids also flow uniformly over the surface. Silicon is a very hard material and other materials can be added or removed without changing the surface. It conducts heat very well, so the temperature can be controlled quickly, accurately and consistently across the surface.

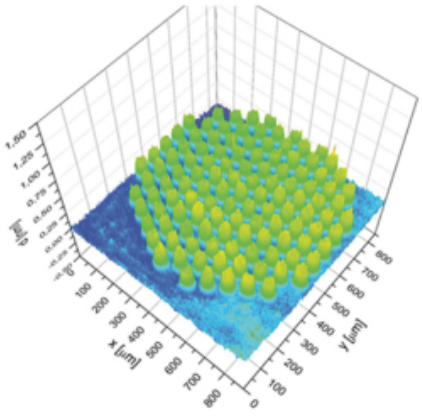
As discovered and capitalized on by the semiconductor industry, it is possible to grow a thin layer of silicon oxide on the surface of silicon by reacting the silicon surface with oxygen at a very high temperature. The resulting oxide layer can be etched to produce micro- or nano-structures and the surface energy of the silicon oxide can be modified to be hydrophobic or hydrophilic. These modifications can also be patterned. We use these oxide-based properties to create an array of discrete devices that are similar in function to the wells on a 96-well plate to control the position of drops of fluid on the surface, replacing legacy plastic. Our process, which miniaturizes the devices relative to the wells on the 96-well plate, enables us to significantly reduce the volumes of reagents required in the oligo synthesis reaction, specifically the most expensive reagent (phosphoramidites) by a factor of 1,000,000. In addition, our silicon chip technology allows us to increase DNA production by a factor of 9,600 on a similar footprint to that of traditional DNA synthesis methods.

Currently, we manufacture DNA on a silicon chip with 6,144 distinct spaces on the chip which we call clusters, each comprised of 121 devices and we have the current capability to increase this to 9,600 genes, as needed. Each device supports the synthesis of a unique oligonucleotide sequence. In parallel, within each cluster, we construct 121 short oligos of 50 to 250 base pairs in length. Each cluster is individually customized to create and assemble the oligos into a single gene and clone them into final form using small volumes and automated processes. Because we synthesize each oligonucleotide individually, almost all DNA sequences can be customized to our customer's specifications, both in terms of volume and amount. This improves production efficiency by enabling the manufacturing of different products in parallel without the need for retooling.

Diagram showing each cluster on the chip containing 121 devices

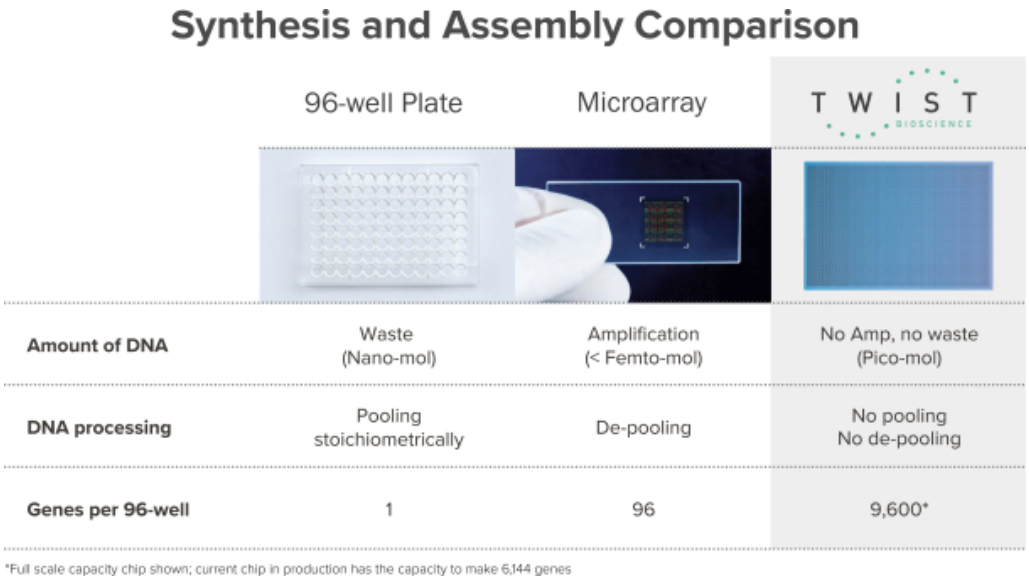


Optical image showing surface structure of a single cluster



We believe that we are only beginning to realize the benefits of our semiconductor-based production process and expect that, similar to the semiconductor industry, we will be able to continuously improve our production

process over time and further our technology leadership position. By developing a semiconductor-based platform to harness the power of biology, we believe that we are promoting the digitization of biology and creating a modern production platform able to satisfy the demands of a rapidly growing industry.



In addition to traditional DNA synthesis methods, some researchers are investigating possible enzymatic DNA synthesis methods that involve using an enzyme in the synthesis process to manufacture the desired DNA sequence. These methods are in early stages of research and have the potential to significantly improve the DNA synthesis process in many respects. Based on the published research on these enzymatic synthesis methods, we believe our semiconductor-based DNA synthesis platform could also be applied to these synthesis methods to address limitations on throughput, scalability and cost.

Key advantages of our proprietary DNA synthesis platform

We designed our DNA synthesis platform to address the diverse needs of our large potential customer base. Given the limitations of traditional DNA synthesis methods, buyers have historically faced trade-offs and compromises when purchasing from legacy DNA providers. We believe that DNA Buyers are looking for a product and purchasing experience that delivers on a number of key factors. We believe that our platform is uniquely designed to meet these customer needs and overcome the limitations of legacy DNA synthesis methods to support the growing demand for synthetic DNA:

	Customer desires	Twist Bioscience advantages
Quality and accuracy	• Quality and accuracy is a basic requirement for all customers. Deviations from customer specifications can render customers' downstream uses less productive or ineffective.	• Synthetic DNA providers are able to supply perfect clonal DNA to the customer. However, existing DNA synthesis technologies require significant cloning and error filtration to produce perfect clonal DNA. We are able to

	Customer desires	Twist Bioscience advantages
		consistently produce high-quality oligos with what we believe is an industry-leading error rate of 1/1000 base pairs. This enables us to reduce the cloning and error filtration necessary to achieve perfect clonal DNA. The benefits, quality and accuracy of our platform also apply to customers who purchase other synthetic DNA based products, such as antibody libraries and oligo pools. In each of our market opportunities, we believe the precision of our technology provides the advantage of cost and production throughput.
Cost	• Cost is a critical consideration for both large and small-scale customers. Large-scale commercial DNA purchasers that outsource their DNA supply are becoming increasingly price sensitive due to their growing demand for DNA. On the other hand, smaller-scale users, particularly academic users, have always been price sensitive and typically have made their own DNA because of limited budgets relative to the prices charged by legacy DNA suppliers.	• Because we miniaturize the chemical reaction on a silicon chip, require lower volumes of reagents and automate the production process, we are able to dramatically lower the production cost per base pair of DNA and offer our synthetic DNA at a lower price than competitors. As of November 2017, the publicly available pricing of our competitors for clonal DNA ranged from $0.17—$3.00 per base pair. Our standard pricing for comparable DNA is $0.09 per base pair for genes between 300 and 1,800 base pairs in length. One of the best demonstrations of our cost advantage is that we supply synthetic DNA to four other competing synthetic DNA providers.

	Customer desires	Twist Bioscience advantages
Throughput / scale	• As the applications for synthetic biology have expanded, customers are increasingly seeking to purchase large quantities of DNA in relatively short periods of time, which often cannot be supplied by a single synthetic DNA provider due to production capacity constraints. Ordering from multiple suppliers to fulfill large orders can be costly and administratively cumbersome for customers.	• Our silicon chip technology is able to increase DNA production by a factor of 9,600 on a footprint similar to traditional DNA synthesis methods. We currently have the capability to manufacture more than 45,000 genes per month, which we believe is the highest in the industry. We have agreed to supply up to approximately 1.3 billion base pairs to Ginkgo Bioworks over a period of four years, which we believe is the largest volume supply commitment in the industry to date.
Turnaround time	• The time between placement of the order and delivery is a key consideration for customers. For example, pharmaceutical companies are focused on shortening internal R&D timelines and ready availability of high- quality, synthetic DNA to meet their internal timelines is an important factor.	• Because our platform enables the large-scale production of DNA, our turnaround time is largely independent of order size. We have enhanced our manufacturing capabilities and expect to reduce turnaround time on large commercial quantities of genes (i.e., orders of over 15,000 genes per month) to 10 business days.
Product offering / complexity	• Customers require a broad range of products including different gene lengths, complicated sequences and a wide range of additional configurations to fulfill a diverse set of applications and uses.	• Because we synthesize each oligonucleotide individually, we can customize orders to almost any customer's specifications. We currently offer genes of up to 3,200 base pairs in length, which we believe satisfies a substantial portion of the market for synthetic DNA today. For Gingko Bioworks, our largest customer, we offer up to 5,000 base pairs in length. We expect to offer genes of up to 10,000 base pairs in the future. Unlike traditional DNA synthesis technologies, we can

	Customer desires	Twist Bioscience advantages
		also manufacture a broad range of additional products on our same DNA synthesis platform, including antibody libraries and oligo pools, among others.
Reliability	• Customers value the reliability of a supplier to deliver on promises of quality and turnaround time to allow them to plan their downstream workflow and hit internal deadlines.	• Due to our throughput capability and proprietary integrated production and ordering process we have been able to consistently meet the specifications and turnaround time that we promise customers.
E-commerce capability	• Customers, particularly smaller-scale customers, value an intuitive, seamless e-commerce experience that tracks orders from placement to delivery to simplify and automate the purchasing process. Some customers also value an application protocol interface, or an API, for electronic integration into their own procurement systems.	• While some synthetic DNA providers have an e-commerce platform for ordering DNA, we believe we offer the most comprehensive e-commerce platform consisting of customized quotes, automated feedback on the feasibility of the sequence and the ability to track orders from placement to delivery. An API is also a core component of our e-commerce system.

Our growth strategy

Our objective is to be the leading provider of synthetic DNA worldwide and to leverage the versatility of our platform to build a leadership position in other synthetic DNA-based product markets in which we have a competitive advantage. We intend to accomplish this objective by executing on the following:

- ***Maintain and expand our position as the provider of choice for high-quality, affordable synthetic*** *genes and* ***DNA to customers across multiple industries****:*
  - Offer an unprecedented combination of quality, cost, throughput and scalability to deliver synthetic DNA to our existing customers and win new customers
- *Increase our penetration within existing buyers of synthetic DNA, including pharmaceutical and biotechnology companies, industrial chemical companies, agricultural biotechnology companies and academic institutions*
- ***Further expand our addressable market by converting current DNA Makers into DNA Buyers*** *by offering a compelling value proposition that saves time and money for DNA users that are currently making their own DNA*

- ***Broaden our reach to the more than 100,000 estimated synthetic DNA users*** *by scaling our multi-channel commercial strategy*
- ***Augment our product offering within the gene franchise to include, for example, longer genes, catalog vectors, maxiprep and products for CRISPR screens***
- *Become a leading supplier of NGS sample preparation products:*
  - Drive adoption of our NGS products by addressing the demand for better sample preparation products that improve the sequencing workflow, increase sequencing accuracy and lower sequencing costs versus other technologies; and
  - Continue to expand our software capabilities to allow customers to fully customize our NGS products to drive adoption by the broader diagnostic community.
- *Conduct antibody therapeutic discovery and optimization for our current customers and future partners:*
  - Leverage our ability to generate customized DNA libraries to reduce the time and cost necessary for lead identification and lead optimization of potential biological therapeutics for biotechnology and pharmaceutical partners;
  - Validate and partner a comprehensive antibody optimization solution with academic institutions and biotechnology and pharmaceutical companies to improve their antibody drug candidates, and discover “bio-better” antibody drugs;
  - Discover new anti-GPCR antibody candidates for target discovery, antibody candidate selection and antibody candidate optimization through adding value by partnering with biotechnology and pharmaceutical companies; and
  - We will look to initiate adding value by partnering with biotechnology and pharmaceutical companies, leveraging our proprietary DNA libraries, antibody optimization solution and anti-GPCR antibody library, which may include upfront, milestone and royalty payments to us.
- *Continue to explore development of DNA as a digital data storage medium via internal research and government and industry partnerships:*
  - Leverage existing strategic relationships and seek to develop additional relationships with leading technology companies for product development and as a potential source of non-dilutive financing for development of DNA as a data storage media; and
  - Continue to develop and explore market opportunities for DNA as a very long-term storage media for market segments, including the WORN (Write Once, Read Never) and WORSE (Write Once, Read Seldom if Ever) markets.
- ***Expand our global presence****:*
  - Expand our operations into other large global markets in which we believe we can be competitive, including for example, Asia. We have received private funding to establish a production facility in China to manufacture DNA in China for the Asian market, with operations expected to begin in 2019.

Beyond these opportunities, we are working with industry partners to create new markets for our products by leveraging the versatility of our platform.

Our products

We have developed multiple products derived from synthetic DNA and our versatile DNA synthesis technology. Our current offering consists of four primary products that address different needs of our customers across a variety of applications: synthetic genes, oligo pools, next generation sequencing tools and DNA libraries.

Synthetic genes

Synthetic genes are manufactured strands of DNA. Customers order our synthetic genes to conduct a wide range of research, including product development for the healthcare, agricultural, and industrial chemical industries as well as a multitude of applications within academic research. Virtually all research and development requires trial and error, and our customers require many variations of genes to find the DNA sequence that achieves their objectives.

We offer two primary categories of synthetic genes: genes of perfect quality, clonal genes, in a vehicle to carry the DNA, also called a vector, and genes of near-perfect quality, non-clonal genes or fragments, that customers can place in their own vector. Within these two categories, customers can order different lengths of DNA depending on their required final gene construct. Customers can order longer genes or shorter genes and can stitch genes together to create longer or shorter constructs if desired.

Clonal genes in a Twist Bioscience or customer vector

Our premier gene synthesis offering delivers clonally perfect genes. For our clonally perfect genes, we perform the cloning on behalf of our customers and deliver DNA in either a customer-supplied vector or a Twist Bioscience vector. Customer-supplied vectors greatly simplify downstream work for our customers, allowing them to take our genes and pass them directly into their workflows. We have also developed a catalog of our own specific vectors. Currently, we manufacture genes of up to 3,200 base pairs in length, yielding a clonally perfect piece of DNA that our customers can immediately use for their research. We offer turnaround times of approximately 15 – 20 business days for clonal genes. As of the date of this prospectus, our standard pricing for clonal DNA is $0.09 per base pair for genes between 300 and 1,800 bps in length. We intend to further expand the length of genes offered to more than 10,000 base pairs and, in parallel, expand our catalog of available vectors to increase flexibility and reduce turnaround times. We also intend to offer express service options for customers that require genes on an expedited basis.

Non-clonal genes

Non-clonal genes serve customers who prefer to conduct their own cloning protocols or that do not need, or want, to pay for perfect quality genes. We offer non-clonal genes of up to 1,800 base pairs in length, which we believe addresses the vast majority of demand for non-clonal genes. From August 2017 through October 2017, we offered average monthly turnaround times of approximately six to 11 business days for non-clonal genes. As of the date of this prospectus, our standard pricing for non-clonal genes is $0.07 per base pair.

Oligonucleotide (Oligo) pools

Oligo pools, or high diversity collections of oligonucleotides, are utilized in many applications, including targeted next generation sequencing, or NGS, CRISPR gene editing, mutagenesis experiments, DNA origami (the nanoscale folding of DNA to create two- and three-dimensional shapes at the nanoscale), DNA computing and data storage in DNA, among others. Our oligo pools are also used for high-throughput reporter assays that are used to study cell signaling pathways, gene regulation, and the structure of cell regulatory elements. For these applications, we provide customers with accurate and uniform synthetic oligos to precisely match their required designs.

We sell a diverse, customizable set of oligo pools, ranging from a few hundred oligos to over one million and offer oligonucleotides of up to 200 nucleotides in length and, from October 2017 through December 2017, average monthly turnaround times of five to six business days. As of the date of this prospectus, our standard pricing for oligo pools is between $0.10 to $1.00 per oligo depending primarily on order size. Because the ability to design oligo pools and customize their experiments is very important to our customers, we have established a co-marketing agreement with Desktop Genetics, a company that specializes in developing algorithms which enable customers to design optimized and high-quality oligo pools. Integration of this design capability with our oligo pool synthesis production competency enables our customers to design and receive a high-quality oligo pool customized to meet their needs.

In the future, we expect to offer longer oligonucleotides, cloned pools, and a sub-pooling capability which will allow our customers to purchase lower complexity pools and arrayed pools.

Oligo pools for CRISPR gene editing

CRISPR is a recently discovered gene editing tool that has become an area of significant research focus, especially in drug development, and is a rapidly growing application that is contributing to growing demand for our oligo pools. In the CRISPR editing process, a short sequence of RNA called guide-RNA (gRNA) binds to its target DNA sequence in a host cell, indicating to an enzyme where to cut and edit the DNA. In order to conduct gene editing research, many single guide-RNA must be created. Researchers can use oligo pools for CRISPR gene editing to silence, through editing, DNA locations. This process creates an error at a particular location in the DNA of the cell, rendering that location unusable, in other words silenced. By studying the relationship between silenced regions and change in phenotype (did the disease get worse or better), researchers can find the genomic regions important to the disease and identify targets for therapeutics. Similar to our standard oligo pools, we offer oligo pools for CRISPR screening with a diverse and customizable set of specifications, including pool sizes ranging from a few hundred oligos to over one million. From oligo produced on a single silicon chip, researchers can edit up to 1,000,000 DNA locations. We currently offer oligo pools for CRISPR screening of up to 200 nucleotides in length, which we believe addresses the vast majority of the market for CRISPR guide library generation.

Next generation sequencing (NGS) tools

We recently expanded the application of our DNA synthesis technology to develop products targeted at the large next generation sequencing market, or NGS. In particular, we are focused on addressing the demand for better sample preparation products that improve sequencing workflow, increase sequencing accuracy, and lower sequencing costs. In the target enrichment process, the DNA probes “enrich” a DNA sample by binding to specified segments of DNA in order to isolate and physically extract the targeted segment of DNA from the sample, prior to downstream sequencing. The targeted segment of DNA can then be copied uniformly prior to NGS analysis by our customers, yielding a larger volume of targeted segments in the sample used for sequencing. Because we are able to precisely target, extract, and uniformly amplify the target DNA segments, our solution considerably improves the accuracy of the downstream sequencing analysis. This enables our customers to perform fewer sequencing runs per sample, without sacrificing accuracy, saving them time and money.

We believe we are the only company to offer double-stranded DNA (dsDNA) probes within a comprehensive target enrichment kit used for exome and targeted sequencing. Using dsDNA as opposed to single-stranded DNA, or RNA, during next generation sequencing preparation avoids the problem of deamination (removal of an amino group). Deamination interferes with the detection of infrequent gene mutations, and may hinder genetic results and clinical diagnosis, particularly in cancer.

Our NGS products are primarily used for diagnostic testing, research for population genetics and biomarker discovery, translational research, microbiology and applied markets. Our customers are primarily diagnostic companies and hospitals, research institutions, agricultural biotechnology companies, and consumer genetics companies conducting diagnostic tests for a wide range of applications.

In addition to our DNA probes, we have created a comprehensive sample preparation kit that combines these probes for NGS target enrichment with all the reagents and consumables necessary to process a sample into sequencing-ready material. This improves the NGS library preparation workflow and is a cost-effective solution that reduces sequencing costs, improves time to results, enhances sequencing coverage, and provides quality control on every DNA probe.

We have launched a kit for sequencing of the exome, or NGS exome capture, the entire known coding region of the genome, and expect to launch a software tool to allow customers to customize their own kit, or NGS custom capture. We expect the development of this software tool, combined with our e-commerce platform, will simplify the design process for our customers and provide broader market access to our products. We currently deliver this exome kit within two to three weeks for our customers. Our NGS tools pricing is based on the numbers of reactions and pools requested by a customer.

DNA libraries

DNA libraries are collections of DNA fragments that are primarily used by pharmaceutical companies during antibody discovery and development. During the drug discovery phase, a pharmaceutical company typically has a biological target or function of interest. In order to find antibodies that best bind to that target in a specific region of a gene and deliver a therapeutic effect, it may be necessary to test many variants of an antibody. Synthetic DNA libraries become useful in this process, as they produce customized, controllable groups of antibodies from specific DNA sequences to run through assays that assess function, toxicity and binding affinity.

Traditionally, pharmaceutical companies have generated antibody libraries through a process called “random mutagenesis.” This uses a technique called polymerase chain reaction (PCR) mutagenesis, where PCR is used to introduce many sequence errors, or variations, within the copies of the antibody. While this generates many different antibody variants, the changes are entirely random and are unknown until the antibody DNA is sequenced. In addition, because of the random approach, there is no guarantee that the resulting antibodies will target the desired region of interest.

Our platform allows customers to customize every antibody variation and construct a precise library systematically to target the entire region of interest. We can create single site libraries in which we change one single amino acid (a group of three DNA bases) within the sequence or single site saturation libraries in which we change every amino acid within the sequence for a more comprehensive approach. We can also generate combinatorial libraries in which we introduce changes to multiple sites within the same gene in specific ratios and combinations. These libraries can be used for antibody engineering, affinity maturation, and humanization, which simplifies downstream screening and identifies more lead molecules. Our libraries are explicitly developed for a specific area of the genome or tailored to a specific disease, with antibody compounds evenly represented across all areas of the genome desired. In the future, we expect to add digital library design tools to our e-commerce platform that will facilitate rapid library design.

To support our efforts to add further value for our customers and potential partners, we are in the process of creating a comprehensive antibody optimization solution to enable simultaneous optimization of multiple characteristics of a given antibody. Working with Distributed Bio, we developed custom software for the optimization of antibody hits, antibody compounds that meet pre-specified criteria for therapeutic development. We are now working to add our high throughput and hyper-variant antibody library capabilities

to create a comprehensive antibody optimization solution for potential partners. We plan to use this solution to design, build and test hyper-variant, tightly controlled antibody libraries that follow the rules of the human repertoire and mitigate the pitfalls associated with traditional optimization methods. By following the rules of the human repertoire, which means including only DNA sequences known to occur in humans, these libraries will be natural in composition and are expected to generate better drug development candidates. The libraries also have a large degree of synthetic variation, enabling simultaneous optimization of several antibody characteristics and the discovery of antibodies with high affinity and specificity to drug targets.

In parallel with the development of our antibody optimization solution, we are conducting a proof-of-concept project to validate whether we are able to identify a “bio-better” (or improved) antibody of icrucumab, an anti-VEGFR1 antibody that has failed in clinical studies to show improvement in clinical outcomes. If we succeed in identifying an improved antibody of a previously unsuccessful antibody candidate as proof-of-concept, we would seek to license our design and build library capabilities to provide improved therapeutic antibodies for pharmaceutical and biotechnology partners.

Additionally, we plan to leverage our ability to rapidly generate custom libraries to discover novel therapeutic antibodies against biological targets that have traditionally been difficult for biological drug development. Specifically, through a collaboration with Distributed Bio we have developed a proprietary antibody library targeting a major class of proteins known as GPCRs. GPCRs are important receptors that control and drive the biology of nearly all disease classes, including inflammation, cancer, metabolism, respiratory, and pain. According to a recent publication in Molecular Pharmacology, approximately 700 approved therapeutics target GPCRs, representing approximately 35% of all approved drugs. However, they remain a difficult class of targets for antibody development due to the lack of exposed protein surfaces to bind. We are now validating this GPCR library of highly designed antibodies and screening it against three GPCR targets and we may partner with other technology providers to advance development of our anti-GPCR antibody discovery efforts. If we are successful in validating the utility of our DNA library synthesis capabilities to address this traditionally difficult class of antibody targets, we may also develop libraries for screening and selection of other biological therapeutic targets such as ion channels and membrane based transporters.

We believe we have several avenues available to monetize our antibody discovery program. For example, we anticipate that successful discovery of a novel therapeutic antibody against any single GPCR target would attract significant partnership interest from academic institutions as well as biotechnology and pharmaceutical companies given the difficult nature of this class of antibody targets. These partnerships may include upfront, milestone and royalty payments to us for access to our GPCR library.

End markets for Twist Bioscience products

Our current product set addresses customers across a range of major applications.

	Product offered	Healthcare	Industrial chemicals	Agriculture	Academic research
Genes	Clonal genes	X	X	X	X
	Non-clonal genes (Gene fragments)	X	X	X	X
Oligo pools	Oligonucleotide pools	X	X	X	X
	Oligo pools for CRISPR gene editing	X	X	X	X
NGS tools	NGS exome capture	X			X
	NGS custom capture	X		X	X
Libraries	Antibody and protein Variant libraries	X	X	X	X

Our target markets

Our currently marketed product offering addresses a market opportunity that was approximately $1.8 billion in calendar year 2016. We believe that current market estimates underestimate the potential for synthetic DNA because they reflect the costly, time-consuming and cumbersome nature of legacy DNA synthesis technologies. We believe our solution has the potential to materially expand our initial market by providing end users access to high-quality and lower cost tools, encouraging adoption and facilitating new applications for our products.

DNA synthesis—DNA Buyers and DNA Makers

Our core DNA synthesis market includes our synthetic DNA, oligo pools and DNA libraries. We believe that our current market opportunity for synthetic DNA was approximately $1.3 billion in calendar year 2016. The market consists of those who buy DNA, or DNA Buyers, and those who make their own DNA, or DNA Makers. Driven by access to more affordable and high-quality synthetic DNA, we believe that there is a strong trend of DNA Makers converting to DNA Buyers.

DNA Buyers

DNA Buyers are generally commercial users in the healthcare, industrial, agricultural and academic fields who require large amounts of DNA. These customers value speed, throughput, and reliability and are increasingly price sensitive given the volume of DNA that they purchase. According to BCC Research, the size of the buyer market in 2016 was approximately $300 million and is growing at a rate of approximately 20% annually as existing DNA Buyers develop new uses for synthetic DNA and existing DNA Makers convert to DNA Buyers.

DNA Makers

DNA Makers purchase supplies in order to make their own DNA. They typically require only a few genes at a time and are very price sensitive. While the consumables required to make DNA are relatively inexpensive, it is a time-consuming and labor-intensive task. The steps include copying and pasting each DNA sequence from one vector to another using restriction enzymes, and mutagenizing the sequence of interest to obtain the desired variant and cloning DNA. Our customers in this market segment are predominantly small-scale synthetic DNA users, which typically include emerging biopharmaceutical companies, academic institutions and research organizations. We estimate our market opportunity in the DNA Maker market to be approximately $950 million

with estimated annual growth of approximately 10%. Our market estimate is based on the market sizes for products used in manual DNA synthesis, including the cloning and restriction digestion enzyme market in 2016, according to a report on Molecular Biology by Markets and Markets.

Cloning one gene is a cumbersome process which typically involves 11 discrete steps and generally takes around 4 - 10 business days to complete. However, most small scale researchers have historically made their own DNA due to the prohibitively high cost of purchasing synthetic DNA in small batches. Given the inefficiency of making DNA, we are increasingly seeing DNA Makers transition to DNA Buyers as we provide broader access to affordable DNA. In addition, as we increase the size of the DNA that we offer, we expect to convert certain researchers who are both DNA Buyers and DNA Makers that buy multiple genes and stitch them together for longer constructs. We also expect the implementation of our intuitive e-commerce platform to provide enhanced access to the relatively untapped market of DNA Makers.

We believe that the DNA synthesis market is in the early stages of a growth acceleration that is similar to the growth experienced by the DNA sequencing industry over the last two decades, where initial demand was severely limited by the high cost and time required to sequence genes. The Human Genome Project, which resulted in the sequencing of the full human genome in 2003, cost $2.7 billion in government funding. At that time, the cost to sequence an entire genome was $50 million. An enormous reduction in cost was required before human genome sequencing could realistically be used as a medical research tool. With innovation in sequencing technology, the first $1,000 genome was achieved in 2014, and costs are significantly lower today.

As the cost of sequencing has decreased, both the size of the market and the number of applications have expanded exponentially. Over the last five years, the market size has more than doubled. DeciBio LLC estimates that by 2016 the total market for sequencing technology had grown to approximately $2.4 billion and expects the market to continue to grow at 17% annually to approximately $4.5 billion by 2019. We believe the synthetic DNA market is undergoing a comparable transformation.

Products for next generation sequencing applications (exome and custom capture tools)

Our NGS products target a market opportunity for NGS sample preparation that was approximately $500 million in calendar year 2016 and growing at approximately 20% annually, according to market research provided by Kalorama Information, a division of marketresearch.com. As the cost of sequencing genes has decreased significantly, the applications of sequencing and the utilization of sequencing technology has increased rapidly. Today, sequencing is used in many fields, including the study of population genetics to discover disease specific markers and the diagnosis of patient-specific mutations. However, in many cases, the sequencing of an entire genome is undesirable and custom targeted sequencing, which focuses on specific regions of the genome, is preferable, as it results in a lower cost per sample and deeper coverage. For example, cancer samples are notoriously heterogeneous, and sequencing them multiple times to achieve the desired result, otherwise known as deep sequencing, would be too costly using whole genome sequencing. Similarly, a growing clinical application for cancer treatment called minimal residual disease analysis requires following the evolution of a few genetic locations to instruct physicians when they have successfully managed the disease and can stop therapy. In this application, and many others, it is significantly more cost-effective to use exome sequencing and custom targeted sequencing rather than whole genome sequencing.

We are focused on addressing the demand for better sample preparation products that improve the sequencing workflow, increase sequencing accuracy and lower sequencing costs. We offer kits consisting of double-stranded DNA probes and a comprehensive set of reagents that are used for exome sequencing and custom targeted sequencing.

Pharmaceutical biologics drug discovery

In the field of pharmaceutical biologics drug discovery, we believe our platform can significantly accelerate the time it takes researchers to go from target identification to an IND application. We believe the integral role of synthetic DNA in the drug discovery and development process along with our DNA synthesis platform uniquely positions us to capture a larger portion of this value chain.

In the initial stages of drug development, our oligo pools can be used to increase the probability of identifying a specific drug target. Our genes and gene fragments can be used to validate the specific function of this drug target. Our DNA libraries can be used in the drug discovery process to identify high value biological therapeutic drug leads. As a biological lead moves towards clinical development, our genes, gene fragments, and antibody libraries can again aid in the lead optimization process. In the clinic, our NGS target enrichment offering may also play a role in patient selection and stratification.

Through our partnership with Distributed Bio, we are beginning to generate proprietary content in biologics with an initial focus on G-protein-coupled receptors, or GPCRs. We also are seeking to establish partnerships to develop content related to additional target areas with other pharmaceutical companies.

Current antibody discovery and development methods rely on the creation of very large number of antibody variations (approximately $>10^{10}$) in a format that can be screened, or tested, rapidly. These libraries consist of DNA sequences expressed into proteins (antibodies) and screened for desired functions which usually requires multiple iterations of designing, constructing and testing antibodies.

Today, many of our pharmaceutical and biotechnology customers use random mutagenesis to generate diversity in their antibody libraries. Random mutagenesis has the following disadvantages:

- The random mutations created through this process may not be found in the human body and therefore may be unlikely to behave well in a clinical setting, may be immunogenic, may aggregate or not express well
- Libraries created from random mutagenesis lack synthetic control in their fabrication and therefore are incapable of enabling researchers to systematically explore changing to individual DNA bases across the DNA sequence and the impact on the antibody

In contrast to the traditional library synthesis methods described above, we are leveraging our DNA synthesis platform to precisely control the design and synthesis of the library, changing each base individually, rather than each codon (group of three bases), creating controlled, predictable library diversity. We believe this will allow researchers to explore the desired sequence variations and combinations desired to facilitate their discovery efforts more effectively.

DNA data storage R&D

Due to the explosion of data across many industries, finding efficient means of storage has become more important. Through the Semiconductor Research Corporation, many leading semiconductor companies, including Microsoft Corporation, IBM Corporation, Micron Technology, Inc., Autodesk Inc., Mentor Graphics Corporation and GLOBAL-FOUNDRIES Inc., are exploring DNA as a data storage medium. The market for digital data storage, including solid-state disk, magnetic disk, magnetic tape and optical disc storage, is currently estimated at over $35 billion.

While DNA is currently too expensive for routine storage, we believe that our modern, silicon-based process to synthesize DNA has the potential to make DNA cost-competitive with additional research and development efforts. If the cost of writing and reading data in DNA becomes equivalent to or lower than magnetic tape, we believe DNA will have the advantage in serving several data storage markets, including the storage of deeply cold data, in particular the WORN (Write Once, Read Never) and WORSE (Write Once, Read Seldom if Ever)

markets, and the market for digital preservation where latency and the cost of reading the data are minor considerations. Typical end-markets for these storage applications include the media and entertainment industries, healthcare/pharmaceutical record storage, cultural/heritage organizations, scientific data records storage, intelligence/defense information, and libraries/museum collections.

Through our relationship with Microsoft Corporation and the University of Washington, we have demonstrated the feasibility of storing data on DNA and the unique benefits of longevity, density, and universality of this format. We believe that over time our technology will develop to allow data storage in DNA to become cost competitive with traditional data storage media, which is necessary to enable us to target several large markets within data storage.

In order to reduce the cost of synthesizing DNA, we are focused on innovating our proprietary platform to synthesize DNA at an even higher throughput, moving from a platform capable of storing megabytes of data to a platform capable of storing terabytes of data. Taking into account trends and internal projections for the cost of synthesizing oligo pools, sequencing price, hard drive price and tape price, we believe new DNA technologies and cost efficiencies could surpass mature information technology hardware solutions in three to five years. We are employing advanced techniques from the semiconductor industry to further miniaturize the chemistry and fluid movement to pursue this opportunity.

Complementing the reduction in cost for making DNA, we are also developing a system to manage the data flow; that is, from binary data to DNA and back to binary data. The equivalent of a computer operating system, it will be responsible for accessing a digital data file of 0s and 1s, applying an encoding scheme to convert the digital data into DNA sequences for synthesis and storage, and, after the stored DNA is sequenced, applying a decoding scheme to retrieve the original digital data file.

Commercial strategy, sales and distribution

We have built a scalable commercial platform with a multi-channel strategy designed to address a diverse customer base consisting of an estimated more than 100,000 synthetic DNA users today. This platform is comprised of a direct sales force and an e-commerce platform.

Our sales force is focused on customer acquisition, support, and management and is highly trained on both the technical aspects of our platform and how synthetic DNA is used in a wide range of industries. Their goal is to articulate our value proposition, drive pilot programs and increase the adoption of our product offerings while maintaining close working relationships with customers.

In January 2018, we launched our multi-channel commercial strategy through our proprietary, innovative, and easy-to-use e-commerce platform to current customers. Based on initial usage data, we believe that this e-commerce platform will enhance the productivity of our sales force and expand our customer reach by allowing customers to design, validate, and place on-demand orders of customized DNA online. We have built our e-commerce platform to allow our customers to receive real-time customized quotes for their sequence as well as track their order status through the manufacturing and delivery process, providing them improved flexibility to plan their budgets and internal timelines. This platform is a critical part of our strategy to address our potential large and diverse customer base, as well as drive commercial productivity, enhance the customer experience and promote loyalty.

We target customers of our NGS products through a direct sales team focused on the NGS tools market and which is separate from our synthetic DNA sales force. We launched early commercial access for our NGS sample preparation tools to select customers in August 2017. Our direct NGS sales representatives are focused on supporting our early adopters and providing a high level of service in order to familiarize customers with our

product offering. In fiscal year 2018, we plan to initiate a full commercial launch for NGS customers including a specific application of our e-commerce platform for customized NGS sample preparation kits in order to drive adoption by the broader diagnostic community.

For our antibody discovery efforts, under the guidance of two experienced executives, we are building a team of scientists to conduct library screening and optimization services. We intend to leverage our DNA synthesis platform to create antibody libraries for these purposes, and initiate partnering activities initially for enabling technology. Subsequently, we intend to establish partnerships with biotechnology and pharmaceutical companies to identify and/or optimize novel antibody candidates.

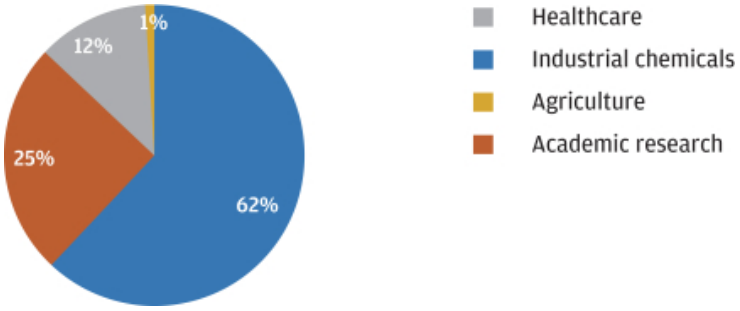
We believe that the market for storing digital data on DNA will be one that evolves based on the unique features (durability, small size, readability and low energy maintenance requirements) of DNA, similar to the way flash memory created its own market segment. Initially, we intend to pursue items of significance including cultural heritage projects (i.e. Montreux Jazz Festival archives) as well as government needs. We intend to pursue very long-term storage opportunities for both of these market segments initially - the WORN and WORSE data - and then expand into shorter term projects as the technology and market demands.

Our customers

Our products serve the needs of customers across multiple growing end markets. We categorize our customers as follows:

- ***Healthcare*** companies include pharmaceutical, biotechnology and diagnostics companies that utilize synthetic biology in target discovery, target validation, drug discovery, drug development, manufacturing, clinical trial stratification, DNA sequencing and diagnostics.
- ***Industrial Chemical*** companies that apply synthetic biology to increase the use of cost-effective and sustainable, specialty chemicals and raw materials, as well as new protein-based and protein-inspired chemicals and materials that are inaccessible through traditional industrial organic chemistry.
- ***Agriculture*** customers include companies that apply synthetic biology to improve crop traits, increase resistance to existing and emerging diseases, increase resistance to extremes of weather and replace oil and natural gas-derived fertilizer with synergistic bacteria, leading to better food security and nutrition.
- ***Academic Research*** customers include institutions that perform research across a wide range of applications, both basic and applied. For purposes of financial reports, we consider the customers we are working with to develop long-term data storage applications using DNA as part of this category.

For the year ended September 30, 2017, the composition of our revenue by customer type was as follows: Healthcare revenue of $1.2 million, Industrial chemicals revenue of $6.7 million, Agriculture revenue of $0.1 million and Academic research revenue of $2.7 million.



The benefits and versatility of our platform are exemplified by our expanding relationships with various partners across a variety of customers and end markets, for example:

Ginkgo Bioworks

We believe Ginkgo Bioworks is the largest purchaser of synthetic DNA globally. Ginkgo Bioworks, the organism company, is bringing biotechnology to consumer goods markets, enabling fragrance, cosmetic, nutrition, food, agriculture and pharmaceuticals to make better products. Ginkgo Bioworks also recently partnered with Bayer to form a new company focused on sustainable agriculture. We began working with Ginkgo Bioworks as one of our initial commercial customers in 2015. In March 2016, we signed an agreement with Ginkgo Bioworks to supply up to 100 million base pairs of DNA, which we believe accounted for approximately 10% of the total synthetic DNA market at the time. In March 2018, we signed a new agreement with Ginkgo Bioworks to supply to Ginkgo Bioworks up to approximately 1.3 billion base pairs over a period of four years, which we believe is the largest volume supply commitment in the industry. This new agreement can only be terminated unilaterally by Ginkgo Bioworks if we undergo a change of control with certain specified parties or commit a material breach of the new agreement. This new agreement may be terminated unilaterally by us if Ginkgo Bioworks fails to place orders for more than a certain percentage of specified quarterly minimums for two consecutive quarters or commits a material breach.

Top 3 pharmaceutical company

For the last two years we have been working closely with one of the top three pharmaceutical companies by revenue, generating bespoke synthetic antibody libraries with ratio controlled amino acid representation at defined positions. Workflow optimization has enabled us to bring the turn-around time for library delivery down to four weeks with no compromise on quality. Outsourcing to us has freed up valuable researcher time for the pharmaceutical company's collaborators, enabling downstream assay development to occur in parallel to library synthesis. In addition, our platform has allowed this company to avoid library enrichment with carry over parental template during the selection process, which can present an issue with more traditional methods of primer-based amplification and assembly.

Syngenta AG

In 2016, Syngenta AG, or Syngenta, a leading agricultural technology company, placed an order to purchase both genes and libraries for research into pesticide resistance. We have been able to offer these genes and libraries at very competitive prices while maintaining high-quality standards that allow Syngenta to improve their research and development process. Syngenta has continued to increase the volume and diversity of products they order from us, consistent with our increase in capabilities.

Case studies demonstrating conversion of makers to buyers

Centre for the Commercialization of Antibodies and Biologics

Since August 2016, we have been working with the Centre for the Commercialization of Antibodies and Biologics (CCAB), which is taking promising therapeutic compounds and providing initial validation and scale-up services for these molecules prior to licensing them to biotechnology companies. CCAB was attracted to us because of our low price for their genes of interest and our ability to supply these genes in CCAB's own vector systems. Importantly, CCAB decided not to hire additional staff for cloning, given their satisfaction with our products, which allowed them to focus staffing resources on other aspects of development within their lab. Given their positive experience, CCAB has continued to expand their business with us and has referred other Toronto academic laboratories to us.

Antibody drug development company

We are working with an antibody drug development company that develops fully human antibody drugs, who uses our synthetic genes for some of its antibody discovery and development. They find that they are able to make better therapeutics using a targeted synthetic approach and have switched to buying synthetic DNA from us. They continue to order larger quantities of our DNA over time.

Competition

Our markets are characterized by significant technological changes, frequent new product introductions and enhancements, and evolving customer demands. We face competition from a broad range of providers of core synthetic biology products such as GenScript Biotech Corporation, GENEWIZ, Inc., Integrated DNA Technologies, Inc., DNA 2.0 Inc. d/b/a ATUM, GeneArt (owned by Thermo Fisher Scientific Inc.), Eurofins Genomics LLC, Sigma-Aldrich Corporation (an indirect wholly owned subsidiary of Merck & Company, Inc.), Promega Corporation, OriGene Technologies, Inc., Blue Heron Biotech, LLC and others. Additionally, we compete with both large and emerging providers in the life sciences tools and diagnostics industries focused on sample preparation for next generation sequencing such as Thermo Fisher Scientific Inc., Illumina, Inc., Integrated DNA Technologies, Inc., Agilent and Roche NimbleGen, Inc. In the antibody discovery market, we compete with clinical research organizations, such as LakePharma, Inc. (mouse hybridoma, llama immune libraries, XOMA phage display library) and Aldevron, LLC (genetic mouse immunization coupled with hybridoma), and antibody discovery biotechnology companies, such as Iontas Ltd (human phage display libraries, human phage display library focused on ion channels), Adimab, LLC (human synthetic yeast display libraries), and Distributed Bio (human synthetic phage display library, lead optimization libraries). In the field of DNA digital data storage, we compete with Catalog Technologies, Inc., ETH Zurich, Helixworks Technologies Limited, Iridia, Inc., North Shore Bio and Roswell Biotechnologies. Many of our competitors have greater financial, technical, research and/or other resources than we do. They may also have larger and more established manufacturing capabilities and marketing, sales, and support functions. The competition is intense within this market and we believe that the principal defining factors driving competition in our market will continue to be quality, cost, throughput and scalability, turnaround time, product offering and complexity, reliability, e-commerce capabilities, customer satisfaction and convenience.

We believe that we compete favorably against our competitors based on our proprietary, integrated DNA synthesis platform, which enables us to achieve high levels of quality, precision, automation, and manufacturing throughput at a significantly lower cost as compared to our competitors.

In order for us to successfully compete against others in our industry, we will need to continue to demonstrate that our products deliver superior performance and value as a result of these key differentiators, and continue to expand the breadth and depth of current and future products and applications.

We also believe that as a large-scale participant in the industry, we have gained experience and brand recognition across the sectors in which we operate, and have achieved a competitive advantage over existing market participants and new entrants. These advantages include:

- *Substantial capital investment*—As of June 30, 2018, we had raised a total of $279.5 million in gross proceeds from the sale of equity securities and we have in turn made substantial capital investments in our disruptive DNA synthesis platform. We believe we are the first and only company to harness the highly scalable production and processing infrastructure of the semiconductor industry to industrialize the production of a wide range of synthetic DNA-based products, we believe we are significantly ahead of current and future competitors.

- *Economies of scale*—Customers are usually price sensitive and economies of scale allow providers to reduce production costs which result in lower pricing for customers. When more genes are produced on a larger scale yet with fewer input costs, as we are able to do with our DNA synthesis technology, economies of scale are achieved.
- *Accumulated technical know-how and operational expertise*—The synthetic biology industry is characterized by rapid and significant changes in technologies and requires precision, years of accumulated technical know-how and operational expertise. Our senior executive team has an average of over 25 years of experience across the synthetic biology, semiconductor, software and pharmaceutical industries.
- *Biotechnology expertise and research and development talent*—Because the synthetic biology industry requires continuous innovation to keep up with emerging new technologies, the productivity and success of providers' research and development is highly dependent on the quality and quantity of the employees and consultants recruited and the ability of executive management.
- *Strong brand and market recognition*—Customers generally select well-recognized providers with proven technology for large-scale and technically-demanding projects.
- *Customer experience*—Customers value an intuitive, seamless e-commerce experience to simplify and automate the purchase process as well as electronic integration to their own procurement systems. Customers also value quality customer service which we believe we satisfy with our multi-channel commercial approach and direct sales force.
- *Patents*—We have developed a comprehensive portfolio of issued patents and patent applications that cover our commercial products and technologies in development. Our patent strategy includes each aspect of our technology, from hardware to e-commerce to DNA storage, in order to create robust intellectual property barriers to entry for competitors.

Suppliers

We procure the raw materials we utilize in our production process from a number of different suppliers. Although most of the raw materials required for our business are typically readily available, we rely on one single source supplier for a critical component of our production process.

Pursuant to a supply agreement, FUJIFILM Dimatix, Inc., or FUJIFILM, is our single source supplier, for specialized print heads and related jetting assemblies which we use as part of our DNA synthesis platform. The FUJIFILM supply agreement has an effective date of November 5, 2015 for a term of 10 years, which term will thereafter be automatically extended by one year on each anniversary of the effective date unless either party notifies the other party 90 days prior to the anniversary that the agreement will terminate on the last day of the then current renewal period. The materials obtained pursuant to the agreement are obtained on a purchase order basis, and the agreement has no minimum requirements on either side, although we provide FUJIFILM six-month rolling forecasts detailing our expected product requirements. As of May 31, 2018, we had a reserve of FUJIFILM products which we estimate should last us approximately two years at our current usage rate. We estimate that it would take us approximately nine months to locate and validate an alternative supplier of the products we currently purchase from FUJIFILM.

We do not have long-term supply agreements with most of our suppliers but secure our raw materials on a purchase order basis. Because most of the raw materials used in our business are readily available in the market from many suppliers, we believe that we can within a reasonable period of time make satisfactory alternative arrangements in the event of an interruption of supply from any vendor.

We procure various raw materials such as reagents, plastic lab ware, and spare parts for use in our DNA synthesis process and we use reagents, plastic lab ware, and packaging in our gene production service.

For fiscal 2016 and fiscal 2017, our cost of raw materials accounted for approximately 27% and 30%, respectively, of the total cost of sales.

Our procurement department manages our raw materials inventory levels by monitoring our sales orders, production and manufacturing output, purchase orders and e-commerce requests. We typically advise our suppliers of our needs one to three months in advance and we procure raw materials on a monthly basis while maintaining one to two months' worth of inventory. We procure raw materials for our customized services and products on an as-needed basis.

We select our suppliers based on the following: technology, quality, delivery, cost, and service. Performance of raw materials from suppliers is monitored at least every six months using data from incoming inspection, non-conformance reports, service reports, on-time delivery reports and customer complaints. Any quality or performance issues are addressed via a quality management conference call or an on-site supplier audit.

We pay for our purchases in cash or on credit and in some cases we prepay for our purchases. Credit terms with our suppliers range between 30 and 90 days.

Manufacturing

Our manufacturing facilities are located at our headquarters in San Francisco and in South San Francisco, California. We currently manufacture all of our products and multiple sub-assemblies at these facilities. As of June 30, 2018, we had 88 full-time employees dedicated to manufacturing our synthetic genes, oligo pools, NGS tools, and DNA libraries.

All of our products originate from synthetic DNA obtained from nanostructured clusters fabricated on our proprietary silicon technology platform. As of March 31, 2018, we have the capacity to synthesize oligos on more than 184,000 nanostructured clusters per month, which corresponds to approximately 230,000 96-well plates on the legacy equipment used by our competitors. Our DNA synthesis process has been meticulously fine-tuned to yield high-quality DNA. In March 2018, we had an average error rate, of one error per 1,000 DNA bps, which we believe is a significantly lower rate than our competitors.

We have also built a large-scale parallel process that transforms nanostructured clusters into synthetic genes (clonal and non-clonal) using a mix of proprietary and over-the counter-laboratory equipment. Synthetic genes are an on-demand product for which customers increasingly demand fast turnaround time. We have enhanced our manufacturing capabilities and we expect to reduce turnaround time on large commercial quantities of genes (i.e., orders of over 15,000 per month) to 10 business days.

Due to its on-demand nature, the gene synthesis business requires manufacturing operations to be in operation 24 hours a day, seven days a week, 365 days per year. For synthetic genes, we have built a highly scalable gene production process with what we believe is industry-leading capacity of more than 45,000 genes per month to address the growing demand of scalable, high-quality, affordable synthetic genes. In December 2017, we only utilized approximately a third of this production capacity for synthetic genes and oligos.

In addition to synthetic genes, we are combining nanostructured clusters into oligo pools. If our production was dedicated entirely to the oligos, we currently have the capacity to produce more than 20 million high-quality oligos per month that can be combined into high-precision oligo pools of various sizes. The pooling process has been fully automated through a mixture of custom proprietary and over-the-counter liquid handling equipment. We are currently only utilizing approximately a third of this production capacity for synthetic genes and oligos.

We intend to increase our shipments to leverage our production capacity through our e-commerce platform, which we believe will expand both our market opportunity and our customer base.

The manufacturing process for our NGS tools is highly flexible and scalable and requires minimal fixed costs and direct labor given the efficiency of our production capability. We have automated the entire workflow using proprietary and over-the-counter laboratory equipment. We have built dedicated production capabilities for our NGS products, which began operation in October 2017. We plan to have the full NGS workflow International Organization for Standardization 13,485 certified in 2018 to comply with diagnostic industry regulatory requirements.

Over time, to further improve our production process, we intend to outsource various sub-assemblies to third-party manufacturers.

Research and development

As of June 30, 2018, we had 56 full-time employees dedicated to research and development. Of these employees, 26 hold advanced degrees in engineering and biology or other sciences, including either a Ph.D. or master's degree. We incurred expenses of $19.2 million expenses for the year ended September 30, 2017 on research and development activities. Our primary research and development operations are located in leased laboratory facilities in San Francisco and South San Francisco, California.

Intellectual property

Our core technology originated as a collaboration between two of our co-founders, Bill Banyai, Ph.D., and Bill Peck, Ph.D., based on the idea that the synthetic DNA market could be revolutionized through a new oligonucleotide synthesis and gene assembly technology. Applying their engineering expertise, Drs. Banyai and Peck conceived—and later refined through collaboration with several of our other accomplished researchers and engineers—innovative silicon-structure based technologies and other innovations for synthesizing nucleic acids that allowed for the manufacture of DNA at greater yields than existing technology allowed.

Our patent strategy is to seek broad patent protection on new developments in nucleic acid synthesis technology and then later file patent applications covering new implementations of the technology and downstream applications utilizing the technology. As part of our strategy, we include each aspect of our technology, from hardware to e-commerce to DNA storage, in order to create robust intellectual property barriers to entry for competitors. As these technologies are implemented, we file new patent applications covering scientific methodology enabled by our technology. Additionally, where appropriate, we file new patent applications covering instrumentation and software that are used in conjunction with our systems for oligo synthesis and gene assembly.

We have developed our own comprehensive portfolio of issued patents and patent applications that cover each step of our commercial products and technologies in development. For example, in part because of our pioneering development efforts in the field of nucleic acid libraries, we have six issued patents and many patent applications pending relating to different aspects of our technology including our devices, our low error rate for oligo synthesis, our large, accurate nucleic acid libraries and their synthesis. We have additional patent filings directed to nucleic acid design and ordering, devices for low error rate nucleic acid synthesis, nucleic acid based data storage, and diversified biologics encoding libraries.

As of June 30, 2018, we own nine issued U.S. patents and two issued international patents in China. We have 81 pending patent applications, including 39 in the United States, 31 international applications and 11 applications filed under the Patent Cooperation Treaty. The U.S. issued patents expire between 2034 and 2036.

The term of individual patents depends upon the legal term of the patents in the countries in which they are obtained. In most countries in which we file, the patent term is 20 years from the date of filing the non-provisional application or PCT application. In the United States, a patent's term may be lengthened by patent term adjustment, which compensates a patentee for administrative delays by the USPTO in granting a patent, or may be shortened if a patent is terminally disclaimed over an earlier-expiring patent.

The patent positions of companies like ours are generally uncertain and involve complex legal and factual questions. Our patents may not enable us to obtain or keep any competitive advantage. Our pending U.S. and foreign patent applications may not issue as patents or may not issue in a form that will be advantageous to us. Any patents we have obtained or do obtain may be challenged by re-examination, opposition or other administrative proceeding, or may be challenged in litigation, and such challenges could result in a determination that the patent is invalid. In addition, competitors may be able to design alternative methods or devices that avoid infringement of our patents. To the extent our intellectual property protection offers inadequate protection, or is found to be invalid, we are exposed to a greater risk of direct competition. If our intellectual property does not provide adequate protection against our competitors' products, our competitive position could be adversely affected, as could our business. Both the patent application process and the process of managing patent disputes can be time consuming and expensive. Furthermore, the laws of some foreign countries may not protect our intellectual property rights to the same extent as do the laws of the United States.

In addition to pursuing patents on our technology, we have taken steps to protect our intellectual property and proprietary technology by entering into confidentiality agreements and intellectual property assignment agreements with our employees, consultants, corporate partners and, when needed, our advisors. Such agreements may not be enforceable or may not provide meaningful protection for our trade secrets or other proprietary information in the event of unauthorized use or disclosure or other breaches of the agreements, and we may not be able to prevent such unauthorized disclosure. Monitoring unauthorized disclosure is difficult, and we do not know whether the steps we have taken to prevent such disclosure are, or will be, adequate.

Legal proceedings

On February 3, 2016 Agilent filed a lawsuit against us and our Chief Executive Officer, Ms. Emily Leproust, in the Superior Court of California, Santa Clara County, or the Court. The complaint also names Does 1 through 20, which are fictitious placeholder defendants. It is possible that Agilent may seek to amend its complaint to name other defendants.

Agilent's complaint alleges three claims: (1) alleged breach of contract, related to the use of confidential information and alleged breach of non-solicitation obligations against Ms. Leproust; (2) alleged breach of a duty of loyalty against Ms. Leproust; and (3) alleged misappropriation of trade secrets under the California Uniform Trade Secrets Act, or CUTSA, against all defendants.

Agilent's specific allegations against Twist and Ms. Leproust are set forth in its first amended complaint, which was filed on October 31, 2016. With regard to the misappropriation claim, Agilent alleges, among other things, that Twist and Ms. Leproust misappropriated trade secrets relating to Agilent's oligonucleotide synthesis technology and used those secrets to develop Twist's technology and identify personnel to hire from Agilent. With regard to the breach of loyalty claim, Agilent alleges, among other things, that Ms. Leproust improperly withheld strategic business and technological plans from Agilent and diverted those plans to Twist instead. With regard to the breach of contract claim, Agilent alleges, among other things, that Ms. Leproust violated her contractual obligations under her employment agreement with Agilent, including by failing to disclose the aforementioned plans and by soliciting one or more Agilent employees to terminate their employment within two years of her resignation.

Agilent's requested relief in its amended complaint includes: compensatory damages; injunctive relief; punitive and/or statutory exemplary damages; a constructive trust upon allegedly misappropriated assets and gains derived from alleged breaches of agreements; and its attorneys' fees and costs. Defendants have responded to Agilent's allegations and asserted numerous affirmative defenses in their answer, filed January 30, 2017, and furthermore deny Agilent's claims have merit or entitle it to any relief.

We and Ms. Leproust currently believe that we have substantial and meritorious defenses to Agilent's claims and intend to vigorously defend our position, including through the trial and appellate stages if necessary. The outcome of any litigation, however, is inherently uncertain and there can be no assurance that the outcome of the case or the costs of litigation, regardless of outcome, will not have a material adverse effect on our business.

We may also be subject to various other legal proceedings and claims arising in the ordinary course of business. Although occasional adverse decisions or settlements may occur, management believes that the final disposition of such matters will not have a material adverse effect on our business, financial position, results of operations or cash flows.

Government regulation

The synthetic biology industry and our current product portfolio is largely unregulated by governmental bodies such as the FDA. Our products are also not intended to be components or incorporated into our customers' products. Rather, our synthetic DNA products enable our customers to develop a wide spectrum of commercial products, some of which may require governmental approval. If a customer's product requires governmental approval, as would be the case with the development of medical diagnostics and therapeutic drugs, it is the customer who seeks and obtains the required governmental approval to commercialize those products. However, in the future we may be subject to a variety of specialized regulatory requirements, including potential regulation by the FDA, any of which could have a material effect on the business.

"Research Use Only" is a term limited to our target enrichment products for the next-generation sequencing market, and is specifically applied only to kits sold to this market segment, and is intended to restrict use of the kits to non-in vitro diagnostic purposes. The RUO label is not affixed to any other products. Our NGS target enrichment and library preparation products are used in a more comprehensive workflow for next generation sequencing. It is this larger workflow that can become an in vitro diagnostic, after undergoing the appropriate regulatory processes. As noted above, our NGS products target a market opportunity for NGS sample preparation that was approximately $500 million in calendar year 2016 and growing at approximately 20% annually, according to market research provided by Kalorama Information, a division of marketresearch.com. This market estimate represents the NGS target enrichment products which are limited solely to the RUO component of target enrichment and library preparation and does not include the full in vitro diagnostic workflow.

While most of the current laws and regulations concerning synthetic biology relate to the end products produced using synthetic biology, this may change. For example, in December 2010, the Presidential Commission for the Study of Bioethical Issues recommended that the federal government oversee, but not regulate, synthetic biology research. The Presidential Commission also recommended that the federal government lead an ongoing review of developments in the synthetic biology field and that the federal government conduct a reasonable risk assessment before the field release of synthetic organisms.

While we and our subsidiaries maintain regulatory compliance practices, we rely on our customers' compliance with laws and regulations applicable to the products they produce. We do not independently monitor whether our customers comply with applicable laws and regulations.

FDA. Pursuant to its authority under the Federal Food, Drug, and Cosmetic Act, or the FDC Act, the FDA has jurisdiction over medical devices. The FDA regulates, among other things, the research, testing, manufacturing, safety, labeling, storage, recordkeeping, premarket clearance or approval, marketing and promotion and sales and distribution of medical devices in the United States to ensure that medical products distributed domestically are safe and effective for their intended uses. In addition, the FDA regulates the import and export of medical devices.

The FDC Act classifies medical devices into one of three categories based on the risks associated with the device and the level of control necessary to provide reasonable assurance of safety and effectiveness. Devices deemed by the FDA to pose the greatest risk, such as life-sustaining, life-supporting or implantable devices, or devices deemed not substantially equivalent to a previously 510(k) cleared device are categorized as Class III. These devices typically require submission and approval of a Premarket Approval Application, or PMA. Devices deemed to pose lower risk are categorized as either Class I or II. Class II classification usually requires the manufacturer to submit to the FDA a premarket notification submission requesting clearance of the device for commercial distribution in the United States pursuant to Section 510(k) of the FDC Act, referred to as 510(k) clearance. Most Class I devices are exempt from this requirement, as are some lower risk Class II devices. When a 510(k) is required, the manufacturer must submit to the FDA a premarket notification submission demonstrating that the device is "substantially equivalent" to: (i) a device that was legally marketed prior to May 28, 1976, for which PMA approval is not required, (ii) a legally marketed device that has been reclassified from Class III to Class II or Class I, or (iii) another legally marketed, similar device that has been cleared through the 510(k) process.

In vitro diagnostics, or IVDs, are a category of medical devices that include reagents, instruments, and systems intended for use in diagnosis of disease or other conditions, including a determination of the state of health, in order to cure, mitigate, treat, or prevent disease or its sequelae. IVDs are intended for use in the collection, preparation, and examination of specimens taken from the human body. A research use only, or RUO, IVD product is an IVD product that is in the laboratory research phase of development. As such, an RUO IVD is not intended for use in clinical investigations or in clinical practice. Such RUO products do not require premarket clearance or approval from the FDA, provided that they be labeled "For Research Use Only. Not for use in diagnostic procedures" pursuant to FDA regulations.

As presently contemplated, none of our IVD products are intended for clinical or diagnostic use, and we market them to academic institutions, life sciences and clinical research laboratories that conduct research, and biopharmaceutical and biotechnology companies for non-diagnostic and non-clinical purposes. Our current IVD products are marketed and labeled as RUO, and are provided to our customers solely for their internal research use. Accordingly, we believe that our current IVD products are subject only to limited regulation with respect to labeling by the FDA, and we have not sought clearance or approval from the FDA to market our products.

In November 2013, the FDA issued final guidance indicating that merely including the RUO labeling statement will not necessarily render the device exempt from FDA premarket clearance, approval, or other regulatory requirements if the totality of circumstances surrounding the distribution of the product indicate that the manufacturer intended its IVDs for diagnostic use. Such circumstances may include, but are not limited to, the product's advertising, labeling, or promotion, or the manufacturer's assistance of a clinical laboratory in validating or verifying a test that incorporates products labeled RUO. We do not believe any of these circumstances apply to our current product portfolio.

While we believe that none of our current IVD products require FDA approval or clearance, we may in the future develop and commercialize a subset of our products or related applications that could become subject to additional regulation by the FDA. If we market our products for use in performing clinical diagnostics, thus subjecting them to additional regulation by the FDA, including premarket and post market control as medical devices, we would be required to obtain either prior 510(k) clearance or prior pre-market approval from the FDA before commercializing the product, unless an exemption applies.

International sales of medical devices are subject to foreign government regulations, which vary substantially from country to country. Outside of the European Union, or EU, regulatory approval needs to be sought on a country-by-country basis in order to market medical devices.

FSAP. The federal Centers for Disease Control and Prevention and the Animal and Plant Health Inspection Service administer requirements of the Federal Select Agent Program, or FSAP. FSAP requirements govern possession, use, and transfer of biological select agents and toxins that have the potential to pose a severe threat to public, animal or plant health or to animal or plant products. It is our policy generally not to produce or otherwise work with material that is subject to FSAP requirements.

Export controls. International shipments of DNA sequences that we produce are potentially licensable under export controls, although in our experience so far exports of DNA sequences that we have produced have not required licenses.

Given the evolving nature of our industry, legislative bodies or regulatory authorities may adopt additional regulation or expand existing regulation to include our service. Changes to the current regulatory framework, including the imposition of additional or new regulations, could arise at anytime, and we may be unable to obtain or maintain comparable regulatory approval or clearance of our service, if required. These regulations and restrictions may materially and adversely affect our business, financial condition, and results of operations.

Facilities

Our principal executive offices are located in San Francisco, California, where we lease approximately 13,000 square feet under a lease that expires in September 30, 2019. We believe that our facilities are sufficient to meet our current needs and that suitable additional space will be available as and when needed.

Our team

As of June 30, 2018, we had 221 full-time employees and a team of 14 dedicated commercial consultants across the European Union and United Kingdom and five dedicated commercial consultants across Asia. Of these full-time employees, 56 full-time employees are engaged in research and development activities. None of our employees is represented by a labor union or covered by a collective bargaining agreement. We consider our relationship with our employees to be good.

Management

Executive officers and directors

The names and ages of our executive officers and directors as of July 31, 2018, are as follows:

Name	Age	Position(s)
Executive officers:		
Emily M. Leproust	45	President, Chief Executive Officer and Director
William Banyai	63	Chief Operating Officer and Director
James M. Thorburn	62	Chief Financial Officer
Mark Daniels	55	General Counsel, Secretary and Chief Ethics and Compliance Officer
Paula Green	51	Vice President of Human Resources
Patrick Finn	47	Vice President of Sales and Marketing
Patrick Weiss	48	Vice President of Operations
Bill Peck	57	Chief Technology Officer
Non-Employee directors:		
Robert Chess	61	Director
Paul A. Conley	50	Director
Keith Crandell	58	Director
Fredrick Craves	72	Director
Xiaoying Mai	31	Director
Robert Ragusa	58	Director

(1) Member of audit committee

(2) Member of compensation committee

(3) Member of nominating and governance committee

Executive officers

Emily M. Leproust, Ph.D. has served as our President and Chief Executive Officer and as a member of our board of directors since April 2013. Prior to co-founding Twist Bioscience, Ms. Leproust served in various positions at Agilent most recently as its Director, Applications and Chemistry R&D from February 2009 to April 2013. Ms. Leproust holds a M.Sc. in Industrial Chemistry from the Lyon School of Industrial Chemistry and a Ph.D. in Organic Chemistry from the University of Houston. Our board of directors believes that Ms. Leproust is qualified to serve as a director because of her operational and historical expertise gained from serving as our President and Chief Executive Officer, and her extensive professional and educational experience in the biotechnology industry.

William Banyai, Ph.D. has served as our Chief Operating Officer and as a member of our board of directors since February 2013. Prior to co-founding Twist Bioscience, from April 2006 to March 2013, Mr. Banyai was the Vice President of Hardware Engineering at Complete Genomics Inc., a life sciences company that developed and commercialized a platform for sequencing and analyzing human genomes. Mr. Banyai was also previously a

director at Glimmerglass Networks, a supplier of SDN enabled Intelligent Optical Switching and Optical Network Management solutions. Mr. Banyai holds a B.S. in Physics and an M.S. in Electrical Science from the University of Michigan, an Engineer of Electrical Engineering degree from the University of Southern California and a Ph.D. in Optical Science from the University of Arizona. Our board of directors believes that Mr. Banyai's experience as our Chief Operating Officer and extensive executive and professional experience in the biotechnology industry, as well as his previous director experience and expertise in corporate governance, qualify him to serve as a director.

Mark Daniels has served as our General Counsel since August 2016, as our Chief Ethics and Compliance Officer since May 1, 2017 and as our Secretary since 2018. Prior to joining us, from January 2013 to May 2016, Mr. Daniels was at Broadcom Corporation, a semiconductor manufacturer and producer of wireless and broadband products, where his most recent position was Vice President, Law and Deputy Chief Corporate Compliance Officer. Before that, he spent 20 years in positions of increasing responsibility in the legal department at Amgen, Inc., a producer of biopharmaceuticals, where his last role was Vice President and Associate General Counsel. Mr. Daniels received his B.S. with honors in Industrial and Labor Relations from Cornell University and a J.D., cum laude, from Harvard Law School.

Patrick Finn*, Ph.D.* has served as our Vice President of Sales and Marketing since March 2015. Prior to joining us, Mr. Finn was Vice President of Sales at Enzymatics Inc., a developer, manufacturer, and marketer of enzymes for molecular biology applications, sold predominantly to manufacturers in research and diagnostic markets from January 2012 to March 2015. Mr. Finn holds a B.Sc. in Chemistry from Heriot-Watt University and a Ph.D. in Chemistry from the University of Southampton.

Paula Green has served as our Vice President of Human Resources since March 2016. Prior to joining us, Ms. Green was Vice President of Human Resources at Qiagen, N.V., a provider of sample and assay technologies for molecular diagnostics, applied testing, academic and pharmaceutical research from March 2001 to September 2015. Ms. Green holds a B.S. Organizational Behavior from the University of San Francisco.

Bill Peck, Ph.D. has been our Chief Technology Officer since February 2013. Prior to co-founding Twist Bioscience, Mr. Peck was the Director of Fluidic Systems at Complete Genomics Inc. from April 2008 to February 2013. Mr. Peck holds a B.Sc., M.Sc., and Ph.D. in Mechanical Engineering from the University of Alberta.

James M. Thorburn has served as our Chief Financial Officer since April 2018. Prior to joining us, Mr. Thorburn served as a member of the board of directors of IXYS Corporation, a publicly traded semiconductor company from March 2007 to January 2018. Mr. Thorburn was also Chief Sales Officer and Co-Head of International at Televerde, a demand generation and sales acceleration enterprise, from August 2014 to February 2018. Prior to Televerde, he served as interim CFO of several public and private companies including Enercore, Next Autoworks, Fisker Automotive and Numonyx. Mr. Thorburn served as Chief Executive Officer of Zilog from March 2001 until August 2006. Prior to serving as Chief Executive Officer of Zilog, Mr. Thorburn held various executive positions including Chief Operating Officer of ON Semiconductor, operating consultant with Texas Pacific Group, Chief Financial Officer at Zilog and various management positions at National Semiconductor Corporation. Mr. Thorburn holds a B.Sc. (Hons.) degree from University of Glasgow and passed the Chartered Institute of Management Accountant exams in the United Kingdom.

Patrick Weiss has served as our Vice President of Operations since January 2014. Prior to joining us, between April 2010 and December 2013, Mr. Weiss served as an outside consultant to various technology companies. Mr. Weiss holds an M.Sc. in Chemistry from E.T.H. Zurich.

Non-employee directors

Robert Chess has served on our board of directors since July 2014. Mr. Chess is Chairman of the board of directors of Nektar Therapeutics, a publicly traded therapeutics company. He has served on the board of Nektar

Therapeutics as either CEO and/or Chairman since 1992 and has held the Chairman position since 1999. Mr. Chess has also served on the board of directors of Pharsight Corp., a publicly traded company that provides software and scientific consulting services to pharmaceutical and biotechnology companies, and CoTherix, Inc., a publicly traded biopharmaceutical company. Mr. Chess currently serves as a lecturer at the Stanford Graduate School of Business, a position he has held since 2004. Mr. Chess holds a B.S. in Engineering with Honors from the California Institute of Technology and an M.B.A. from Harvard University. Our board of directors believes that Mr. Chess brings extensive board and executive experience managing the operations of biotechnology companies, and his service on a number of public company boards provides important industry and corporate governance experience, which qualifies him to serve as one of our directors.

Keith Crandell has served on our board of directors since October 2013. Mr. Crandell is the Managing Director of Arch Venture Corporation, a venture capital firm focused on early-stage technology companies, since 1994. Mr. Crandell is a director of several private companies and he also serves on the board of directors of Adesto Technologies Corp., a provider of low power, smart non-volatile memory products which is a publicly traded company and Quanterix, a publicly traded life science instrument company. Mr. Crandell holds a B.S. in Chemistry and Mathematics from St. Lawrence University, an M.S. in Chemistry from the University of Texas, Arlington, and an M.B.A. from the University of Chicago. Our board of directors believes that Mr. Crandell brings extensive experience in the technology industry and that his service on a number of boards provides an important perspective on operations, finance and corporate governance matters, which qualifies him to serve as one of our directors.

Frederick Craves, Ph.D. has served on our board of directors since May 2014. Mr. Craves is the Founder of Bay City Capital, one of the world's premier life science investment firms, and has been Managing Director since its founding in September 1996. Over the course of his career, Mr. Craves has worked in executive management of a multinational pharmaceutical company and founded and managed several biotech companies. He previously served on the boards of several private and public companies, including Reliant Pharmaceuticals, Medarex Pharmaceuticals and Incyte Pharmaceuticals. His current board memberships include two publicly traded companies, Madrigal Pharmaceuticals, Inc., a clinical stage biopharmaceutical company, where he is lead director and Dermira, Inc. a dermatological biotechnology company. Mr. Craves holds a B.S. in Biology from Georgetown University, an M.S. in Biochemical Pharmacology from Wayne State University, and a Ph.D. in Pharmacology and Toxicology from the University of California, San Francisco. Our board of directors believes that in addition to his educational background, Mr. Craves brings extensive experience in the biotechnology industry and his service on a number of boards of public and private companies provides an important perspective on operations and corporate governance matters, which qualifies him to serve as one of our directors.

Paul A. Conley, Ph.D. has served on our board of directors since July 2013. Mr. Conley is a Partner and Managing Director at Paladin Capital Group, a prominent venture capital investment firm, a position he has held since November 2007. Mr. Conley also serves on the board of directors of many companies, several in the biotechnology and related fields, including 10x Genomics, Inc., TOMA Bioscience, Inc., and General Automation Laboratory Technologies, Inc. Mr. Conley holds a B.S. in Mechanical Engineering and an M.S. in Mechanical & Aerospace from the University of Virginia, an M.S. in Bioengineering and a Ph.D. in Applied Physics from the University of California, San Diego. Our board of directors believes that Mr. Conley brings extensive experience in the biotechnology industry and his service on a number of boards provides an important perspective on operations and corporate governance matters, as well as his education in biotechnology, which qualifies him to serve as one of our directors.

Xiaoying Mai has served on our board of directors since July 2018. Ms. Mai is an Investment Director of GF Xinde Investment Management Co. Ltd, a venture capital investment firm based in China that specializes in investing in biotechnology companies, a position she has held since June 2015. Ms. Mai previously served as a financial

manager for Guangfa Securities Co., Ltd, a publicly listed company in Hong Kong from December 2012 to June 2015, where she specialized in preparing financial information for public disclosure and tax management.
Ms. Mai has also served as a member of the IPSAS program-international public sector accounting standard and worked with the United Nations in 2011. Ms. Mai holds a B.A. in Business Management from the Guangdong University of Foreign Studies and a M.A. in accountancy from George Washington University. Our board of directors believes that Ms. Mai brings extensive experience in the biotechnology industry and her experience with the Asian markets will help us to expand into such markets, which qualifies her to serve as one of our directors.

Robert Ragusa has served on our board of directors since February 2017. Mr. Ragusa is currently the Senior Vice President, Global Quality and Operations, at Illumina, Inc., a strategic commercial partner of Twist Bioscience Corporation and a publicly traded corporation, where he has worked since December 2013. Prior to joining Illumina, Inc., from April 2010 to November 2013, Mr. Ragusa was Executive Vice President, Global Operations and Service at Accuray Incorporated, a radiation oncology company that develops, manufactures, sells and supports cancer treatment solutions. Mr. Ragusa holds a B.S. in Biomedical and Electrical Engineering and an M.B.A. from the University of Connecticut, and an M.S. in Biomedical and Electrical Engineering from Carnegie-Mellon University. Our board of directors believes that Mr. Ragusa brings extensive experience in important ecosystem partners and managing operations of large public companies, and this, in addition to his education in biotechnology, finance and management, qualifies him to serve as one of our directors.

There are no family relationships among any of our directors or executive officers.

Code of business conduct and ethics

We have adopted a code of business conduct and ethics that will apply to all of our employees, officers and directors beginning on the effective date of the registration statement of which this prospectus forms a part. Immediately prior to the effectiveness of this offering, the full text of our code of business conduct and ethics will be posted on the investor relations section of our website at www.twistbioscience.com. We expect that any amendment to the code, or any waivers of its requirements, will be disclosed on our website to the extent required by the applicable rules and exchange requirements. The inclusion of our website in this prospectus does not include or incorporate by reference the information on our website into this prospectus.

Board of directors

Our board of directors is currently comprised of seven members. Subject to the rights of holders of any series of preferred stock, our amended and restated bylaws permit our board of directors to establish by resolution the authorized number of directors, and seven directors are currently authorized. Upon completion of this offering our board of directors will consist of members, of whom will qualify as “independent” under the listing standards of the Nasdaq Global Market.

Voting arrangements

The election of the members of our board of directors is currently governed by the amended and restated stockholders agreement that we entered into with certain holders of our common stock and certain holders of our convertible preferred stock in January 2016, as amended in March 2017, and the related provisions of our amended and restated certificate of incorporation. Pursuant to the stockholders agreement and these provisions, Messrs. Banyai, Chess, Conley, Crandell, Craves and Ragusa and Mesdames Leproust and Mai have been designated to serve on our board of directors.

- Mr. Crandell was designated by ARCH Ventures Fund VII, LP and elected by the holders of our Series A convertible preferred stock;

- Mr. Craves was designated by Tao Invest LLC, and elected by the holders of our Series B convertible preferred stock;
- Mr. Ragusa was designated by Illumina, Inc., and elected by the holders of our Series C convertible preferred stock;
- Mr. Conley was designated and elected by the holders of a majority of our Series D convertible preferred stock at the time of his designation, and his designation was approved by the holders of a majority of our common stock;
- Ms. Mai was designated by the holders of a majority of our Series D convertible preferred stock held collectively by Ever Alpha Fund L.P. and Bay City Capital GF Xinde International Life Sciences USD Fund, L.P. at the time of her designation, and elected by the holders of a majority of our Series D convertible preferred stock at the time of her designation;
- Mr. Banyai was elected to the board of directors by the holders of our common stock;
- Mr. Chess was elected to the board of directors by a majority the holders of our common stock and convertible preferred stock, each voting as a single class; and
- Ms. Leproust was elected to the board of directors as our chief executive officer.

The holders of shares of our common stock and convertible preferred stock who are parties to our stockholders agreement are obligated to vote for such designees indicated above. The provisions of this stockholders agreement will terminate upon the closing of this offering and our certificate of incorporation will be amended and restated, after which there will be no further contractual obligations or charter provisions regarding the election of our directors.

Our directors hold office until their successors have been elected and qualified or appointed, or the earlier of their death, resignation or removal.

Classified board

In connection with the closing of this offering, we will file our amended and restated certificate of incorporation which will provide that our board of directors will be divided into three classes, with staggered three-year terms. Only one class of directors will be elected at each annual meeting of our stockholders, with the other classes of directors continuing for the remainder of their respective three-year terms. Upon the expiration of the term of a class of directors, a director in that class will be eligible to be elected for a new three-year term at the annual meeting of stockholders in the year in which their term expires.

Our directors will be divided among the three classes as follows:

- the Class I directors will be , and , and their terms will expire at the annual meeting of stockholders to be held in 2019;
- the Class II directors will be , and , and their terms will expire at the annual meeting of stockholders to be held in 2020; and
- the Class III directors will be , and , and their terms will expire at the annual meeting of stockholders to be held in 2021.

In addition, our amended and restated bylaws and amended and restated certificate of incorporation will provide that, subject to the rights of holders of any series of preferred stock, (i) only the board of directors may fill vacancies on the board of directors until the next annual meeting of stockholders and (ii) the number of our

directors shall be fixed from time to time by a resolution of the majority of our board of directors. Any additional directorships resulting from an increase in the number of directors will be distributed among the three classes so that, as nearly as possible, each class will consist of one-third of the total number of directors.

This classification of the board of directors and the provisions described above may have the effect of delaying or preventing changes in our control or management. See “Description of capital stock—Anti-takeover effects of Delaware law and our amended and restated certificate of incorporation and amended and restated bylaws.”

Role of the board in risk oversight

One of the key functions of our board of directors is informed oversight of our risk management process. Our board of directors does not have a standing risk management committee, but rather administers this oversight function directly through the board of directors as a whole, as well as through its standing committees that address risks inherent in their respective areas of oversight. In particular, our board of directors is responsible for monitoring and assessing strategic risk exposure. Our audit committee is responsible for reviewing and discussing our major financial risk exposures and the steps our management has taken to monitor and control these exposures, including guidelines and policies with respect to risk assessment and risk management. Our audit committee also monitors compliance with legal and regulatory requirements, in addition to oversight of the performance of our external audit function. Our nominating and governance committee monitors the effectiveness of our governance guidelines. Our compensation committee reviews and discusses the risks arising from our compensation philosophy and practices applicable to all employees that are reasonably likely to have a materially adverse effect on us.

Director independence

In connection with this offering, we intend to list our common stock on the Nasdaq Global Market. Under the rules of the Nasdaq Global Market, independent directors must comprise a majority of a listed company’s board of directors within a specified period of time after completion of such company’s initial public offering. In addition, the rules of require that, subject to specified exceptions, each member of a listed company’s audit, compensation, and nominating committees be independent. Under the rules of Nasdaq Global Market, a director will only qualify as an “independent” director if, in the determination of that company’s board of directors, that director does not have a relationship that would interfere with the exercise of independent judgment in carrying out the responsibilities of a director with the listed company.

Audit committee members must also satisfy the independence criteria set forth in Rule 10A-3 under the Exchange Act. In order to be considered independent for purposes of Rule 10A-3, each member of the audit committee of a listed company may not, other than in his or her capacity as a member of such committee, the board of directors, or any other board committee: (i) accept, directly or indirectly, any consulting, advisory, or other compensatory fees from the listed company or any of its subsidiaries; or (ii) be an affiliated person of the listed company or any of its subsidiaries.

Our board of directors has undertaken a review of its composition, the composition of its committees, and the independence of each director and considered whether any director has a material relationship with us that could compromise his or her ability to exercise independent judgment in carrying out his or her responsibilities. Based on information provided by each director concerning his or her background, employment, and affiliations, including family relationships, our board of directors has determined that each of , , , and does not have a relationship that would interfere with the exercise of independent judgment in carrying out the responsibilities of a director and that each of these directors is “independent” as that term is defined under the applicable rules and regulations of the Securities and Exchange

Commission, and the listing standards of the Nasdaq Global Market. In making these determinations, our board of directors considered the current and prior relationships that each non-employee director has with our company and all other facts and circumstances our board of directors deemed relevant in determining their independence, including the beneficial ownership of our capital stock by each non-employee director, and the transactions involving them described in the section titled “Certain relationships and related party transactions.”

Committees of the board of directors

Our board of directors has established an audit committee, a compensation committee and a nominating and governance committee. The composition and responsibilities of each committee are described below. Upon completion of this offering, copies of the charters for each committee will be available on the investor relations portion of our website at www.twistbioscience.com. Members serve on these committees until their resignations or removal. The inclusion of our website in this prospectus does not include or incorporate by reference the information on our website into this prospectus.

Audit committee

Our audit committee is comprised of Messrs. Chess, Conley and Craves, and, effective upon the completion of this offering, our audit committee will consist of , and , with serving as audit committee chairperson. Our board of directors has determined that each of the members of our audit committee satisfies the requirements for independence and financial literacy under the current listing standards of the Nasdaq Global Market and Securities and Exchange Commission rules and regulations, including Rule 10A-3. Our board of directors has also determined that and are each an audit committee financial expert within the meaning of Item 407(d) of Regulation S-K of the Securities Act.

Our audit committee will be responsible for, among other things:

- selecting a qualified firm to serve as independent registered public accounting firm to audit our financial statements;
- helping to ensure the independence and performance of the independent registered public accounting firm;
- discussing the scope and results of the audit with the independent registered public accounting firm, and reviewing, with management and the independent accountants, our interim and year-end operating results;
- developing procedures for employees to submit concerns anonymously about questionable accounting or audit matters;
- reviewing related party transactions;
- reviewing our policies on risk assessment and risk management;
- approving all audit and all permissible non-audit services, to be performed by the independent registered public accounting firm; and
- reviewing the audit committee report required by Securities and Exchange Commission rules to be included in our annual proxy statement.

Our audit committee will operate under a written charter, to be effective on the date of this offering, which satisfies the applicable rules of the Securities and Exchange Commission and the listing standards of the Nasdaq Global Market, and which will be available on our website upon completion of this offering. All audit services to be provided to us and all permissible non-audit services, other than *de minimis* non-audit services, to be provided to us by our independent registered public accounting firm will be approved in advance by our audit committee.

Compensation Committee

Our compensation committee is comprised of Messrs. Chess, Crandell and Craves, and, effective upon the completion of this offering, our compensation committee will consist of , and with serving as compensation committee chairperson. Our board of directors has determined that each member of the compensation committee is a non-employee director, as defined pursuant to Rule 16b-3 promulgated under the Exchange Act. Our board has determined that , and meet the requirements for independence under the listing standards of the Nasdaq Global Market and Securities and Exchange Commission rules and regulations. Our compensation committee will be responsible for, among other things:

- reviewing and approving the compensation of our chief executive officer and other executive officers;
- reviewing the compensation paid to our directors and making recommendations to our board of directors;
- reviewing, adopting, amending, and administering our equity incentive plans and granting awards to eligible persons and determining the terms of such awards;
- reviewing, approving, amending, and terminating any change in control, severance or termination agreement, plan or arrangement for our executive officers;
- reviewing in conjunction with the nominating and governance committee, succession planning for our chief executive officer and other executive officers and evaluating potential successors; and
- assessing whether our compensation policies and practices create risks that are reasonably likely to have a material adverse effect on us.

Our compensation committee will operate under a written charter, to be effective on the date of this offering, which satisfies the applicable rules of the Securities and Exchange Commission and the listing standards of the Nasdaq Global Market.

Nominating and governance committee

Effective upon the completion of this offering, our nominating and governance committee will consist of Messrs. , and , each of whom is a non-employee member of our board of directors, with Mr. serving as the nominating and governance committee chairperson. Our board of directors has determined that , and meet the requirements for independence under the listing standards of the Nasdaq Global Market and Securities and Exchange Commission rules and regulations.

Our nominating and governance committee will be responsible for, among other things:

- identifying, evaluating and making recommendations to our board of directors regarding, nominees for election to our board of directors, and individuals to fill any vacancies on our board of directors, between meetings of our stockholders at which directors are to be elected;
- identifying, evaluating and making recommendations to our board of directors regarding the chairmanship and membership of each of its committees;
- considering and making recommendations to our board of directors regarding the composition of our board of directors and its committees;
- assessing the effectiveness of any diversity policy our board of directors may determine to implement;
- reviewing in conjunction with the compensation committee, succession planning for our chief executive officer and other executive officers and evaluating potential successors; and

- reviewing and assessing the adequacy of our corporate governance guidelines and recommending any proposed changes to our board of directors.

The nominating and governance committee will operate under a written charter, to be effective on the date of this offering, which satisfies the applicable listing requirements and rules of the Nasdaq Global Market.

Our board of directors may from time to time establish other committees.

Compensation committee interlocks and insider participation

During fiscal 2017, our compensation committee consisted of Messrs. Chess, Crandell and Craves. None of the members of our compensation committee has at any time been one of our officers or employees. None of our executive officers currently serves, or during fiscal 2017 has served, as a member of our board of directors or the compensation committee (or other board committee performing equivalent functions) of any entity that has one or more of its executive officers who served on our board of directors or our compensation committee during fiscal 2017. Certain members of our compensation committee are affiliated with entities that purchased our preferred stock. Please see “Equity financings” for more information.

Director compensation

Historically, we have neither had a formal compensation policy for our non-employee directors, nor have we had a formal policy of reimbursing expenses incurred by our non-employee directors in connection with their board service. However, we have reimbursed our non-employee directors for reasonable expenses incurred in connection with their attendance at board of directors or committee meetings and occasionally granted stock options. Other than as described below, we did not provide our non-employee directors, in their capacities as such, with any cash, equity or other compensation in fiscal 2017. Neither Emily Leproust, our President and Chief Executive Officer, nor William Banyai, our Chief Operating Officer, received separate compensation for services as a director. Ms. Leproust and Mr. Banyai’s compensation is discussed in the section titled “Executive compensation.”

The following table sets forth certain information regarding the compensation of our non-employee directors for fiscal 2017:

Name	Option awards ($)(1)(2)	Total ($)
Robert Chess	75,264(3)	75,264
Paul A. Conley	—	—
Keith Crandell	—	—
Frederick Craves	—	—
Xiaoying Mai[4]	—	—
Robert Ragusa	—	—

(1) The amount reported in this column represents the aggregate grant date fair value for financial statement reporting purposes of stock options granted in fiscal 2017 under our 2013 Plan, as determined in accordance with FASB ASC Topic 718. This amount reflects our accounting expense for these stock options and does not represent the actual economic value that may be realized by each non-employee director. There can be no assurance that this amount will ever be realized. For information on the assumptions used in valuing this award, refer to Note 15 to the consolidated financial statements included elsewhere in this prospectus.

(2) The number of shares underlying outstanding stock options held by each non-employee director as of September 30, 2017, was as follows: Mr. Chess (70,340); Mr. Conley (0); Mr. Crandell (0); Mr. Craves (0); Ms. Mai (0) and Mr. Ragusa (0).

(3) This represents the grant date fair value of an option to purchase to purchase 70,340 shares of common stock granted on September 29, 2017 with an exercise price of $0.89 per share. The option grant is subject to a 4-year vesting schedule, with 10% of the shares vesting on

September 29, 2017, 15% of the shares vesting on September 28, 2018 and 1/48th of the shares vesting monthly thereafter, subject to continuous service through each applicable vesting date. The option has a term of ten years.

(4) Ms. Mai was appointed to the board of directors in July 2018 and did not serve as a member of the board in fiscal 2017.

In , 2018, our board of directors approved a non-employee director compensation policy that will become effective upon the closing of this offering. Under this policy, we will pay our non-employee directors a cash retainer for service on the board of directors and an additional cash retainer for service on each committee on which the director is a member, which will be paid quarterly in arrears. The chairman of each committee will receive higher retainers for such service. The fees paid to non-employee directors for service on the board of directors and for service on each committee of the board of directors on which the director is a member are as follows:

	Member Annual Retainer	Chairman Annual Retainer
Board of Directors	$	$
Audit Committee		
Compensation Committee		
Nominating and Corporate Governance Committee		

In addition, each non-employee director elected to our board of directors following the completion of this offering will, upon the date of his or her initial election or appointment to be a non-employee director, be granted an option to purchase a number of shares of common stock having a grant date fair value of $. One-third of the shares subject to such initial option grant will vest on each anniversary of the date of grant, subject to the director providing service through each vesting date. Further, at the close of business on the date of each annual stockholder meeting following the initial public offering, each person who is then a non-employee director will be granted an option to purchase a number of shares of common stock having a grant date fair value of $. 100% of the shares subject to such annual option grant will vest in full on the earlier of the one year anniversary of the grant date and the next annual stockholder meeting, subject to the director providing service through the vesting date. All stock option awards to non-employee directors following the completion of this offering are expected to be made pursuant to the 2018 Plan. For additional information, see “Executive compensation — 2018 equity incentive plan.”

We will also continue to reimburse our non-employee directors for reasonable travel and out-of-pocket expenses incurred in connection with attending our board of director and committee meetings.

The non-employee director compensation program is intended to provide a total compensation package that enables us to attract and retain qualified and experienced individuals to serve as directors and to align our directors’ interests with those of our stockholders.

Board diversity

Upon consummation of this offering, our nominating and governance committee will be responsible for reviewing with the board of directors, on an annual basis, the appropriate characteristics, skills and experience required for the board of directors as a whole and its individual members. In evaluating the suitability of individual candidates (both new candidates and current members), the nominating and governance committee, in recommending candidates for election, and the board of directors, in approving (and, in the case of vacancies, appointing) such candidates, may take into account many factors, including, but not limited to, diversity of personal and professional background, perspective and experience; personal and professional integrity, ethics and values; experience in corporate management, operations or finance; experience relevant to our industry and with relevant social policy concerns; experience as a board member or executive officer of another publicly held company; relevant academic expertise or other proficiency in an area of our operations; practical and mature business judgment; and any other relevant qualifications, attributes or skills.

Currently, our board of directors evaluates, and following the consummation of this offering will evaluate, each individual in the context of the board of directors as a whole, with the objective of assembling a group that can best maximize the success of the business and represent stockholder interests through the exercise of sound judgment using its diversity of experience in these various areas.

Limitation of liability and indemnification of directors and officers

Our amended and restated certificate of incorporation, which will become effective upon the closing of this offering, will contain provisions that limit the liability of our directors for monetary damages to the fullest extent permitted by Delaware law. Consequently, our directors will not be personally liable to us or our stockholders for monetary damages for any breach of fiduciary duties as directors, except liability for the following:

- any breach of their duty of loyalty to our company or our stockholders;
- any act or omission not in good faith or that involves intentional misconduct or a knowing violation of law;
- unlawful payments of dividends or unlawful stock repurchases or redemptions as provided in Section 174 of the DGCL; or
- any transaction from which they derived an improper personal benefit.

Our amended and restated bylaws, which will become effective upon the closing of this offering, will provide that we shall indemnify, to the fullest extent permitted by law, any person who is or was a party or is threatened to be made a party to any action, suit or proceeding, by reason of the fact that he or she is or was one of our directors or officers or is or was serving at our request as a director or officer of another corporation, partnership, joint venture, trust or other enterprise. Our amended and restated bylaws will provide that we may indemnify to the fullest extent permitted by law any person who is or was a party or is threatened to be made a party to any action, suit or proceeding, by reason of the fact that he or she is or was one of our employees or agents or is or was serving at our request as an employee or agent of another corporation, partnership, joint venture, trust or other enterprise. Our amended and restated bylaws will also provide that we must advance expenses incurred by or on behalf of a director or officer in advance of the final disposition of any action or proceeding, subject to very limited exceptions.

Prior to the closing of this offering, we intend to obtain insurance policies under which, subject to the limitations of the policies, coverage is provided to our directors and officers against loss arising from claims made by reason of breach of fiduciary duty or other wrongful acts as a director or officer, including claims relating to public securities matters, and to us with respect to payments that may be made by us to these officers and directors pursuant to our indemnification obligations or otherwise as a matter of law.

Prior to the closing of this offering, we intend to enter into indemnification agreements with each of our directors and executive officers that may be broader than the specific indemnification provisions contained in the DGCL. These indemnification agreements may require us, among other things, to indemnify our directors and executive officers against liabilities that may arise by reason of their status or service. These indemnification agreements may also require us to advance all expenses incurred by the directors and executive officers in investigating or defending any such action, suit or proceeding. We believe that these agreements are necessary to attract and retain qualified individuals to serve as directors and executive officers.

The underwriting agreement provides for indemnification by the underwriters of us and our officers, directors and employees for certain liabilities arising under the Securities Act, or otherwise.

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers or persons controlling our company pursuant to the foregoing provisions, we have been informed that, in the opinion of the Securities and Exchange Commission, such indemnification is against public policy as expressed in the Securities Act and is therefore unenforceable.

Executive compensation

Overview

As an emerging growth company, we have opted to comply with the executive compensation disclosure rules applicable to "smaller reporting companies," as such term is defined in the rules promulgated under the Securities Act.

Our named executive officers for fiscal 2017 were:

- Emily M. Leproust, our President, Chief Executive Officer and Secretary;
- William Banyai, our Chief Operating Officer; and
- Patrick Weiss, our Senior Vice President, Global Operations.

Summary compensation table

The following table sets forth certain information regarding the compensation of our named executive officers for fiscal 2017:

Name and principal position	Year	Salary ($)(1)	Bonus ($)	Option awards ($)(2)	Non-equity incentive plan compensation ($)(3)	All other compensation ($)	Total ($)
Emily M. Leproust *President, Chief Executive Officer and Secretary*	2017	340,001	—	2,445,057	87,150	—	2,872,208
William Banyai *Chief Operating Officer*	2017	317,501	—	1,615,700	58,848	—	1,992,049
Patrick Weiss *Senior Vice President, Global Operations*	2017	314,994	—	1,070,000	44,136	—	1,429,130

(1) The amounts reported in this column represent salary earned by each of our named executive officers in fiscal 2017.

(2) The amounts reported in this column reflect the aggregate grant date fair value for financial statement reporting purposes of stock options granted in fiscal 2017 as determined in accordance with FASB ASC Topic 718. These amounts reflect our accounting expense for these stock options and do not represent the actual economic value that may be realized by each named executive officer. There can be no assurance that these amounts will ever be realized. For information on the assumptions used in valuing these awards, refer to Note 15 to the consolidated financial statements included elsewhere in this prospectus.

(3) Represents annual bonuses earned by each named executive officer under our annual cash incentive plan for executive officers for fiscal 2017. The amounts reported represent performance-based cash incentives earned by each named executive officer based on the achievement of certain revenue goals and strategic objectives and the named executive officer's target incentive compensation amount.

Outstanding equity awards as of September 30, 2017

The following table provides information regarding the unexercised stock options and restricted stock awards held by each of our named executive officers as of September 30, 2017:

		Option awards(1)				Stock awards(1)	
Name	Grant date	Number of securities underlying unexercised options (#) exercisable (2)	Number of securities underlying unexercised options (#) unexercisable (3)	Option exercise price ($)(4)	Option expiration date	Number of shares or units of stock that have not vested (#) (5)	Market value of shares or units of stock that have not vested ($) (6)
Emily M. Leproust	9/29/2015(7)	500,000	500,000	0.60	9/28/2025	—	—
	9/29/2017(8)	228,510	2,056,590	0.89	9/28/2027	—	—
William Banyai	9/29/2015(7)	500,000	500,000	0.60	9/28/2025	—	—
	9/29/2017(8)	151,000	1,359,000	0.89	9/28/2027	—	—
Patrick Weiss	4/1/2014(9)	—	—	—	—	9,875	
	6/19/2014(10)	—	—	—	—	86,415	
	9/29/2015(11)	250,000	250,000	0.60	9/28/2025	—	—
	9/29/2017(8)	100,000	900,000	0.89	9/28/2027	—	—

(1) All awards were granted under our 2013 Plan.

(2) Because all stock options granted to our named executive officers under the 2013 Plan are early exercisable, and early exercised shares are subject to a repurchase right in favor of the Company which lapses as the option vests, this column reflects the number of options held by our named executive officers that were exercisable and vested as of September 30, 2017.

(3) Because all stock options granted to our named executive officers under the 2013 Plan are early exercisable, and early exercised shares are subject to a repurchase right in favor of the Company which lapses as the option vests, this column reflects the number of options held by our named executive officers that were exercisable and unvested as of September 30, 2017.

(4) This column represents the fair market value of a share of our common stock on the date of grant, as determined by our board of directors.

(5) The shares in this column represent shares of restricted stock issued upon the early exercise of stock options, in each case that remained unvested as of September 30, 2017. We have a right to repurchase any unvested shares subject to each such award if the holder of the award ceases to provide services to us prior to the applicable vesting dates.

(6) The market value of our common stock is based upon the assumed initial public offering price of $ per share, which is the midpoint of the estimated offering price range set forth on the cover page of this prospectus.

(7) The option grant is subject to a 4-year vesting schedule, with 25% of the shares vesting on September 1, 2016 and 1/48th of the shares vesting monthly thereafter, subject to continuous service through each applicable vesting date. The option grant is also subject to a 50% single trigger acceleration provision and a 100% double trigger acceleration provision (in each case, as described below).

(8) The option grant is subject to a 4-year vesting schedule, with 10% of the shares vesting on September 29, 2017, 15% of the shares vesting on September 28, 2018 and 1/48th of the shares vesting monthly thereafter, subject to continuous service through each applicable vesting date.

(9) The restricted shares were part of an early exercised stock option grant covering 79,000 shares of our common stock that are subject to a 4-year vesting schedule, with 25% of the shares vesting on March 31, 2015 and 1/48th of the shares vesting monthly thereafter, subject to continuous service through each applicable vesting date.

(10) The restricted shares were part of an early exercised stock option grant covering 460,877 shares of our common stock that are subject to a 4-year vesting schedule, with 25% of the shares vesting on June 19, 2015 and 1/48th of the shares vesting monthly thereafter, subject to continuous service through each applicable vesting date.

(11) The option grant is subject to a 4-year vesting schedule, with 25% of the shares vesting on September 1, 2016 and 1/48th of the shares monthly thereafter, subject to continuous service through each applicable vesting date.

Base salary

We use base salaries to recognize the experience, skills, knowledge and responsibilities required of all our employees, including our named executive officers. None of our named executive officers is currently party to an employment agreement or other agreement or arrangement that provides for automatic or scheduled increases in base salary.

Annual bonus

We have an annual objective-setting and review process for our named executive officers that is the basis for the determination of potential annual bonuses. Our board of directors reviews and approves both the annual objectives and the payment of annual bonuses for our executives. Each of our named executive officers is eligible for annual performance-based bonuses of up to a specific percentage of their salary, subject to approval by our board of directors or the compensation committee. The performance-based bonus is tied to a set of specified goals and strategic objectives for our named executive officers and we conduct an annual performance review to determine the attainment of such goals and objectives. Our management may propose bonus awards to our board of directors primarily based on such review process. Our board of directors or the compensation committee makes the final determination of the achievement of both the specified corporate and strategic objectives and the eligibility requirements for and the amount of such bonus awards. For fiscal 2017, annual bonuses were paid out based on the satisfaction of certain revenue goals and strategic objectives.

Equity-based incentive awards

Our equity-based incentive awards are designed to align our interests and the interests of our stockholders with those of our employees and consultants, including our named executive officers. Our board of directors or the compensation committee is responsible for approving equity grants to employees and consultants.

Prior to this offering, we have granted all equity incentive awards pursuant to our 2013 Plan. Following this offering, we will grant equity incentive awards under the terms of our 2018 Plan. The terms of our equity plans are described below under “Equity incentive plans.”

All stock options are granted with an exercise price per share that is no less than the fair market value of our common stock on the date of grant of each award. Our stock option awards generally vest over a four-year period and may be subject to acceleration of vesting and exercisability under certain termination and corporate transaction events.

On September 29, 2017, the compensation committee granted stock options to Emily Leproust, William Banyai and Patrick Weiss, to purchase 2,285,100 shares, 1,510,000 shares and 1,000,000 shares, respectively, each at an exercise price of $0.89 per share. Ten percent of the shares subject to each option grant were vested on the date of grant and 15% of the shares will vest on September 28, 2018, and 1/48th of the shares will vest on each monthly anniversary thereafter, subject to the named executive officer’s continuous service through each applicable vesting date.

Employment agreements

In connection with the offering, we entered into an amended and restated employment agreement with each of the named executive officers, effective as of the effective time of the registration statement. These agreements provide for at-will employment and establish the named executive officer’s base salary, eligibility to participate in an incentive bonus plan and standard employee benefits.

These amended and restated employment agreements also provide for certain severance payments and benefits in connection with each named executive officer’s termination of employment under various circumstances, including in connection with a change in control of the Company. The material terms and conditions of these provisions are summarized below in “—Potential Payments Upon Termination or Change in Control.” The severance and change in control benefits described below will be in effect for ____ years from the effective date of the registration statement.

Potential payments upon termination or change in control

Involuntary Termination of Employment Not in Connection with Change in Control

In the event that we terminate a named executive officer's employment without "cause" or such named executive officer dies, experiences a "disability" or resigns for "good reason," in each case, other than during the two month period prior to, or the 12-month period following, a change in control, such named executive officer will be eligible to receive the following severance benefits, subject to, among other things, executing a general release of claims in favor of the Company and complying with the terms of his or her confidentiality agreement:

- a cash payment equal to months of her then-current base salary in the case of Ms. Leproust and months of his then-current base salary in the case of Mr. Banyai and Mr. Weiss, payable according to our regular payroll schedule over a -month period; and
- COBRA premiums for a period of months in the case of Ms. Leproust and months in the case of Mr. Banyai and Mr. Weiss.

Involuntary Termination of Employment in Connection with Change in Control

In the event that we terminate a named executive officer's employment without "cause" or such named executive officer dies, experiences a "disability" or resigns for "good reason," in each case, within the two-month period prior to, or the 12-month period following a change in control, such named executive officer will be eligible to receive the following severance benefits, subject to, among other things, executing a general release of claims in favor of the Company and complying with the terms of his or her confidentiality agreement:

- a cash payment equal to months of her then-current base salary in the case of Ms. Leproust and months of his then-current base salary in the case of Mr. Banyai and Mr. Weiss, payable according to our regular payroll schedule over a -month period;
- COBRA premiums for a period of months in the case of Ms. Leproust and months in the case of Mr. Banyai and Mr. Weiss; and
- % immediate vesting acceleration of all of the shares of our common stock underlying any then-outstanding unvested stock options and other unvested equity awards.

Each named executive officer's employment agreement contains a "better after-tax" provision, which provides that if any of the payments to an executive constitutes a parachute payment under Section 280G of the Code, the payments will either be (i) reduced or (ii) provided in full to the executive, whichever results in the named executive officer receiving the greater amount after taking into consideration the excise tax under Section 4999 of the Code and any interest or penalties associated with such excise tax.

As defined in each named executive officer's employment agreement, "cause" means the named executive officer's (i) material breach of the employment agreement any other written agreement with the Company, which breach to the extent deemed curable by the board of directors is not cured within 10 business days after written notice thereof from the Company; (ii) material failure to comply with the Company's written policies or rules, which breach to the extent deemed curable by the board of directors is not cured within ten (10) business days after written notice thereof from the Company; (iii) repeated failure to follow reasonable and lawful instructions from the board of directors, which failure is not cured within 10 business days after written notice thereof from the Company; (iv) commission, conviction of, or a plea of "guilty" or "no contest" to, a felony under the laws of the United States or any state if such felony is work-related, impairs his or her ability to perform services for the Company in accordance with the employment agreement, or results in a loss to the Company or damage to the reputation of the Company; (v) misappropriation of funds or property of the

Company; (vi) gross neglect of his or her duties; (vii) act or omission that results directly or indirectly in material financial accounting improprieties for the Company; (viii) failure to cooperate with a government investigation; or (ix) gross or willful misconduct resulting in a loss to the Company or damage to the reputation of the Company.

As defined in each named executive officer's employment agreement, "good reason" means a resignation by the named executive officer within 90 days after one of the following conditions has come into existence without his or her written consent: (i) a material diminution in executive's authority, duties or responsibilities; (ii) a material reduction of executive's annual base salary unless there is a corresponding reduction in the base salaries of all other executive officers of the Company; or (iii) a material change in the geographic location at executive you must perform services. A condition shall not be considered "good reason" unless executive gives the Company written notice of the condition within 30 days after the condition comes into existence and the Company fails to remedy the condition within 30 days after receiving executive's written notice.

As defined in each named executive officer's employment agreement, "disability" means that the named executive officer is unable to perform the essential functions of his or her position, with or without reasonable accommodation, for a period of at least 120 consecutive days because of a physical or mental impairment.

Option agreements

The stock option awards granted to Emily Leproust and William Banyai on September 29, 2015, provide that in the event of a "corporate transaction" (as defined in the 2013 Plan) that occurs during the executive officer's service, 50% of the then unvested shares subject to the stock option shall vest as of immediately prior to such corporate transaction. In addition, if the executive officer is terminated (A) upon the consummation of, or within 12 months following, a corporate transaction and (B) by the Company without "cause" or by the executive officer for "good reason" (each, as defined below), then 100% of the then unvested shares subject to the option shall immediately vest as of the date of such termination.

For purposes of the stock options granted to Emily Leproust and William Banyai on September 29, 2015, "cause" exists if the executive officer is terminated as a result of the following: (i) dishonest statements or acts of the executive officer with respect to the Company that are materially injurious to the Company; (ii) commission by the executive officer of, or indictment of the executive officer for, (A) a felony or (B) a misdemeanor involving moral turpitude, deceit, dishonesty or fraud; (iii) commission of an act involving a violation of material procedures or policies of the Company, which, if curable, remain uncured for more than 30 days after the executive officer's knowledge of such violation; (iv) material and sustained failure of the executive officer to perform the duties and responsibilities assigned under her or his employment agreement, which if curable, remain uncured for more than 30 days after the executive officer is given notice of such breach; (v) gross negligence, willful misconduct or insubordination of the executive officer with respect to the Company or any affiliate of the Company that is materially injurious to the Company; (vi) a material breach by the executive officer of any of her or his obligations under the employment agreement or any other agreement with the Company; or (vii) termination by the executive officer of her or his employment upon less than 60 days advance written notice.

For purposes of the stock options granted to Emily Leproust and William Banyai on September 29, 2015, "good reason" means a resignation of the employment by the applicable executive officer after the occurrence of any of the following events: (i) a material reduction in the executive officer's then current base salary except in certain limited circumstances; (ii) a material reduction in the executive officer's authority, duties, or responsibilities except in certain limited circumstances; or (iii) a relocation of the executive officer's principal office to a location which increases the executive officer's commute more than 50 miles from the location of the executive officer's principal office.

Equity incentive plans

2018 equity incentive plan

General. Our 2018 Equity Incentive Plan, or 2018 Plan, was adopted by our board of directors on and approved by our stockholders on . The 2018 Plan will become effective on the day immediately prior to the date that the registration statement of which this prospectus forms a part becomes effective.

Share Reserve. The maximum aggregate number of shares that may be issued under the 2018 Plan is shares of our common stock, which number is the sum of (i) shares of our common stock plus (ii) any shares remaining available for issuance under the 2013 Stock Plan at the time the 2018 Plan becomes effective, in an amount not to exceed shares, plus (iii) any shares subject to awards under the 2013 Plan that otherwise would have been returned to the 2013 Plan on account of the expiration, cancellation or forfeiture of such awards following the effectiveness of the 2018 Plan, in an amount not to exceed shares. In addition, the number of shares reserved for issuance under the 2018 Plan will be increased automatically on the first day of each fiscal year, following the fiscal year in which the 2018 Plan becomes effective, by a number equal to the least of:

- shares;
- % of the shares of common stock outstanding at that time; or
- such number of shares determined by our board of directors.

If an award expires, is forfeited or becomes unexercisable for any reason without having been exercised in full, or is surrendered pursuant to an exchange program, the unissued shares that were subject to the award will, unless the 2018 Plan is terminated, continue to be available under the 2018 Plan for issuance pursuant to future awards. In addition, any shares which are retained by the Company upon exercise of an award in order to satisfy the exercise or purchase price for such award or any withholding taxes due with respect to such award will be treated as not issued and will continue to be available under the 2018 Plan for issuance pursuant to future awards. Shares issued under the 2018 Plan and later forfeited to the Company due to the failure to vest or repurchased by the Company at the original purchase price paid to the Company for the shares (including, without limitation, upon forfeiture to or repurchase by the Company in connection with a participant ceasing to be a service provider) will again be available for future grant under the 2018 Plan. To the extent an award under the 2018 Plan is paid out in cash rather than shares, such cash payment will not result in reducing the number of Shares available for issuance under the 2018 Plan.

Plan administration. Our board of directors has delegated its authority to administer the 2018 Plan to our compensation committee. Subject to the provisions of our 2018 Plan, the administrator has the power to determine the terms of awards, including the recipients, the exercise price, if any, the number of shares subject to each award, the fair market value of a share of our common stock, the vesting schedule applicable to the awards, together with any vesting acceleration, and the form of consideration, if any, payable upon exercise of the award and the terms of the award agreement for use under the 2018 Plan. The administrator also has the authority, subject to the terms of the 2018 Plan, to amend existing awards, to prescribe rules and to construe and interpret the 2018 Plan and awards granted thereunder and to institute an exchange program by which outstanding awards may be surrendered in exchange for awards of the same type which may have a lower exercise price or different terms, awards of a different type and/or cash subject to stockholder approval.

Eligibility. Employees, members of our board of directors who are not employees and consultants are eligible to participate in our 2018 Plan.

Types of award. Our 2018 Plan provides for the grant of incentive stock options, within the meaning of Section 422 of the Code, to our employees and the employees of our subsidiaries, and for the grant of

nonstatutory stock options, stock appreciation rights, restricted stock, restricted stock units, performance units, and performance shares to our employees, directors, and consultants and the employees and consultants of our subsidiaries.

Stock options. The administrator may grant incentive and/or non-statutory stock options under our 2018 Plan, provided that incentive stock options may only be granted to employees. The exercise price of such options must generally be equal to at least the fair market value of our common stock on the date of grant. The term of an option may not exceed 10 years; provided, however, that an incentive stock option held by a participant who owns more than 10% of the total combined voting power of all classes of our stock, or of certain of our subsidiary corporations, may not have a term in excess of five years and must have an exercise price of at least 110% of the fair market value of our common stock on the grant date. The administrator will determine the methods of payment of the exercise price of an option, which may include cash, shares or other property acceptable to the administrator. Subject to the provisions of our 2018 Plan, the administrator determines the remaining terms of the options (e.g., vesting). After the termination of service of an employee, director or consultant, the participant may exercise his or her option, to the extent vested, for the period of time stated in his or her option agreement. Generally, if termination is due to death or disability, the option will remain exercisable for 12 months. In the event of a termination for cause, options generally terminate immediately upon the termination of the participant for cause. In all other cases, the option will generally remain exercisable for three months following the termination of service. However, in no event may an option be exercised later than the expiration of its term. The maximum aggregate number of shares of our common stock that may be issued under the 2018 Plan pursuant to incentive stock options may not exceed the maximum number of shares initially reserved under the 2018 Plan and to the extent allowable under Section 422 of the Internal Revenue Code, or the Code, any other shares that become available for issuance or reissuance pursuant to the terms of the 2018 Plan.

Stock appreciation rights. Stock appreciation rights may be granted under our 2018 Plan. Stock appreciation rights allow the recipient to receive the appreciation in the fair market value of our common stock between the date of grant and the exercise date. Subject to the provisions of our 2018 Plan, the administrator determines the terms of stock appreciation rights, including when such rights vest and become exercisable and whether to settle such awards in cash or with shares of our common stock, or a combination thereof, except that the per share exercise price for the shares to be issued pursuant to the exercise of a stock appreciation right will be no less than 100% of the fair market value per share on the date of grant. The specific terms will be set forth in an award agreement.

Restricted stock. Restricted stock may be granted under our 2018 Plan. Restricted stock awards are grants of shares of our common stock that are subject to various restrictions, including restrictions on transferability and forfeiture provisions. Shares of restricted stock will vest and the restrictions on such shares will lapse, in accordance with terms and conditions established by the administrator. Such terms may include, among other things, vesting upon the achievement of specific performance goals determined by the administrator and/or continued service. The administrator, in its sole discretion, may accelerate the time at which any restrictions will lapse or be removed. Recipients of restricted stock awards generally will have voting and dividend rights with respect to such shares upon grant without regard to vesting, unless the administrator provides otherwise. Shares of restricted stock that do not vest for any reason will be subject to our right of repurchase or forfeited by the recipient and will revert to us. The specific terms will be set forth in an award agreement.

Restricted stock units. Restricted stock units may be granted under our 2018 Plan, and may include the right to dividend equivalents, as determined in the discretion of the administrator. Each restricted stock unit granted is a bookkeeping entry representing an amount equal to the fair market value of one share of our common stock. The administrator determines the terms and conditions of restricted stock units, including the vesting criteria, which may include achievement of specified performance criteria and/or continued service, and the form and timing of

payment. The administrator, in its sole discretion, may accelerate the time at which any restrictions will lapse or be removed. The administrator determines, in its sole discretion, whether an award will be settled in stock, cash or a combination of both. The specific terms will be set forth in an award agreement.

Performance units/performance shares. Performance units and performance shares may be granted under our 2018 Plan. Performance units and performance shares are awards that will result in a payment to a participant only if performance goals established by the administrator are achieved and any other applicable vesting provisions are satisfied. The administrator will establish organizational or individual performance goals in its discretion, which, depending on the extent to which they are met, will determine the number and/or the value of performance units and performance shares to be paid out to participants. For purposes of such awards, the performance goals may be based on one or more of the following performance criteria and any adjustment(s) thereto, in each case as determined by the administrator: (i) sales or non-sales revenue; (ii) return on revenues; (iii) operating income; (iv) income or earnings including operating income; (v) income or earnings before or after taxes, interest, depreciation, and/or amortization; (vi) income or earnings from continuing operations; (vii) net income; (viii) pre-tax income or after-tax income; (ix) net income excluding amortization of intangible assets, depreciation and impairment of goodwill and intangible assets, and/or excluding charges attributable to the adoption of new accounting pronouncements; (x) raising of financing or fundraising; (xi) project financing; (xii) revenue backlog; (xiii) gross margin; (xiv) operating margin or profit margin; (xv) capital expenditures, cost targets, reductions and savings, and expense management; (xvi) return on assets (gross or net), return on investment, return on capital or invested capital, or return on stockholder equity; (xvii) cash flow, free cash flow, cash flow return on investment (discounted or otherwise), net cash provided by operations, or cash flow in excess of cost of capital; (xviii) performance warranty and/or guarantee claims; (xix) stock price or total stockholder return; (xx) earnings or book value per share (basic or diluted); (xxi) economic value created; (xxii) pre-tax profit or after-tax profit; (xxiii) strategic business criteria, consisting of one or more objectives based on meeting specified market penetration or market share, completion of strategic agreements such as licenses, funded collaborations, joint ventures, acquisitions, and the like, geographic business expansion, objective customer satisfaction or information technology goals, and/or intellectual property asset metrics; (xxiv) objective goals relating to divestitures, joint ventures, mergers, acquisitions, and similar transactions; (xxv) objective goals relating to staff management, results from staff attitude and/or opinion surveys, staff satisfaction scores, staff safety, staff accident and/or injury rates, compliance headcount, performance management, and completion of critical staff training initiatives; (xxvi) objective goals relating to projects, including project completion timing and/or achievement of milestones, project budget, and technical progress against work plans; (xxvii) key regulatory objectives or milestones; and (xxviii) enterprise resource planning. However, awards issued to participants may take into account other factors (including subjective factors). In addition, performance goals may differ from participant to participant, performance period to performance period, and from award to award. Any criteria used may be measured, as applicable, (i) in absolute terms, (ii) in relative terms (including, but not limited to, any increase (or decrease) over the passage of time and/or any measurement against other companies or financial or business or stock index metrics particular to us), (iii) on a per share and/or share per capita basis, (iv) against our performance as a whole or against any of our affiliate(s), or a particular segment(s), a business unit(s) or a product(s) of ours or individual project company, (v) on a pre-tax or after-tax basis, and/or (vi) using an actual foreign exchange rate or on a foreign exchange neutral basis. After the grant of a performance unit or performance share, the administrator, in its sole discretion, may reduce or waive any performance objectives or other vesting provisions for such performance units or performance shares. Performance units shall have an initial dollar value established by the administrator prior to the grant date. Performance shares shall have an initial value equal to the fair market value of our common stock on the grant date. The administrator, in its sole discretion, may pay earned performance units or performance shares in the form of cash, in shares, or in some combination thereof.

Non-transferability of awards. Unless the administrator provides otherwise, our 2018 Plan generally does not allow for the transfer of awards and only the recipient of an option or stock appreciation right may exercise such an award during his or her lifetime.

Certain adjustments. In the event of certain corporate events or changes in our capitalization, to prevent diminution or enlargement of the benefits or potential benefits available under the 2018 Plan, the administrator will make adjustments to one or more of the number, kind and class of securities that may be delivered under the 2018 Plan and/or the number, kind, class and price of securities covered by each outstanding award.

Liquidation or dissolution. In the event of our proposed winding up, liquidation or dissolution, the administrator will notify participants as soon as practicable and all awards will terminate immediately prior to the consummation of such proposed transaction.

Corporate transaction. Our 2018 Plan provides that in the event of certain significant corporate transactions, including: (1) a transfer of all or substantially all of our assets, (2) a merger, consolidation or other capital, reorganization or business combination transaction of the Company with or into another corporation, entity or person, or (3) the consummation of a transaction, or series of related transactions, in which any person becomes the beneficial owner, directly or indirectly, of more than 50% of the Company's then outstanding capital stock, each outstanding award will be treated as the administrator determines. Such determination may provide that such awards will be (i) continued if we are the surviving corporation, (ii) assumed by the surviving corporation or its parent, (iii) substituted by the surviving corporation or its parent for a new award, (iv) canceled in exchange for a payment equal to the excess of the fair market value of our shares subject to such award over the exercise price or purchase price paid for such shares, or if such award is "underwater" canceled for no consideration, if any, or (v) in the case of options, accelerated prior to the consummation of the corporate transaction and cancelled for no consideration if not exercised.

Change of control. The administrator may provide, in an individual award agreement or in any other written agreement between a participant and us that the stock award will be subject to additional acceleration of vesting and exercisability in the event of a change of control. Under the 2018 Plan, a "change of control" is generally (1) a merger, consolidation, or any other corporate reorganization in which our stockholders immediately before the transaction do not own, directly or indirectly, more than a majority of the combined voting power of the surviving entity (or the parent of the surviving entity), (2) the consummation of the sale, transfer or other disposition of all or substantially all of our assets, (3) an unapproved change in the majority of the board of directors, and (4) the acquisition by any person or company of more than 50% of the total voting power of our then outstanding stock.

Clawback/recovery. Stock awards granted under the 2018 Plan will be subject to recoupment in accordance with any clawback policy we may be required to adopt pursuant to applicable law and listing requirements. In addition, the administrator may impose such other clawback, recovery or recoupment provisions in any stock award agreement as it determines necessary or appropriate.

Amendment or termination. Our board of directors has the authority to amend, suspend or terminate the 2018 Plan provided such action does not impair the existing rights of any participant. Our 2018 Plan will automatically terminate in 2028, unless we terminate it sooner. We will obtain stockholder approval of any amendment to our 2018 Plan as required by applicable law or listing requirements.

2013 stock plan

General. Our board of directors adopted, and our stockholders approved, our 2013 Stock Plan, or the 2013 Plan, on February 4, 2013. The 2013 Plan was last amended on June 1, 2017. Our 2013 Stock Plan, or 2013 Plan,

will be terminated effective immediately prior to the effectiveness of the registration statement of which this prospectus forms a part, and no new awards will be granted under our 2013 Plan following this offering, but previously granted awards will continue to be subject to the terms and conditions of the 2013 Plan and the stock award agreements pursuant to which such awards were granted.

Share reserve. Under our 2013 Plan, we have reserved for issuance an aggregate of 34,306,102 shares. In general, if an award granted under our 2013 Plan is canceled or terminated or otherwise forfeited by a participant, then the number of shares underlying such award will again become available for awards under the 2013 Plan. Following the effectiveness of our 2018 Plan, such shares will again become available for awards under the 2018 Plan.

Plan administration. Our board of directors has administered the 2013 Plan before this offering. Our board of directors has delegated its authority to administer the 2013 Plan to our compensation committee following this offering.

Eligibility. Employees, members of our board of directors who are not employees and consultants are eligible to participate in our 2013 Plan.

Types of award. Our 2013 Plan provides for incentive and nonstatutory stock options to purchase shares of our common stock and restricted stock awards.

Stock options. The administrator may grant incentive and/or non-statutory stock options under our 2013 Plan, provided that incentive stock options are only granted to employees. The exercise price of such options must generally be equal to at least the fair market value of our common stock on the date of grant except for certain grants made to certain foreign employees. The term of an option must not exceed 10 years; provided, however, that an incentive stock option held by a participant who owns more than 10% of the total combined voting power of all classes of our stock, or of certain of our subsidiary corporations, must not have a term in excess of 5 years and must have an exercise price of at least 110% of the fair market value of our common stock on the grant date. The administrator determines the methods of payment of the exercise price of an option. In addition, the administrator determines the vesting schedule applicable to options, together with any vesting acceleration, and the terms of the option agreements for use under our 2013 Plan. After the termination of service of an employee, director or consultant, the participant may exercise his or her option, to the extent vested, for the period of time stated in his or her option agreement. Generally, if termination is due to death or disability, the option will remain exercisable for 12 months. In the event of a termination for cause, options generally terminate immediately upon the termination of the participant for cause. In all other cases, the option will generally remain exercisable for 3 months following the termination of service. However, in no event may an option be exercised later than the expiration of its term.

Restricted stock. Restricted stock may be granted under our 2013 Plan. Restricted stock awards are grants of shares of our common stock that are subject to various restrictions, including restrictions on transferability and forfeiture provisions. Shares of restricted stock will vest and the restrictions on such shares will lapse, in accordance with terms and conditions established by the administrator. The administrator, in its sole discretion, may accelerate the time at which any restrictions will lapse or be removed. Recipients of restricted stock awards generally will have the same rights as other shareholders with respect to such shares upon grant without regard to vesting, subject to any applicable agreements. Shares of restricted stock that do not vest for any reason will be subject to our right of repurchase or forfeited by the recipient and will revert to us. The specific terms will be set forth in an award agreement.

Non-transferability of awards. Unless the administrator provides otherwise, our 2013 Plan generally does not allow for the transfer of awards and only the recipient of an option or stock appreciation right may exercise such an award during his or her lifetime.

Certain adjustments. In the event of certain corporate events or changes in our capitalization, to prevent diminution or enlargement of the benefits or potential benefits available under the 2013 Plan, the administrator will make adjustments to one or more of the number, kind and class of securities that may be delivered under the 2013 Plan and/or the number, kind, class and price of securities covered by each outstanding award.

Liquidation or dissolution. In the event of our proposed winding up, liquidation or dissolution, all awards will terminate immediately prior to the consummation of such proposed transaction.

Corporate transaction. The 2013 Plan provides that in the event of certain significant corporate transactions, including: (1) a transfer of all or substantially all of our assets, (2) a merger, consolidation or other capital, reorganization or business combination transaction of the Company with or into another corporation, entity or person, or (3) the consummation of a transaction, or series of related transactions, in which any person becomes the beneficial owner, directly or indirectly, of more than 50% of the Company's then outstanding capital stock, each outstanding award will be treated as the administrator determines. Such determination may provide that such awards will be (i) continued if we are the surviving corporation, (ii) assumed by the surviving corporation or its parent, (iii) substituted by the surviving corporation or its parent for a new award, (iv) canceled in exchange for a payment equal to the excess of the fair market value of our shares subject to such award over the exercise price or purchase price paid for such shares, or if such award is "underwater" canceled for no consideration, if any, or (v) in the case of options, accelerated prior to the consummation of the corporate transaction and cancelled for no consideration if not exercised.

Amendment or termination. Our board of directors may amend or terminate the 2013 Plan at any time. If our board of directors amends a plan, it does not need to ask for stockholder approval of the amendment unless such amendment increases the number of shares available for issuance under the 2013 Plan or as otherwise required by applicable law. No further awards will be made under the 2013 Plan after this offering.

Employee stock purchase plan

General. Our Employee Stock Purchase Plan, or 2018 ESPP, was adopted by our board of directors on and approved by our stockholders on . The 2018 ESPP will become effective on the day immediately prior to the date that the registration statement of which this prospectus forms a part becomes effective. The 2018 ESPP is intended to qualify as an "employee stock purchase plan" within the meaning of Section 423 of the Code for U.S. employees. In addition, the 2018 ESPP authorizes grants of purchase rights that do not comply with Section 423 of the Code under a separate non-423 component for non-U.S. employees and certain non-U.S. service providers.

Share reserve. We have reserved shares of our common stock for issuance under the ESPP. The number of shares reserved for issuance under the ESPP will be increased automatically on the first day of each fiscal year for a period of up to ten years, starting with the fiscal year following the year in which the ESPP becomes effective, by a number equal to the least of:

- shares;
- % of the shares of common stock outstanding at that time; or
- such number of shares determined by our board of directors.

As of the date hereof, no shares of our common stock have been purchased under the ESPP.

Plan administration. The ESPP will be administered by our board of directors or a committee designated by our board of directors. Our board of directors has delegated its authority to administer the ESPP to our compensation committee.

Eligibility. Generally, all regular employees, including executive officers, employed by us or by any of our designated affiliates and certain non-U.S. service providers may participate in the ESPP.

Employees may have to satisfy one or more of the following service requirements before participating in the ESPP, as determined by the administrator, including: (1) being customarily employed for more than 20 hours per week, (2) being customarily employed for more than five months per calendar year, or (3) continuous employment with us or one of our affiliates for a period of time (not to exceed two years). No employee may purchase shares under the ESPP at a rate in excess of $25,000 worth of our common stock based on the fair market value per share of our common stock at the beginning of an offering for each year such a purchase right is outstanding. Finally, no employee will be eligible for the grant of any purchase rights under the ESPP if immediately after such rights are granted, such employee has voting power over 5% or more of our outstanding capital stock measured by vote or value under Section 424(d) of the Code.

Non-U.S. service providers must provide bona fide services to the Company and may be subject to additional eligibility criteria as the administrator may determine even if such criteria is not consistent with Section 423 of the Code.

Offerings. The 2018 ESPP is implemented through a series of offerings under which participants are granted purchase rights to purchase shares of our common stock on specified dates during such offerings. Under the 2018 ESPP, we may specify offerings with durations of not more than 27 months, and may specify shorter purchase periods within each offering. Each offering will have one or more purchase dates on which shares of our common stock will be purchased for participants in the offering. An offering under the 2018 ESPP may be terminated under certain circumstances. The administrator will have the discretion to structure an offering so that if the fair market value of a share of our common stock on the first trading day of a new purchase period within that offering is less than or equal to the fair market value of a share of our common stock on the offering date for that offering, then that offering will terminate immediately as of that first trading day, and the participants in such terminated offering will be automatically enrolled in a new offering beginning on the first trading day of such new offering period.

Payroll deductions. Participants who are employees may contribute, normally through payroll deductions, up to % of their earnings (as defined in the 2018 ESPP) for the purchase of our common stock under the ESPP. Participants who are not employees will contribute on an after-tax basis in a manner determined by the administrator.

Unless otherwise determined by the administrator, common stock will be purchased for the accounts of participants in the 2018 ESPP at a price per share that is at least the lesser of (1) 85% of the fair market value of a share of our common stock on the first date of an offering, or (2) 85% of the fair market value of a share of our common stock on the date of purchase.

Certain adjustments. In the event that there occurs a change in our capital structure through such actions as a stock split, reverse stock split, stock dividend, combination, consolidation, recapitalization (including a recapitalization through a large nonrecurring cash dividend) or reclassification of our common stock, subdivision of our common stock, a rights offering, a reorganization, merger, spin-off, split-up, repurchase, or exchange of our common stock or other significant corporate transaction, or other change affecting our common stock, the administrator will make appropriate adjustments to: (1) the classes) and maximum number of shares reserved under the 2018 ESPP, (2) the class(es) and maximum number of shares by which the share reserve may increase automatically each year, (3) the class(es) and number of shares and purchase price of all outstanding purchase rights, and (4) the class(es) and number of shares that are subject to purchase limits under ongoing offerings.

Dissolution or liquidation. In the event of our proposed winding up, liquidation or dissolution, any offering period then in progress will be shortened by setting a new purchase date, and will terminate immediately prior to the consummation of such proposed dissolution or liquidation, unless provided otherwise by the

administrator. The administrator will notify each participant that the purchase date has been changed and that the participant's purchase right will be exercised automatically on the new purchase date unless prior to such date the participant has withdrawn from the offering period.

Corporate transactions. The 2018 ESPP provides that in the event of certain significant corporate transactions, including: (1) a transfer of all or substantially all of our assets, (2) a merger, consolidation or other capital, reorganization or business combination transaction of the Company with or into another corporation, entity or person, or (3) the consummation of a transaction, or series of related transactions, in which any person becomes the beneficial owner, directly or indirectly, of more than 50% of the Company's then outstanding capital stock, a successor corporation may assume or substitute each outstanding purchase right. If the successor corporation refuses to assume or substitute the purchase right, the offering period then in progress will be shortened, and a new purchase date will be set. The administrator will notify each participant that the purchase date has been changed and that the participant's purchase right will be exercised automatically on the new purchase date unless prior to such date the participant has withdrawn from the offering period.

Amendment or termination. The administrator has the authority to amend, suspend or terminate our ESPP, except that, subject to certain exceptions described in our ESPP, no such action may adversely affect any outstanding rights to purchase stock under our ESPP without the holder's consent. We will obtain stockholder approval of any amendment to our ESPP as required by applicable law or listing requirements.

Executive incentive bonus plan

Our Executive Incentive Bonus Plan, or Bonus Plan, was adopted by our board of directors on . The Bonus Plan will become effective on the day immediately prior to the date that the registration statement of which this prospectus forms a part becomes effective. The purpose of the Bonus Plan is to motivate and reward eligible officers and employees for their contributions toward the achievement of certain performance goals.

Administration. The Bonus Plan will be administered by the compensation committee, which shall have the discretionary authority to interpret the provisions of the Bonus Plan, including all decisions on eligibility to participate, the establishment of performance goals, the amount of awards payable under the plan, and the payment of awards. The compensation committee, in its sole discretion and on such terms and conditions as it may provide, may delegate all or part of its authority and powers under the Bonus Plan to one or more directors and/or officers of the Company.

Eligibility. Officers and other key employees of the Company designated by the compensation committee to participate in the Bonus Plan will be eligible to participate in this Bonus Plan, provided the compensation committee has not, in its sole discretion, withdrawn such designation and he or she meets the following conditions: (a) is a full-time regular employee of the Company as of the last day of the applicable performance period; and (b) is not subject to disciplinary action, is in good standing with the Company and is not subject to a performance improvement plan.

Performance criteria. Commencing with fiscal 2019, we expect the compensation committee to establish cash bonus targets and corporate performance metrics for a specific performance period pursuant to the Bonus Plan. Corporate performance goals may be based on one or more of the following criteria, as determined by our compensation committee and any adjustments thereto established by the compensation committee: (i) sales or non-sales revenue; (ii) return on revenues; (iii) operating income; (iv) income or earnings including operating income; (v) income or earnings before or after taxes, interest, depreciation, and/or amortization; (vi) income or earnings from continuing operations; (vii) net income; (viii) pre-tax income or after-tax income; (ix) net income excluding amortization of intangible assets, depreciation, and impairment of goodwill and intangible assets and/or excluding charges attributable to the adoption of new accounting pronouncements; (x) raising of financing or fundraising; (xi) project financing; (xii) revenue backlog; (xiii) gross margin; (xiv) operating margin

or profit margin; (xv) capital expenditures, cost targets, reductions, and savings and expense management; (xvi) return on assets (gross or net), return on investment, return on capital or invested capital, or return on stockholder equity; (xvii) cash flow, free cash flow, cash flow return on investment (discounted or otherwise), net cash provided by operations, or cash flow in excess of cost of capital; (xviii) performance warranty and/or guarantee claims; (xix) stock price or total stockholder return; (xx) earnings or book value per share (basic or diluted); (xxi) economic value created; (xxii) pre-tax profit or after-tax profit; (xxiii) strategic business criteria, consisting of one or more objectives based on meeting specified market penetration or market share, completion of strategic agreements such as licenses, funded collaborations, joint ventures acquisitions, and the like, geographic business expansion, objective customer satisfaction or information technology goals, or intellectual property asset metrics; (xxiv) objective goals relating to divestitures, joint ventures, mergers, acquisitions, and similar transactions; (xxv) objective goals relating to staff management, results from staff attitude and/or opinion surveys, staff satisfaction scores, staff safety, staff accident and/or injury rates, compliance, headcount, performance management, or completion of critical staff training initiatives; (xxvi) objective goals relating to projects, including project completion, timing and/or achievement of milestones, project budget, or technical progress against work plans; (xxvii) key regulatory objectives or milestones; and (xxviii) enterprise resource planning.

However, awards issued to participants may take into account other factors (including subjective factors). Performance goals may differ from participant to participant, performance period to performance period, and from award to award. Any criteria used may be measured, as applicable, (i) in absolute terms, (ii) in relative terms (including, but not limited to, any increase (or decrease) over the passage of time and/or any measurement against other companies or financial or business or stock index metrics particular to us), (iii) on a per share and/or share per capita basis, (iv) against our performance as a whole or against any of our affiliate(s), or a particular segment(s), a business unit(s) or a product(s) of ours or individual project company, (v) on a pre-tax or after-tax basis, and/or (vi) using an actual foreign exchange rate or on a foreign exchange neutral basis.

Service requirement. Unless otherwise determined by the compensation committee, a participant must be actively employed and in good standing with the Company on the date the award is paid. The compensation committee may make exceptions to this requirement in the case of retirement, death or disability, an unqualified leave of absence or under other circumstances, as determined by the compensation committee in its sole discretion.

Limits. The total awards under the Bonus Plan may not exceed $5 million during any fiscal year or $20 million in the aggregate during the applicable reliance period (within the meaning of Section 162(m) of the Code).

Amendment or termination. The compensation committee may terminate the Bonus Plan at any time, provided such termination shall not affect the payment of any awards accrued under the Bonus Plan prior to the date of the termination. The compensation committee may, at any time, or from time to time, amend or suspend and, if suspended, reinstate, the Bonus Plan in whole or in part.

Perquisites, health, welfare and retirement benefits

Our named executive officers are eligible to participate in our employee benefit plans, including our medical, dental, vision, group life, disability and accidental death and dismemberment insurance plans, in each case on the same basis as all of our other employees, except that beginning in fiscal 2018, our named executive officers along with certain other key employees will be eligible to participate in a supplemental disability plan for which we will pay premiums. We provide a 401(k) plan to our employees, including our current named executive officers, as discussed in the section below entitled “—401(k) Plan.”

We generally do not provide perquisites or personal benefits to our named executive officers, except in limited circumstances.

401(k) plan

We maintain a tax-qualified retirement plan (401(k) plan) that provides eligible employees with an opportunity to save for retirement on a tax advantaged basis. Eligible employees are able to defer eligible compensation subject to applicable annual Code limits. Employees are immediately and fully vested in their contributions. The 401(k) plan permits us to make matching contributions and profit sharing contributions to eligible participants, although we have not made any such contributions to date. We intend for our 401(k) plan to qualify under Sections 401(a) and 501(a) of the Code so that contributions by employees to the 401(k) plan, and earnings on those contributions, are not taxable to employees until withdrawn from the 401(k) plan.

Pension benefits

None of our named executive officers participate in or have an account balance in any qualified or non-qualified defined benefit plan sponsored by us.

Nonqualified deferred compensation

We have not offered any nonqualified deferred compensation plans or arrangements or entered into any such arrangements with any of our named executive officers

Rule 10b5-1 sales plans

We expect that some of our executive officers and directors may enter into stock selling plans in accordance with Rule 10b5-1 of the Securities Exchange Act of 1934, as amended, and our insider trading policy.

Certain relationships and related party transactions

In addition to the compensation arrangements, including employment, termination of employment and change in control arrangements, and indemnification arrangements, discussed, when required, in the sections titled “Management” and “Executive compensation” and the registration rights described in the section titled “Description of capital stock—Registration rights,” the following is a description of each transaction since October 1, 2014 and each currently proposed transaction in which:

- we have been or are to be a participant;
- the amount involved exceeded or will exceed $120,000; and
- any of our directors, executive officers, or holders of more than 5% of any class of our voting securities, or any immediate family member of, or person sharing the household with, any of these persons, had or will have a direct or indirect material interest.

Equity financings

Series A convertible preferred stock financing

In three closings between July 2013 and January 2014, we sold an aggregate of 27,898,391 shares of our Series A convertible preferred stock at a purchase price of $0.3290 per share and upon conversion of certain convertible promissory notes with an aggregate conversion amount of approximately $610,000, for an aggregate purchase price of approximately $9.1 million. Each share of our Series A convertible preferred stock will convert automatically into one share of our common stock immediately prior to the completion of our initial public offering.

The following table summarizes the Series A convertible preferred stock purchased by our directors, executive officers and beneficial holders of more than 5% of our capital stock. The terms of these purchases, notwithstanding the conversion terms of the convertible promissory notes, were the same for all purchasers of our Series A convertible preferred stock.

Name of stockholder*	Shares of series A convertible preferred stock	Total purchase price (cash)	Total purchase price (conversion of indebtedness)
Entities affiliated with ARCH Venture Partners(1)	11,709,369	$3,399,999.83	$ 407,144.31
Illumina, Inc.(2)	5,368,361	$1,539,999.65	$ 203,572.01
Entities affiliated with Paladin Capital Group(3)	4,133,737	$1,359,999.48	$ 0.00

* Owners of more than 5% of our common stock

(1) Keith Crandell, a member of our board of directors, is a managing director at ARCH Venture Partners VII, LLC, which is affiliated with ARCH Venture Fund VII, L.P. Consists of shares held by ARCH Venture Fund VII, L.P.

(2) Robert Ragusa, a member of our board of directors, is Senior Vice President, Global Quality and Operations of Illumina, Inc.

(3) Paul Conley, a member of our board of directors, is a managing director of Paladin Capital Management, LLC, which is affiliated with the Paladin funds holding our shares but Mr. Conley does not beneficially own any of the shares held by the Paladin funds. Consists of shares held by Paladin III (CA), LP, Paladin III (Cayman Islands) LP, Paladin III (HR), LP, Paladin III (NY City), LP, Paladin III Co-Investment, LLC and Paladin III, LP.

Series B convertible preferred stock financing

In May 2014, we sold an aggregate of 32,828,281 shares of our Series B convertible preferred stock at a purchase price of $0.7920 per share for an aggregate purchase price of approximately $26 million. Each share of our Series B convertible preferred stock will convert automatically into one share of our common stock immediately prior to the completion of our initial public offering.

The following table summarizes the Series B convertible preferred stock purchased by our directors, executive officers and beneficial holders of more than 5% of our capital stock. The terms of these purchases were the same for all purchasers of our Series B convertible preferred stock.

Name of Stockholder*	Shares of series B convertible preferred stock	Total purchase price
Entities affiliated with ARCH Venture Partners(1)	7,111,643	$ 5,632,421.26
Illumina, Inc.(2)	3,260,455	$ 2,582,280.36
Entities affiliated with Paladin Capital Group(3)	4,134,841	$ 3,274,794.07
Entities affiliated with Tao Capital Partners(4)	9,532,828	$ 7,549,999.78

* Owners of more than 5% of our common stock

(1) Keith Crandell, a member of our board of directors, is a managing director at ARCH Venture Partners VII, LLC, which is affiliated with ARCH Venture Fund VII, L.P. Consists of shares held by ARCH Venture Fund VII, L.P.

(2) Robert Ragusa, a member of our board of directors, is Senior Vice President, Global Quality and Operations of Illumina, Inc.

(3) Paul Conley, a member of our board of directors, is a managing director of Paladin Capital Management, LLC, which is affiliated with the Paladin funds holding our shares but Mr. Conley does not beneficially own any of the shares held by the Paladin funds. Consists of shares held by Paladin III (CA), LP, Paladin III (Cayman Islands) LP, Paladin III (HR), LP, Paladin III (NY City), LP, Paladin III Co-Investment, LLC and Paladin III, LP.

(4) Frederick Craves, a member of our board of directors, was appointed to the board by Tao Invest LLC but Mr. Craves does not beneficially own any of the shares held by Tao Invest LLC.

Series C convertible preferred stock financing

In May 2015, we sold an aggregate of 24,668,310 shares of our Series C convertible preferred stock at a purchase price of $1.4999 per share for an aggregate purchase price of approximately $37 million. Each share of our Series C convertible preferred stock will convert automatically into one share of our common stock immediately prior to the completion of our initial public offering.

The following table summarizes the Series C convertible preferred stock purchased by our directors, executive officers and beneficial holders of more than 5% of our capital stock. The terms of these purchases were the same for all purchasers of our Series C convertible preferred stock.

Name of Stockholder*	Shares of series C convertible preferred stock	Total purchase price
Entities affiliated with ARCH Venture Partners(1)	2,641,354	$ 3,961,766.86
Illumina, Inc.(2)	6,667,111	$ 9,999,999.79
Entities affiliated with Paladin Capital Group(3)	1,160,419	$ 1,740,512.46
Entities affiliated with Tao Capital Partners(4)	1,337,843	$ 2,006,630.72
Entities affiliated with Fidelity Select Portfolios(5)	10,000,666	$ 14,999,998.94

* Owners of more than 5% of our common stock

(1) Keith Crandell, a member of our board of directors, is a managing director at ARCH Venture Partners VII, LLC, which is affiliated with ARCH Venture Fund VII, L.P. Consists of shares held by ARCH Venture Fund VII, L.P.

(2) Robert Ragusa, a member of our board of directors, is Senior Vice President, Global Quality and Operations of Illumina, Inc.

(3) Paul Conley, a member of our board of directors, is a managing director of Paladin Capital Management, LLC, which is affiliated with the Paladin funds holding our shares but Mr. Conley does not beneficially own any of the shares held by the Paladin funds. Consists of shares held by Paladin III (CA), LP, Paladin III (Cayman Islands) LP, Paladin III (HR), LP, Paladin III (NY City), LP, Paladin III Co-Investment, LLC and Paladin III, LP.

(4) Frederick Craves, a member of our board of directors, was designated to our board by Tao Invest LLC but Mr. Craves does not beneficially own any of the shares held by Tao Invest LLC.

(5) Consists of shares held by Fidelity Advisor Series VII: Fidelity Advisor Biotechnology Fund and Fidelity Select Portfolios: Biotechnology Portfolio.

Series D convertible preferred stock financing

In multiple closings between January 2016 and May 2018, we sold an aggregate of 96,650,074 shares of our Series D convertible preferred stock at a purchase price of $2.1457 per share for an aggregate purchase price of

approximately $207.4 million. Each share of our Series D convertible preferred stock will convert automatically into one share of our common stock immediately prior to the completion of our initial public offering.

The following table summarizes the Series D convertible preferred stock purchased by our directors, executive officers and beneficial holders of more than 5% of our capital stock. The terms of these purchases were the same for all purchasers of our Series D convertible preferred stock.

Name of stockholder*	Shares of series D convertible preferred stock	Total purchase price
Entities affiliated with ARCH Venture Partners(1)	11,077,949	$ 23,769,955.17
Illumina, Inc.(2)	1,556,590	$ 3,339,975.16
Entities affiliated with Paladin Capital Group(3)	1,405,825	$ 3,016,478.70
Entities affiliated with Fidelity Select Portfolios(4)	2,429,930	$ 5,213,900.80
Entities affiliated with Tao Capital Partners(5)	2,086,725	$ 4,477,485.83
Ever Alpha Fund L.P.(6)	32,623,385	$ 69,999,997.21

* Owners of more than 5% of our common stock

(1) Keith Crandell, a member of our board of directors, is a managing director at ARCH Venture Partners VII, LLC, which is affiliated with ARCH Venture Fund VII, L.P. and a managing director at ARCH Venture Partners VIII, LLC, which is affiliated with ARCH Venture Fund VII Overage, L.P. Consists of shares held by ARCH Venture Fund VII, L.P. and ARCH Venture Fund VII Overage, L.P.

(2) Robert Ragusa, a member of our board of directors, is Senior Vice President, Global Quality and Operations of Illumina, Inc.

(3) Paul Conley, a member of our board of directors, is a managing director of Paladin Capital Management, LLC, which is affiliated with the Paladin funds holding our shares but Mr. Conley does not beneficially own any of the shares held by the Paladin funds. Consists of shares held by Paladin III (CA), LP, Paladin III (Cayman Islands) LP, Paladin III (HR), LP, Paladin III (NY City), LP, Paladin III Co-Investment, LLC and Paladin III, LP.

(4) Consists of shares held by Fidelity Advisor Series VII: Fidelity Advisor Biotechnology Fund and Fidelity Select Portfolios: Biotechnology Portfolio.

(5) Frederick Craves, a member of our board of directors, was designated to our board by Tao Invest LLC but Mr. Craves does not beneficially own any of the shares held by Tao Invest LLC.

(6) Xiaoying Mai, a member of our board of directors, is an Investment Director of GF Xinde Investment Management Co. Ltd, which is affiliated with Ever Alpha Fund L.P. but Ms. Mai does not beneficially own any of the shares held by Ever Alpha Fund L.P.

Indemnification agreements and directors' and officers' liability insurance

We have entered into or intend to enter into indemnification agreements with each of our directors and executive officers. The indemnification agreements and our certificate of incorporation and bylaws require us to indemnify our directors and officers to the fullest extent permitted by Delaware law, including indemnification of expenses such as attorneys' fees, judgments, penalties fines and settlement amounts incurred by the director or executive officer in any action or proceeding, including any action or proceeding by or in right of us, arising out of the person's services as a director or executive officer. We have obtained an insurance policy that insures our directors and officers against certain liabilities, including liabilities arising under applicable securities laws. For more information regarding these indemnification agreements, see "Executive compensation—Limitation of liability and indemnification of directors and officers."

Registration rights agreement

In January 2016, we entered into an amended and restated registration rights agreement, as amended in March 2017, with certain holders of our convertible preferred stock, including entities affiliated with Arch Venture Partners, Fidelity Advisor, Illumina, Inc., Paladin Holdings, and Tao Invest LLC, which each hold more than 5% of our capital stock and some of which certain of our directors are affiliated. Pursuant to the amended and restated registration rights agreement, these holders are entitled to rights with respect to the registration of their shares following this offering under the Securities Act. For a more detailed description of these registration rights, see "Description of capital stock—Registration rights."

Stockholders agreement

In January 2016, we entered into an amended and restated stockholders agreement, as amended in March 2017, under which certain holders of our capital stock, including entities with which certain of our directors are affiliated, have agreed to vote their shares on certain matters, including with respect to the election of directors. This agreement grants certain of our investors the right of co-sale with respect to proposed transfers of our securities by certain stockholders. This agreement will terminate upon the completion of this offering and thereafter none of our stockholders will have any special rights regarding the election or designation of members of our board of directors, co-sale or the voting of our capital stock.

Other transactions

We have granted stock options and other equity awards to our executive officers and certain of our directors. For a description of these options and equity awards, see “Executive Compensation—Outstanding equity awards as of September 30” and “Management—Non-employee director compensation Table.”

We have entered into certain employment arrangements or agreements with some of our executive officers that provide for severance and change in control benefits. We intend to amend such agreements in connection with the completion of this offering and we will disclose the terms of such agreements once finalized. For a description of the current employment arrangements, see “Executive compensation—Executive employment arrangements.”

On November 10, 2017, we entered into a separation and release agreement with Solange Glaize in connection with her resignation as our Chief Financial Officer on October 23, 2017. Pursuant to the terms of her separation and release agreement, she received approximately $160,000 in severance benefits, which consisted of cash severance and reimbursements for COBRA premiums and legal fees.

We purchase certain reagents and equipment from Illumina, Inc., a company that owns more than five percent of our outstanding capital stock and where Robert Ragusa, one of our board members, serves as the Senior Vice President, Global Quality and Operations. Purchases from Illumina, Inc. amounted to $1 million and $2 million for the years ended September 30, 2016 and 2017, respectively. We do not currently have an agreement with Illumina, Inc., for the purchase of reagents but we acquire them on a purchase order basis. We believe that the prices we pay to Illumina, Inc. for reagents and equipment are comparable to prices available from third parties selling similar reagents and equipment of similar quality.

Policies and procedures for related party transactions

Our audit committee charter will be effective when we complete this offering. The charter states that our audit committee is responsible for reviewing and approving in advance any related party transaction. Our board of directors intends to adopt a written related person transaction policy to set forth the policies and procedures for the review and approval or ratification of related person transactions by the audit committee. Pursuant to the policy, all of our directors, officers and employees will be required to report to the audit committee prior to entering into any transaction, arrangement or relationship, or any series of similar transactions, arrangements or relationships in which we are to be a participant, the amount involved exceeds $120,000 and a related person had or will have a direct or indirect material interest, including purchases of goods or services by or from the related person or entities in which the related person has a material interest, indebtedness, guarantees of indebtedness and employment by us of a related person.

We believe that we have executed all of the transactions set forth under the section entitled “Certain Relationships and Related Party Transactions” on terms no less favorable to us than we could have obtained

from unaffiliated third parties. It is our intention to ensure that all future transactions between us and our officers, directors and principal stockholders and their affiliates, are approved by the audit committee of our board of directors, and are on terms no less favorable to us than those that we could obtain from unaffiliated third parties.

Principal stockholders

The following table and footnotes set forth information with respect to the beneficial ownership of our common stock as of June 30, 2018, subject to certain assumptions set forth in the footnote and as adjusted to reflect the sale of the shares of common stock offered in the public offering under this prospectus for:

- each holder of 5% or more of the outstanding shares of our common stock;
- each of our named executive officers;
- each of our directors; and
- all of our executive officers and directors as a group.

In accordance with SEC rules, each listed person's beneficial ownership includes:

- all shares the investor actually owns beneficially or of record;
- all shares over which the investor has or shares voting or dispositive control (such as in the capacity as a general partner of an investment fund); and
- all shares the investor has the right to acquire beneficial ownership of within 60 days after June 30, 2018.

Our calculation of the percentage of beneficial ownership prior to this offering is based on 213,961,940 shares of common stock outstanding as of June 30, 2018, assuming the automatic conversion of all outstanding shares of our convertible preferred stock on a one-for-one basis into 182,045,056 shares of common stock and shares outstanding after completion of this offering. The percentage ownership information assumes no exercise of the underwriters' option to purchase additional shares. Shares of common stock that a person has the right to acquire within 60 days after June 30, 2018 are deemed outstanding for purposes of computing the percentage ownership of the person holding such rights, but are not deemed outstanding for purposes of computing the percentage ownership of any other person, except with respect to the percentage ownership of all directors and executive officers as a group.

Unless otherwise indicated, we believe, based on the information furnished to us, that the persons named in the table below have sole voting and investment power with respect to all securities that they beneficially own, subject to community property laws where applicable. Unless otherwise noted below, the business address of the stockholders listed below is the address of our principal executive office, 455 Mission Bay Boulevard South. Suite 545, San Francisco, CA 94158.

Name of beneficial owner	Shares beneficially owned prior to the offering: Common stock	Options exercisable within 60 days	Aggregate number of shares beneficially owned	%	Shares beneficially owned after the offering: Aggregate number of shares beneficially owned	%
5% or more stockholders:						
Ever Alpha Fund L.P.(1)	32,623,385	—	32,623,385	15.3%		
Entities affiliated with ARCH Venture Partners(2)	32,540,315	—	32,540,315	15.2%		
Illumina, Inc.(3)	16,852,517	—	16,852,517	7.9%		
Entities affiliated with Tao Capital Partners(4)	12,957,396	—	12,957,396	6.16%		
Entities affiliated with Fidelity Select Portfolios(5)	12,430,596	—	12,430,596	5.8%		
Entities affiliated with Paladin Capital Group(6)	10,834,822	—	10,834,822	5.1%		
Named executive officers and directors:						
Emily M. Leproust(7)	7,013,171	957,676	7,970,847	3.7%		
William Banyai(8)	7,013,171	880,166	7,893,337	3.7%		
Patrick Weiss(9)	539,877	464,583	1,004,460	*		
Robert Chess(10)	691,315	7,034	698,349	*		
Frederick B. Craves(11)	661,122	—	661,122	*		
Paul A. Conley(12)	—	—	—	*		
Keith Crandell(1)	32,540,315	—	32,540,315	15.2%		
Xiaoying Mai(13)	—	—	—	*		
Robert Ragusa(2)	16,852,517	—	16,852,517	7.9%		
All directors and executive officers as a group(14) (14 persons)	72,324,659	4,145,577	76,470,236	35.1%		

* Represents beneficial ownership of less than one percent of the outstanding shares of our common stock.

(1) Consists of 32,623,385 shares held of record by Ever Alpha Fund L.P. Ever Glory Limited is the general partner of Ever Alpha Fund L.P. Ever Glory Limited is a wholly owned subsidiary of Guangfa Xinde Capital Management Limited. Guangfa Xinde Capital Management Limited is a wholly owned subsidiary of Guangfa Investment (Hong Kong) Company Limited. Guangfa Investment (Hong Kong) Company Limited is a wholly owned subsidiary of Guangfa Holding (Hong Kong) Corporation Limited. Guangfa Holding (Hong Kong) Corporation Limited is the wholly owned subsidiary of Guangfa Securities Co., Ltd, a publicly listed company in Hong Kong. Sun Shuming, Lin Zhihai, Qin Li, Sun Xiaoyan, Yang Xiong, Tang Xin. Chan Kalok, Shang Shuzhi, Li Xiulin, Li Yanxi and Liu Xuetao serve on the Board of Directors of Guangfa Securities Co., Ltd and may be deemed to share voting and dispositive power over the shares held by Ever Alpha Fund L.P. The address of Ever Alpha Fund L.P. is Fl 16th, 183rd Tianhebei Rd, Guangzhou, PR China.

(2) Consists of (i) 23,687,378 shares held of record by ARCH Venture Fund VII, L.P., or ARCH VII and (ii) 8,852,937 shares held of record by ARCH Venture Fund VIII Overage, L.P., or ARCH VIII Overage. ARCH Venture Partners VII, L.P., or the GPLP, is the sole general partner of ARCH VII and ARCH Venture Partners VII, LLC, or the GPLLC, is the sole general partner of the GPLP. ARCH Venture Partners VIII, LLC, or ARCH VIII Partners, is the sole general partner of ARCH VIII Overage. Keith Crandell, Clinton Bybee and Robert Nelsen are the managing directors of the GPLLC and ARCH VIII Partners, and therefore, may be deemed to share voting and dispositive power over the shares held of record by ARCH VII and ARCH VIII Overage. The address for each of the entities identified in this footnote is 8755 West Higgins Road, Suite 1025, Chicago, IL 60631.

(3) Consists of 16,852,517 shares held of record by Illumina, Inc. Robert Ragusa is Senior Vice President, Global Quality and Operations of Illumina, Inc., and has sole voting and dispositive power over the shares held of record by Illumina, Inc. The address of Illumina, Inc. is 25861 Industrial Boulevard, Hayward, CA 94545.

(4) Consists of (i) 12,067,486 shares held of record by Tao Invest, LLC and (ii) 889,910 shares held of record by Tao Invest II, LLC, or collectively, the Tao Funds. Tao Capital Management LP is the managing member of each of the Tao Funds. Tao Capital Management Inc. is the general partner of Tao Capital Management LP. Nicholas J. Pritzker is the chairman and Joseph I. Perkovich is the president of Tao Capital Management Inc. and each may be deemed to have voting and dispositive power over the shares held of record by the Tao Funds. The address of Tao Invest LLC is 1 Letterman Drive, San Francisco, CA 94129.

(5) Consists of (i) 2,320,378 shares held of record by Fidelity Advisor Series VII: Fidelity Advisor Biotechnology Fund and (ii) 10,110,218 shares held of record by Fidelity Select Portfolios: Biotechnology Portfolio, or collectively, the Fidelity Funds. The Fidelity Funds are managed by direct or indirect subsidiaries of FMR LLC. Edward C. Johnson 3d is a Director and the Chairman of FMR LLC and Abigail P. Johnson is a Director, the Vice Chairman and the President of FMR LLC. Members of the family of Edward C. Johnson 3d, including Abigail P. Johnson, are the predominant owners, directly or through trusts, of Series B voting common shares of FMR LLC, representing 49% of the voting power of FMR LLC. The Johnson family group and all other Series B shareholders have entered into a shareholders' voting agreement under which all Series B voting common shares will be voted in accordance with the majority vote of Series B voting common shares. Accordingly, through their ownership of voting common shares and the execution of the shareholders' voting agreement, members of the Johnson family may be deemed, under the Investment Company Act of 1940, to form a controlling group with respect to FMR LLC. Neither FMR LLC nor Edward C. Johnson 3d nor Abigail P. Johnson has the sole power to vote or direct the voting of the shares owned directly by the various investment companies registered under the Investment Company Act advised by Fidelity Management & Research Company, or FMR Co, a wholly owned subsidiary of FMR LLC, which power resides with the Fidelity Funds' Boards of Trustees. Fidelity Management & Research Company carries out the voting of the shares under written guidelines established by the Fidelity Funds' Boards of Trustees. The address for each of the entities identified in this footnote is 525 Washington Boulevard, New Jersey, NJ 07310.

(6) Consists of (i) 988,543 shares held of record by Paladin III (CA), LP, (ii) 1,990,272 shares held of record by Paladin III (Cayman Islands), LP, (iii) 988,543 shares held of record by Paladin III (HR), LP, (iv) 2,897,892 shares held of record by Paladin III (NY City), LP, (v) 3,433,546 shares held of record by Paladin III, LP, or collectively, the Paladin Funds, and (vi) 536,026 shares held of record by Paladin III Co-Investment, LLC. Paladin Holdings III, L.P. is the general partner of the Paladin Funds and Managing Member of Paladin III Co-Investment, LLC and its Investment Committee, which consists of Michael Steed and Mark Maloney, may be deemed to have voting and dispositive power over the shares held of record by the Paladin Funds and Paladin III Co-Investment LLC. The address for each of the entities identified in this footnote is c/o Paladin Capital Management, LLC, 2020 K Street, NW - Suite 620, Washington, DC 20006.

(7) Consists of (i) 7,013,171 shares of common stock and (ii) 957,676 shares subject to stock options issuable upon the exercise of options exercisable within 60 days after June 30, 2018.

(8) Consists of (i) 7,013,171 shares of common stock and (ii) 880,166 shares subject to stock options issuable upon the exercise of options exercisable within 60 days after June 30, 2018.

(9) Consists of (i) 539,877 shares of common stock and (ii) 464,583 shares subject to stock options issuable upon the exercise of stock options exercisable within 60 days after June 30, 2018.

(10) Consists of (i) 691,315 shares of common stock and (ii) 7,034 shares subject to stock options issuable upon the exercise of options exercisable within 60 days after June 30, 2018.

(11) Consists of 661,122 shares held of record by The Craves Family Foundation. Fred Craves may be deemed to hold sole voting and dispositive power with respect to the shares held by The Craves Family Foundation. Mr. Craves does not have voting and dispositive power over the shares held of record by the Tao Funds. Mr. Craves' address is 750 Battery Street, Suite 400, San Francisco, CA 94111.

(12) Paul Conley does not have voting and dispositive power over the shares held of record by the Paladin Funds and Paladin III Co-Investment LLC.

(13) Xiaoying Mai does not have voting and dispositive power over the shares held of record by Ever Alpha Fund L.P.

(14) Consists of (i) 22,270,705 shares of common stock, (ii) 4,145,577 shares of common stock that may be acquired pursuant to the exercise of stock options within 60 days of June 30, 2018 and (iii) 50,053,954 shares of common stock issuable upon conversion of preferred stock.

Description of capital stock

The following is a description of the material terms of our amended and restated certificate of incorporation and amended and restated bylaws as each will be in effect as of the completion of this offering, and of specific provisions of Delaware law. The following description is intended as a summary only and is qualified in its entirety by reference to our amended and restated certificate of incorporation, our amended and restated bylaws and the DGCL. Copies of our amended and restated certificate of incorporation and amended and restated bylaws have been filed as exhibits to the registration statement of which this prospectus is a part.

General

Immediately following the closing of this offering, our authorized capital stock will consist of shares of common stock, $0.00001 par value per share, and shares of preferred stock, $0.00001 par value per share, all of which preferred stock will be undesignated. The following information reflects the filing of our amended and restated certificate of incorporation and the conversion of all outstanding shares of our preferred stock into shares of common stock immediately prior to the closing of this offering.

Upon the closing of this offering and based on 213,961,940 shares of our common stock outstanding as of June 30, 2018, shares of our common stock will be outstanding, assuming the conversion of all outstanding shares of our convertible preferred stock into 182,045,056 shares of our common stock immediately prior to the closing of this offering. As of June 30, 2018, we had 196 stockholders of record.

Common stock

As of June 30, 2018, we had 213,961,940 shares of common stock issued and outstanding assuming the conversion of all outstanding shares of our convertible preferred stock into 182,045,056 shares of our common stock as if such conversion had occurred on June 30, 2018. The holders of our common stock are entitled to one vote for each share held of record on all matters submitted to a vote of the stockholders. Cumulative voting for the election of directors is not provided for in our certificate of incorporation, which means the holders of a majority of our shares of common stock can elect all of the directors then standing for election. Subject to preferences that may be applicable to any outstanding convertible preferred stock, holders of common stock are entitled to receive ratably such dividends as may be declared by the board of directors out of funds legally available for that purpose. See “Dividend policy.” In the event of liquidation, dissolution or winding up of the company, the holders of our common stock are entitled to share ratably in all assets remaining after payment of liabilities, subject to the prior distribution rights of any outstanding convertible preferred stock. The common stock has no preemptive or conversion rights or other subscription rights. The outstanding shares of common stock are, and the shares of common stock to be issued upon completion of this offering will be, fully paid and non-assessable.

Preferred stock

As of June 30, 2018, there were 182,045,056 shares of convertible preferred stock outstanding, which will automatically convert, immediately prior to the completion of this offering, into 182,045,056 shares of our common stock. After the closing of this offering, the board of directors will have the authority, without further action by the stockholders, to issue up to shares of preferred stock, $0.00001 par value per share, in one or more series. The board of directors will also have the authority to designate the rights, preferences, privileges and restrictions of each such series, including dividend rights, preferences, privileges and restrictions of each such series, including dividend rights, dividend rates, conversion rights, voting rights, terms of redemption, redemption prices, liquidation preferences, sinking fund terms and the number of shares constituting any series.

The issuance of preferred stock may have the effect of delaying, deferring or preventing a change in control of the company without further action by the stockholders. The issuance of convertible preferred stock with voting and conversion rights may also adversely affect the voting power of the holders of common stock and the likelihood that such holders will receive dividend payments and payments upon liquidation. In certain circumstances, an issuance of preferred stock could have the effect of decreasing the market price of the common stock. As of the closing of the offering, no shares of convertible preferred stock will be outstanding. We currently have no plans to issue any shares of convertible preferred stock.

Warrants

As of June 30, 2018, we had warrants outstanding to purchase 1,421,515 shares of our common stock, assuming the conversion of our convertible preferred stock into common stock, and which will become exercisable for an additional 634,920 shares of our common stock at an exercise price of $0.63 per share upon the drawing down of additional loans under our credit facility, at exercise prices ranging from approximately $0.329 to $2.1457 per share. Each outstanding warrant contains provisions for the adjustment of the exercise price and the number of shares issuable upon exercise in the event of stock dividends, stock splits, reorganizations and reclassifications, consolidations and the like.

Options

As of June 30, 2018, we had outstanding options to purchase 24,000,608 shares of our common stock under our 2013 Plan and 9,347,391 shares remained available for future awards.

Registration rights

Based on the number of shares outstanding as of June 30, 2018, under our amended and restated registration rights agreement, after the consummation of this offering, the holders of up to approximately 203.4 million shares of common stock, or their affiliates or transferees, have the right to require us to register their shares under the Securities Act so that those shares may be publicly resold, or to include their shares in any registration statement we file, in each case as described below.

The registration rights terminate with respect to the registration rights of an individual holder on the earliest to occur of (i) five years following the consummation of this offering, (ii) the liquidation, dissolution or indefinite cessation of the business operations of our company, or the closing of a deemed liquidation, dissolution or winding up of our company pursuant to our amended and restated certificate of incorporation, or (iii) such time as Rule 144 or another similar exemption under the Securities Act is available for the sale of such stockholder's shares.

Demand registration rights

Based on the number of shares outstanding as of June 30, 2018, after the consummation of this offering, the holders of approximately 182.4 million shares of our common stock (on an as-converted basis), or their transferees, will be entitled to certain demand registration rights. At any time after one hundred eighty (180) days following the effectiveness of the registration statement of which this prospectus is a part, the holders of at least a majority of the registrable securities may demand that we effect a registration under the Securities Act covering the public offering and sale of at least the number of registrable securities held by such stockholders having an anticipated aggregate offering price, net of underwriting discounts and commissions, of at least $10,000,000. Upon any such demand, we must effect the registration of such registrable securities that have been requested to register together with all other registrable securities that we may have been requested to register by other stockholders pursuant to the incidental registration rights described below. We are only obligated to effect two registrations in response to these demand registration rights. In the event we are

required to effect such a demand registration, we may not effect any other registration of securities for sale for our own account (other than a registration effected solely to implement an employee benefit plan or in certain business combination transactions) within 120 days following the effective date of the demand registration.

Piggyback registration rights

In connection with this offering, certain holders were entitled to, and the necessary percentage of holders waived, their rights to notice of this offering and to include their shares of registrable securities in this offering. If we register any securities for public sale in another offering, including pursuant to any stockholder initiated demand registration, holders of such registrable securities will have the right to include their shares in the registration statement for such offering, subject to certain exceptions. The underwriters of any underwritten offering will have the right to limit the number registrable securities to be included in the registration statement, subject to certain restrictions.

Form S-3 registration rights

Following this offering, we are required to use our best efforts to qualify and remain qualified to register securities pursuant to a registration statement on Form S-3 under the Securities Act. At any time after we are qualified to file a registration statement on Form S-3, the holders of registrable securities anticipated to have an aggregate sale price, net of underwriting discounts and commission, in excess of $5,000,000 may request in writing an unlimited number of registration statements on Form S-3 for the registrable securities held by such requesting holder or holders, and we are required to use our best efforts to effect such registrations.

Expenses of registration

We will pay all registration expenses related to any demand, piggyback or Form S-3 registration, including reasonable fees and disbursements of one special counsel for the holders of such registrable securities, other than underwriting fees, discounts or commissions (if any), which will be borne by the holders of such registrable securities.

Anti-takeover effects of delaware law and our amended and restated certificate of incorporation and amended and restated bylaws

Our amended and restated certificate of incorporation and our amended and restated bylaws, which will be in effect upon the completion of this offering, will contain certain provisions that could have the effect of delaying, deterring or preventing another party from acquiring control of us. These provisions and certain provisions of Delaware law, which are summarized below, are expected to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed, in part, to encourage persons seeking to acquire control of us to negotiate first with our board of directors. We believe that the benefits of increased protection of our potential ability to negotiate more favorable terms with an unfriendly or unsolicited acquirer outweigh the disadvantages of discouraging a proposal to acquire us.

Undesignated preferred stock

As discussed above, our board of directors will have the ability to issue preferred stock with voting or other rights or preferences that could impede the success of any attempt to change control of us. These and other provisions may have the effect of deterring hostile takeovers or delaying changes in control or management of our company.

Limits on ability of stockholders to act by written consent or call a special meeting

Our amended and restated certificate of incorporation will provide that our stockholders may not act by written consent, which may lengthen the amount of time required to take stockholder actions. As a result, a holder

controlling a majority of our capital stock would not be able to amend our bylaws or remove directors without holding a meeting of our stockholders called in accordance with our bylaws.

In addition, our amended and restated bylaws will provide that special meetings of the stockholders may be called only by the majority of our board of directors. Stockholders may not call a special meeting, which may delay the ability of our stockholders to force consideration of a proposal or for holders controlling a majority of our capital stock to take any action, including the removal of directors.

Requirements for advance notification of stockholder nominations and proposals

Our amended and restated bylaws will establish advance notice procedures with respect to stockholder proposals and the nomination of candidates for election as directors, other than nominations made by or at the direction of our board of directors or a committee of our board of directors. These provisions may have the effect of precluding the conduct of certain business at a meeting if the proper procedures are not followed. These provisions may also discourage or deter a potential acquirer from conducting a solicitation of proxies to elect the acquirer's own slate of directors or otherwise attempting to obtain control of our company.

Board classification

Upon the closing of the offering, our board of directors will be divided into three classes, one class of which is elected each year by our stockholders. The directors in each class will serve three-year terms. For more information on the classified board, see "Management—Board of directors." A third party may be discouraged from making a tender offer or otherwise attempting to obtain control of us as it is it more difficult and time-consuming for stockholders to replace a majority of the directors on a classified board.

No cumulative voting

Our amended and restated certificate of incorporation and amended and restated bylaws will not permit cumulative voting in the election of directors. Cumulative voting allows a stockholder to vote a portion or all of its shares for one or more candidates for seats on the board of directors. Without cumulative voting, a minority stockholder may not be able to gain as many seats on our board of directors as the stockholder would be able to gain if cumulative voting were permitted. The absence of cumulative voting makes it more difficult for a minority stockholder to gain a seat on our board of directors to influence our board's decision regarding a takeover.

Amendment of charter and bylaws provisions

The amendment of the above provisions of our amended and restated certificate of incorporation will require approval by holders of at least two thirds of our outstanding capital stock entitled to vote generally in the election of directors. The amendment of our bylaws will require approval by the holders of at least two thirds of our outstanding capital stock entitled to vote generally in the election of directors.

Delaware anti-takeover statute

We are subject to the provisions of Section 203 of the DGCL regulating corporate takeovers. In general, Section 203 prohibits a publicly held Delaware corporation from engaging, under certain circumstances, in a business combination with an interested stockholder for a period of three years following the date the person became an interested stockholder unless:

- prior to the date of the transaction, our board of directors approved either the business combination or the transaction which resulted in the stockholder becoming an interested stockholder;
- upon completion of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction commenced, calculated as provided under Section 203; or

- at or subsequent to the date of the transaction, the business combination is approved by our board of directors and authorized at an annual or special meeting of stockholders, and not by written consent, by the affirmative vote of at least two-thirds of the outstanding voting stock which is not owned by the interested stockholder.

Generally, a business combination includes a merger, asset or stock sale, or other transaction resulting in a financial benefit to the interested stockholder. An interested stockholder is a person who, together with affiliates and associates, owns or, within three years prior to the determination of interested stockholder status, did own 15% or more of a corporation's outstanding voting stock. We expect the existence of this provision to have an anti-takeover effect with respect to transactions our board of directors does not approve in advance. We anticipate that Section 203 may also discourage attempts that might result in a premium over the market price for the shares of common stock held by stockholders.

The provisions of Delaware law and the provisions of our amended and restated certificate of incorporation and amended and restated bylaws, as amended upon the completion of this offering, could have the effect of discouraging others from attempting hostile takeovers and, as a consequence, they might also inhibit temporary fluctuations in the market price of our common stock that often result from actual or rumored hostile takeover attempts. These provisions might also have the effect of preventing changes in our management. It is possible that these provisions could make it more difficult to accomplish transactions that stockholders might otherwise deem to be in their best interests.

Transfer agent and registrar

Upon the completion of this offering, the transfer agent and registrar for our common stock will be . The transfer agent and registrar's address is , and its telephone number is .

Listing

We intend to apply to list our common stock on the Nasdaq Global Market under the trading symbol "TWST."

Shares eligible for future sale

Prior to this offering, there has not been any public market for our common stock, and we make no prediction as to the effect, if any, that market sales of shares of common stock or the availability of shares of common stock for sale will have on the market price of common stock prevailing from time to time. Nevertheless, sales of substantial amounts of common stock in the public market, or the perception that such sales could occur, could adversely affect the market price of common stock and could impair our future ability to raise capital through the sale of equity securities.

Sale of restricted shares

Based on the number of shares outstanding as of June 30, 2018, when this offering is complete, we will have an aggregate of shares of common stock outstanding.

Of the outstanding shares, all of the shares sold in this offering will be freely tradable. The remaining shares of common stock will be deemed "restricted securities" as defined in Rule 144. Restricted securities may be sold in the public market only if registered or if they qualify for an exemption from registration under Rule 144 or Rule 701, promulgated under the Securities Act, which rules are summarized below.

As a result of the contractual restrictions described below and the provisions of Rules 144 and 701, the restricted shares will be available for sale in the public market as follows:

- no shares will be eligible for sale when this offering is complete; and
- shares will be eligible for sale upon the expiration of the lock-up agreements, described below, beginning 181 days after the date of this prospectus.

In addition, of the 24,000,608 shares of our common stock that were subject to stock options outstanding as of June 30, 2018, options to purchase 7,429,126 shares of common stock were vested as of June 30, 2018 and will be eligible for sale 181 days following the date of this prospectus.

Lock-up agreements and obligations

We, all of our directors, officers and all of our securityholders have entered into lock-up agreements that generally provide that these holders will not offer, pledge, sell, agree to sell, directly or indirectly, or otherwise dispose of any shares of common stock or any securities convertible into or exchangeable for shares of common stock without the prior written consent of J.P. Morgan Securities LLC and Cowen and Company, LLC for a period of 180 days from the date of this prospectus, subject to certain exceptions. These agreements, and the exceptions thereto, are described beginning on page 164 of this prospectus in the section titled "Underwriting."

In addition, each grant agreement under our 2013 Plan contains restrictions similar to those set forth in the lock-up agreements described above limiting the disposition of securities issuable pursuant to those plans for a period of 180 days following the date of this prospectus.

Rule 144

In general, under Rule 144 as currently in effect, once we have been subject to public company reporting requirements for at least 90 days, a person who is not deemed to have been one of our affiliates for purposes of the Securities Act at any time during the 90 days preceding a sale and who has beneficially owned the shares proposed to be sold for at least six months, including the holding period of any prior owner other than our

affiliates, is entitled to sell such shares without complying with the manner of sale, volume limitation or notice provisions of Rule 144, subject to compliance with the public information requirements of Rule 144. If such a person has beneficially owned the shares proposed to be sold for at least one year, including the holding period of any prior owner other than our affiliates, then such person is entitled to sell such shares without complying with any of the requirements of Rule 144.

In general, under Rule 144, as currently in effect, our affiliates or persons selling shares on behalf of our affiliates are entitled to sell upon expiration of the lock-up agreements described above, within any three-month period beginning 90 days after the date of this prospectus, a number of shares that does not exceed the greater of:

- 1% of the number of shares of our common stock then outstanding, which will equal approximately shares, assuming no exercise of the underwriters' option to purchase additional shares of common stock, immediately after this offering; or
- the average weekly trading volume of our common stock on the Nasdaq Global Market during the four calendar weeks preceding the filing of a notice on Form 144 with respect to such sale.

Sales under Rule 144 by our affiliates or persons selling shares on behalf of our affiliates are also subject to certain manner of sale provisions and notice requirements and to the availability of current public information about us.

Rule 701

Rule 701, as presently in effect, generally allows a stockholder who purchased shares of our common stock pursuant to a written compensatory plan or contract and who is not deemed to have been an affiliate of our company during the immediately preceding 90 days to sell these shares in reliance upon Rule 144, but without being required to comply with the public information, holding period, volume limitation, or notice provisions of Rule 144. Rule 701 also permits affiliates of our company to sell their Rule 701 shares under Rule 144 without complying with the holding period requirements of Rule 144. All holders of Rule 701 shares, however, are required to wait until 90 days after the date of the· prospectus before selling such shares pursuant to Rule 701.

As of June 30, 2018, 10,737,541 shares of our outstanding stock had been issued in reliance on Rule 701 as a result of exercises of stock options and stock awards. These shares will be eligible for resale in reliance on this rule upon expiration of the lock-up agreements described above.

Stock options

We intend to file a registration statement on Form S-8 under the Securities Act covering all of the shares of our common stock subject to options outstanding or reserved for issuance under our stock plans, and shares of our common stock issued upon the exercise of options by employees. We expect to file this registration statement as soon as permitted under the Securities Act. Shares covered by this registration statement will be eligible for sale in the public market, upon the expiration or release from the terms of the lock-up agreements, and subject to vesting of such shares.

Registration rights

When this offering is complete, the holders of an aggregate of 203,420,957 shares of our common stock, or their transferees, will be entitled to rights with respect to the registration of their shares under the Securities Act. Registration of these shares under the Securities Act would result in these shares becoming freely tradeable without restriction under the Securities Act immediately upon the effectiveness of such registration. For a further description of these rights, see "Description of capital stock—Registration rights."

Material U.S. federal income tax considerations for non-U.S. holders

This section discusses certain material U.S. federal income tax consequences of the ownership and sale, exchange or other taxable disposition of our common stock sold pursuant to this offering to a "non-U.S. holder" (as defined below). This discussion does not provide a complete analysis of all potential tax considerations. The information provided below is based upon provisions of the Internal Revenue Code of 1986, as amended, or Code, Treasury regulations promulgated thereunder, administrative rulings and judicial decisions currently in effect. These authorities may change at any time, possibly on a retroactive basis, or the Internal Revenue Service, or IRS, might interpret the existing authorities differently. In either case, the U.S. federal income tax considerations of owning or disposing of our common stock could differ from those described below. As a result, we cannot assure you that the U.S. federal income tax considerations described in this discussion will not be challenged by the IRS or will be sustained by a court if challenged by the IRS.

This discussion does not address the tax considerations arising under the alternative minimum tax, the net investment income tax, the laws of any state, local or non-U.S. jurisdiction, or under U.S. federal gift and estate tax laws. In addition, this discussion does not address tax considerations applicable to an investor's particular circumstances or to investors that may be subject to special tax rules, including, without limitation:

- banks, insurance companies or other financial institutions;
- partnerships or entities or arrangements treated as partnerships or other pass-through entities for U.S. federal income tax purposes (or investors in such entities);
- corporations that accumulate earnings to avoid U.S. federal income tax;
- tax-exempt or governmental organizations or tax-qualified retirement plans;
- real estate investment trusts or regulated investment companies;
- controlled foreign corporations or passive foreign investment companies;
- persons who acquired our common stock pursuant to the exercise of an employee stock option or otherwise as compensation for services;
- dealers in securities or currencies;
- traders in securities that elect to use a mark-to-market method of accounting for their securities holdings;
- persons that own, or are deemed to own, more than 5% of our capital stock (except to the extent specifically set forth below);
- certain former citizens or long-term residents of the United States;
- persons who hold our common stock as a position in a hedging transaction, "straddle," "conversion transaction" or other risk reduction transaction;
- persons who do not hold our common stock as a capital asset within the meaning of Section 1221 of the Code (generally, for investment purposes); or
- persons deemed to sell our common stock under the constructive sale provisions of the Code.

In addition, if a partnership or entity classified as a partnership for U.S. federal income tax purposes is a beneficial owner of our common stock, the tax treatment of a partner in the partnership or an owner of the entity will depend upon the status of the partner or other owner and the activities of the partnership or other entity. Accordingly, this discussion does not address U.S. federal income tax considerations applicable to partnerships that hold our common stock, and partners in such partnerships should consult their tax advisors.

Investors considering the purchase of our common stock should consult their own tax advisors regarding the application of the U.S. federal income, gift and estate tax laws to their particular situations and the consequences of non-U.S., state or local laws, and tax treaties.

Non-U.S. holder defined

For purposes of this section, a “non-U.S. holder” is any holder of our common stock, other than an entity taxable as a partnership for U.S. federal income tax purposes, that is not:

- an individual who is a citizen or resident of the United States for U.S. federal income tax purposes;
- a corporation, or other entity taxable as a corporation for U.S. federal income tax purposes, created or organized under the laws of the United States, any state therein or the District of Columbia or otherwise treated as such for U.S. federal income tax purposes;
- a trust that (1) is subject to the primary supervision of a U.S. court and one or more U.S. persons have authority to control all substantial decisions of the trust or (2) has a valid election in effect under applicable Treasury regulations to be treated as a U.S. person; or
- an estate whose income is subject to U.S. federal income tax regardless of source.

If you are a non-U.S. citizen who is an individual, you may, in many cases, be deemed to be a resident alien, as opposed to a nonresident alien, by virtue of being present in the United States for at least 31 days in the calendar year and for an aggregate of at least 183 days during a three-year period ending in the current calendar year. For these purposes, all the days present in the current year, one-third of the days present in the immediately preceding year, and one-sixth of the days present in the second preceding year are counted. Resident aliens are subject to U.S. federal income tax as if they were U.S. citizens. Such an individual is urged to consult his or her own tax advisor regarding the U.S. federal income tax consequences of the ownership and sale, exchange or other taxable disposition of our common stock.

Distributions

We do not anticipate paying any distributions in the foreseeable future. If we do make any distributions on shares of our common stock, however, such distributions will constitute dividends for U.S. federal income tax purposes to the extent paid from our current or accumulated earnings and profits, as determined under U.S. federal income tax principles. Distributions in excess of our current and accumulated earnings and profits will constitute a return of capital that is applied against and reduces, but not below zero, a non-U.S. holder’s adjusted tax basis in shares of our common stock. Any remaining excess will be treated as gain realized on the sale, exchange or other taxable disposition of our common stock. See “—Sale of common stock.”

Subject to the discussion below regarding the Foreign Account Tax Compliance Act, or FATCA, and backup withholding, any distribution made to a non-U.S. holder on our common stock that is not effectively connected with a non-U.S. holder’s conduct of a trade or business in the United States will generally be subject to U.S. withholding tax at a 30% rate. The withholding tax might not apply, however, or might apply at a reduced rate, under the terms of an applicable income tax treaty between the United States and the non-U.S. holder’s country of residence. You should consult your tax advisors regarding your entitlement to benefits under a relevant income tax treaty. Generally, in order for us or our paying agent to withhold tax at a lower treaty rate, a non-U.S. holder must certify its entitlement to treaty benefits. A non-U.S. holder generally can meet this certification requirement by providing an IRS Form W-8BEN, W-8BEN-E (or any successor form to the IRS Form W-8BEN or W-8BEN-E) to us or our paying agent. If the non-U.S. holder holds the stock through a financial institution or other agent acting on the non-U.S. holder’s behalf, the non-U.S. holder will be required to provide appropriate documentation to the agent. The non-U.S. holder’s agent will then be required to provide certification to us or our paying agent, either directly or through other intermediaries. If you are eligible for a reduced rate of U.S. federal withholding tax under an income tax treaty, you may obtain a refund or credit from the IRS of any excess amounts withheld by filing an appropriate claim for a refund with the IRS in a timely manner.

Distributions received by a non-U.S. holder that are effectively connected with a U.S. trade or business conducted by the non-U.S. holder, and, if required by an applicable income tax treaty between the United States and the non-U.S. holder's country of residence, are attributable to a permanent establishment maintained by the non-U.S. holder in the United States, are not subject to such withholding tax. To obtain this exemption, a non-U.S. holder must provide us with an IRS Form W-8ECI properly certifying such exemption. Such effectively connected distributions, although not subject to U.S. withholding tax, are generally taxed at the same graduated rates applicable to U.S. persons, net of certain deductions and credits. In addition to the graduated tax described above, distributions received by corporate non-U.S. holders that are effectively connected with a U.S. trade or business of the corporate non-U.S. holder may also be subject to a branch profits tax equal to 30% of its effectively connected earnings and profits for the taxable year, as adjusted for certain items, although an applicable income tax treaty between the United States and the non-U.S. holder's country of residence might provide for a lower rate.

Sale of common stock

Subject to the discussion below regarding FATCA and backup withholding, non-U.S. holders will generally not be subject to U.S. federal income tax on any gains realized on the sale, exchange or other taxable disposition of our common stock unless:

- the gain (1) is effectively connected with the conduct by the non-U.S. holder of a U.S. trade or business and (2) if required by an applicable income tax treaty between the United States and the non-U.S. holder's country of residence, is attributable to a permanent establishment (or, in the case of an individual, a fixed base) maintained by the non-U.S. holder in the United States (in which case the special rules described below apply);
- the non-U.S. holder is an individual who is present in the United States for 183 days or more in the taxable year of the sale, exchange or other taxable disposition of our common stock, and certain other requirements are met (in which case the gain would be subject to a flat 30% tax, or such reduced rate as may be specified by an applicable income tax treaty, which may be offset by U.S.-source capital losses, even though the individual is not considered a resident of the United States, provided that the non-U.S. holder has timely filed U.S. federal income tax returns with respect to such losses); or
- the rules of the Foreign Investment in Real Property Tax Act, or FIRPTA, treat the gain as effectively connected with a U.S. trade or business.

The FIRPTA rules may apply to a sale, exchange or other taxable disposition of our common stock if we are at the time of the sale, exchange, or other taxable disposition, or were within the shorter of the five-year period preceding the disposition and the non-U.S. holder's holding period, a "United States real property holding corporation," or USRPHC. In general, we would be a USRPHC if the value of our interests in U.S. real property comprised at least half of the value of our business assets and our U.S. and non-U.S. real property interests. If we are or become a USRPHC, as long as our common stock is regularly traded on an established securities market, such common stock will be treated as U.S. real property interests subject to the FIRPTA rules only if a non-U.S. holder actually owns or constructively holds more than 5% of our outstanding common stock at any time within the shorter of the five-year period preceding the disposition and the non-U.S. holder's holding period. Currently, we believe we are not, and do not anticipate becoming, a USRPHC.

If any gain from the sale, exchange or other taxable disposition of our common stock, (1) is effectively connected with a U.S. trade or business conducted by a non-U.S. holder and (2) if required by an applicable income tax treaty between the United States and the non-U.S. holder's country of residence, is attributable to a permanent establishment (or, in the case of an individual, a fixed base) maintained by such non-U.S. holder in

the United States, then the gain generally will be subject to U.S. federal income tax at the same graduated rates applicable to U.S. persons, net of certain deductions and credits. If the non-U.S. holder is a corporation, under certain circumstances, that portion of its earnings and profits that is effectively connected with its U.S. trade or business, subject to certain adjustments, generally would be subject to a "branch profits tax." The branch profits tax rate is equal to 30% of its effectively connected earnings and profits for the taxable year, as adjusted for certain items, although an applicable income tax treaty between the United States and the non-U.S. holder's country of residence might provide for a lower rate.

Backup withholding and information reporting

Payments of dividends on our common stock will not be subject to backup withholding, provided the non-U.S. holder certifies its non-U.S. status, such as by furnishing a valid IRS Form W-8BEN, W-8BEN-E or W-8ECI (and we or our paying agent do not have actual knowledge or reason to know the holder is a U.S. person or that the conditions of any other exemption are not, in fact, satisfied), or otherwise establishes an exemption. However, information returns are required to be filed with the IRS in connection with any dividends on our common stock paid to the non-U.S. holder, regardless of whether any tax was actually withheld. Copies of these reports may be made available to tax authorities in the country where the non-U.S. holder resides. In addition, proceeds of the sale or other taxable disposition of our common stock within the United States or conducted through certain U.S.-related brokers generally will not be subject to backup withholding or information reporting, if the applicable withholding agent receives the certification described above or the non-U.S. holder otherwise establishes an exemption. Proceeds of a disposition of our common stock conducted through a non-U.S. office of a non-U.S. broker that does not have certain enumerated relationships with the United States generally will not be subject to backup withholding or information reporting. The backup withholding rate is currently 24%.

Backup withholding is not an additional tax. Any amounts withheld from a payment to a holder of our common stock under the backup withholding rules can be credited against any U.S. federal income tax liability of the holder and may entitle the holder to a refund from the IRS, provided that the required information is furnished to the IRS in a timely manner.

Foreign account tax compliance act, or FATCA

FATCA imposes U.S. federal withholding tax of 30% on certain types of U.S. source "withholdable payments" (including dividends and the gross proceeds from the sale, exchange or other taxable disposition of U.S. stock) to foreign financial institutions, which are broadly defined for this purpose, and other non-U.S. entities that fail to comply with certain certification and information reporting requirements regarding U.S. account holders or owners of such institutions or entities. The obligation to withhold under FATCA applies to any dividends on our common stock, and will apply to gross proceeds from the sale, exchange or other taxable disposition of our common stock paid after December 31, 2018 and to certain "pass-thru" payments received with respect to instruments held through foreign financial institutions after the later of December 31, 2018 and the date on which applicable final Treasury regulations are issued. An intergovernmental agreement between the United States and an applicable foreign country may modify the requirements described in this paragraph. Non-U.S. holders should consult their own tax advisors regarding the possible implications of FATCA on their investment in our common stock.

The preceding discussion of U.S. federal income tax considerations is for general information only. It is not tax advice. Each prospective investor should consult its own tax advisor regarding the particular U.S. federal, state, local and non-U.S. tax consequences of the sale, exchange or other taxable disposition of our common stock, including the consequences of any proposed change in applicable laws.

Underwriting

We are offering the shares of common stock described in this prospectus through a number of underwriters. J.P. Morgan Securities LLC and Cowen and Company, LLC are acting as joint book-running managers of the offering and as representatives of the underwriters. We have entered into an underwriting agreement with the underwriters. Subject to the terms and conditions of the underwriting agreement, we have agreed to sell to the underwriters, and each underwriter has severally agreed to purchase, at the public offering price less the underwriting discounts and commissions set forth on the cover page of this prospectus, the number of shares of common stock listed next to its name in the following table:

Name	Number of shares
J.P. Morgan Securities LLC	
Cowen and Company, LLC	
Allen & Company LLC	
Robert W. Baird & Co. Incorporated	
Total	

The underwriters are committed to purchase all the shares of common stock offered by us if they purchase any shares. The underwriting agreement also provides that if an underwriter defaults, the purchase commitments of non-defaulting underwriters may also be increased or the offering may be terminated.

The underwriters propose to offer the shares of common stock directly to the public at the initial public offering price set forth on the cover page of this prospectus and to certain dealers at that price less a concession not in excess of $ per share. Any such dealers may resell shares to certain other brokers or dealers at a discount of up to $ per share from the initial public offering price. After the initial offering of the shares to the public, the offering price and other selling terms may be changed by the underwriters. Sales of shares made outside of the United States may be made by affiliates of the underwriters.

The underwriters have an option to buy up to additional shares of common stock from us solely to cover sales of shares by the underwriters which exceed the number of shares specified in the table above. The underwriters have 30 days from the date of this prospectus to exercise this option to purchase additional shares. If any shares are purchased with this option to purchase additional shares, the underwriters will purchase shares in approximately the same proportion as shown in the table above. If any additional shares of common stock are purchased, the underwriters will offer the additional shares on the same terms as those on which the shares are being offered.

The underwriting fee is equal to the public offering price per share of common stock less the amount paid by the underwriters to us per share of common stock. The underwriting fee is $ per share. The following table shows the per share and total underwriting discounts and commissions to be paid to the underwriters assuming both no exercise and full exercise of the underwriters' option to purchase additional shares.

	Without exercise of option to purchase additional shares	With full exercise of option to purchase additional shares
Per share	$	$
Total	$	$

We estimate that the total expenses of this offering, including registration, filing and listing fees, printing fees and legal and accounting expenses, but excluding the underwriting discounts and commissions, will be

approximately $. We have agreed to reimburse the underwriters for expenses relating to the clearance of this offering with the Financial Industry Regulatory Authority, Inc. (in an amount not to exceed $).

A prospectus in electronic format may be made available on the web sites maintained by one or more underwriters, or selling group members, if any, participating in the offering. The underwriters may agree to allocate a number of shares to underwriters and selling group members for sale to their online brokerage account holders. Internet distributions will be allocated by the representatives to underwriters and selling group members that may make Internet distributions on the same basis as other allocations.

We have agreed that we will not (i) offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, or otherwise transfer or dispose of, directly or indirectly, or file with the Securities and Exchange Commission a registration statement under the Securities Act of 1933, as amended, or the Securities Act, relating to, any shares of our common stock or any securities convertible into or exchangeable or exercisable for any shares of our common stock, or publicly disclose the intention to make any offer, sale, pledge, disposition or filing, or (ii) enter into any swap or other arrangement that transfers all or a portion of the economic consequences associated with the ownership of any shares of common stock or any such other securities (regardless of whether any of these transactions are to be settled by the delivery of shares of common stock or such other securities, in cash or otherwise), in each case without the prior written consent of J.P. Morgan Securities LLC and Cowen and Company, LLC for a period of 180 days after the date of this prospectus, other than (i) the shares of our common stock to be sold hereunder, or (ii) any shares of our common stock issued upon the exercise of options granted under our existing equity incentive plans.

Our directors and executive officers, and all of our stockholders have entered into lock-up agreements with the underwriters prior to the commencement of this offering pursuant to which each of these persons or entities, with limited exceptions, for a period of 180 days after the date of this prospectus, may not, without the prior written consent of J.P. Morgan Securities LLC and Cowen and Company, LLC, (1) offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, or otherwise transfer or dispose of, directly or indirectly, any shares of our common stock or any securities convertible into or exercisable or exchangeable for our common stock (including, without limitation, common stock or such other securities which may be deemed to be beneficially owned by such directors, executive officers and stockholders in accordance with the rules and regulations of the Securities and Exchange Commission and securities which may be issued upon exercise of a stock option or warrant), or publicly disclose the intention to make any offer, sale, pledge or disposition, (2) enter into any swap or other agreement that transfers, in whole or in part, any of the economic consequences of ownership of our common stock or such other securities, whether any such transaction described in clause (1) or (2) above is to be settled by delivery of common stock or such other securities, in cash or otherwise or (3) make any demand for or exercise any right with respect to the registration of any shares of our common stock or any security convertible into or exercisable or exchangeable for our common stock.

The restrictions described in the immediately preceding paragraph do not apply to, among other items:

- transfers or dispositions of shares of common stock:
    - as a bona fide gift;
    - to any trust for the direct or indirect benefit of the party subject to the lock-up restrictions or the immediate family of such person;
    - to any corporation, partnership, limited liability company or other entity under the ownership of the party subject to the lock-up restrictions or the immediate family of such person;

- by will, other testamentary document or intestate succession to the legal representative, heir, beneficiary or a member of the immediate family of the party subject to the lockup restrictions;
- as distributions to partners, members or stockholders of the party subject to the lock-up restrictions; and
- as transfers to affiliates, investment funds or other entities controlled or managed by the party subject to the lock-up restrictions,

provided that in the case of any transfer or distribution pursuant to the above six subclauses, (i) each transferee, donee or distributee shall sign and deliver a lock-up letter in the form executed by the party subject to the lock up restrictions and (ii) no filing or other public announcement under Section 16(a)of the Exchange Act of 1934, as amended, or the Exchange Act shall be required or shall be voluntarily made during the restricted period (other than a filing on Form 5 or a required filing on a Schedule 13F or 13G);

- the transfer pursuant to a bona fide third-party tender offer, merger, consolidation or other similar transaction made to all holders of our common stock involving a change of control; provided that in the event such tender offer, merger, consolidation or other such transaction is not completed, the shares of our common stock shall remain subject to the lock-up restrictions;
- the exercise of outstanding warrants or options to purchase shares of common stock granted under any stock incentive plan or stock purchase plan of the Company, provided that the underlying shares shall continue to be subject to the lock-up restrictions;
- the establishment of a trading plan pursuant to Rule 10b5-1 under the Exchange Act for the transfer of shares of common stock, provided that (i) such plan does not provide for the transfer of shares of common stock during the restricted period and (ii) no filing under the Exchange Act or other public announcement shall be required or voluntarily made by or on behalf of the party subject to the lock-up restrictions regarding the establishment of such plan;
- the transfer or disposition of shares of common stock acquired in this offering or on the open market following this offering, provided that no filing under the Exchange Act or other public announcement shall be required or voluntarily made in connection with such transfer or disposition during the restricted period (other than a required filing on a Schedule 13F or 13G);
- transfers or surrenders to us of shares of common stock pursuant to any contractual arrangement that provides us with an option to repurchase such shares in connection with the termination of the party subject to the lock-up's employment or service relationship with us, or pursuant to a right of first refusal with respect to transfers of such shares of common stock or other securities, or on a cashless or "net exercise" basis or to cover tax withholding obligations of the party subject to the lock-up, in connection with the vesting or exercise of such shares of common stock or other securities, provided that any filing under Section 16 of the Exchange Act shall clearly indicate in the footnotes thereto that the filing relates to such circumstances described above and no other public announcement shall be required or voluntarily made in connection with such transfers or surrenders; and
- transfers or dispositions of shares of common stock by operation of law pursuant to a qualified domestic order or in connection with a divorce settlement or other court order, provided that the recipient of such shares shall execute and deliver to J.P. Morgan Securities LLC and Cowen and Company, LLC a lock-up letter in the form of this Letter Agreement, provided, further that any filing under Section 16 of the Exchange Act shall clearly indicate in the footnotes that the filing relates to the circumstances described above and no other public announcement shall be required or voluntarily made in connection with such transfer or disposition.

We have agreed to indemnify the underwriters against certain liabilities, including liabilities under the Securities Act.

We intend to apply to have our common stock quoted on the Nasdaq Global Market under the symbol “TWST.”

In connection with this offering, the underwriters may engage in stabilizing transactions, which involves making bids for, purchasing and selling shares of common stock in the open market for the purpose of preventing or retarding a decline in the market price of the common stock while this offering is in progress. These stabilizing transactions may include making short sales of the common stock, which involves the sale by the underwriters of a greater number of shares of common stock than they are required to purchase in this offering, and purchasing shares of common stock on the open market to cover positions created by short sales. Short sales may be “covered” shorts, which are short positions in an amount not greater than the underwriters’ option to purchase additional shares referred to above, or may be “naked” shorts, which are short positions in excess of that amount. The underwriters may close out any covered short position either by exercising their option to purchase additional shares, in whole or in part, or by purchasing shares in the open market. In making this determination, the underwriters will consider, among other things, the price of shares available for purchase in the open market compared to the price at which the underwriters may purchase shares through the option to purchase additional shares. A naked short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of the common stock in the open market that could adversely affect investors who purchase in this offering. To the extent that the underwriters create a naked short position, they will purchase shares in the open market to cover the position.

The underwriters have advised us that, pursuant to Regulation M of the Securities Act, they may also engage in other activities that stabilize, maintain or otherwise affect the price of the common stock, including the imposition of penalty bids. This means that if the representatives of the underwriters purchase common stock in the open market in stabilizing transactions or to cover short sales, the representatives can require the underwriters that sold those shares as part of this offering to repay the underwriting discount received by them.

These activities may have the effect of raising or maintaining the market price of the common stock or preventing or retarding a decline in the market price of the common stock, and, as a result, the price of the common stock may be higher than the price that otherwise might exist in the open market. If the underwriters commence these activities, they may discontinue them at any time. The underwriters may carry out these transactions on the Nasdaq Global Market, in the over-the-counter market or otherwise.

Prior to this offering, there has been no public market for our common stock. The initial public offering price will be determined by negotiations between us and the representatives of the underwriters. In determining the initial public offering price, we and the representatives of the underwriters expect to consider a number of factors including:

- the information set forth in this prospectus and otherwise available to the representatives of the underwriters;
- our prospects and the history and prospects for the industry in which we compete;
- an assessment of our management;
- our prospects for future earnings;
- the general condition of the securities markets at the time of this offering;

- the recent market prices of, and demand for, publicly traded common stock of generally comparable companies; and
- other factors deemed relevant by the underwriters and us.

Neither we nor the underwriters can assure investors that an active trading market will develop for our common shares, or that the shares will trade in the public market at or above the initial public offering price.

Directed shares

At our request, the underwriters have reserved approximately up to shares of our common stock offered by this prospectus for sale, at the initial public offering price, to our directors and officers and certain employees and other parties related to us. Shares purchased by our directors and officers will be subject to the 180-day lock-up restriction described above. The number of shares of common stock available for sale to the general public will be reduced to the extent these individuals purchase such reserved shares. Any reserved shares that are not so purchased will be offered by the underwriters to the general public on the same basis as the other shares offered by this prospectus. Participants in the directed share program who will be subject to a day lock up with respect to any shares sold to them pursuant to the program.

Selling restrictions

Other than in the United States, no action has been taken by us or the underwriters that would permit a public offering of the securities offered by this prospectus in any jurisdiction where action for that purpose is required. The securities offered by this prospectus may not be offered or sold, directly or indirectly, nor may this prospectus or any other offering material or advertisements in connection with the offer and sale of any such securities be distributed or published in any jurisdiction, except under circumstances that will result in compliance with the applicable rules and regulations of that jurisdiction. Persons into whose possession this prospectus comes are advised to inform themselves about and to observe any restrictions relating to the offering and the distribution of this prospectus. This prospectus does not constitute an offer to sell or a solicitation of an offer to buy any securities offered by this prospectus in any jurisdiction in which such an offer or a solicitation is unlawful.

Notice to prospective investors in the European economic area

In relation to each Member State of the European Economic Area which has implemented the Prospectus Directive (each, a “Relevant Member State”), with effect from and including the date on which the Prospectus Directive is implemented in that Relevant Member State, no offer of shares may be made to the public in that Relevant Member State other than:

a) to any legal entity which is a qualified investor as defined in the Prospectus Directive;

b) to fewer than 150 natural or legal persons (other than qualified investors as defined in the Prospectus Directive), subject to obtaining the prior consent of the underwriters; or

c) in any other circumstances falling within Article 3(2) of the Prospectus Directive,

provided that no such offer of shares shall require the Company or any underwriter to publish a prospectus pursuant to Article 3 of the Prospectus Directive or supplement a prospectus pursuant to Article 16 of the Prospectus Directive and each person who initially acquires any shares or to whom any offer is made will be deemed to have represented, acknowledged and agreed to and with each of the underwriters and the Company that it is a “qualified investor” within the meaning of the law in that Relevant Member State implementing Article 2(1)(e) of the Prospectus Directive.

In the case of any shares being offered to a financial intermediary as that term is used in Article 3(2) of the Prospectus Directive, each such financial intermediary will be deemed to have represented, acknowledged and agreed that the shares acquired by it in the offer have not been acquired on a non-discretionary basis on behalf of, nor have they been acquired with a view to their offer or resale to, persons in circumstances which may give rise to an offer of any shares to the public other than their offer or resale in a Relevant Member State to qualified investors as so defined or in circumstances in which the prior consent of the representatives has been obtained to each such proposed offer or resale.

For the purposes of this provision, the expression an "offer of shares to the public" in relation to any shares in any Relevant Member State means the communication in any form and by means of sufficient information on the terms of the offer and the shares to be offered so as to enable an investor to decide to purchase shares, as the same may be varied in that Member State by any measure implementing the Prospectus Directive in that Member State, the expression "Prospectus Directive" means Directive 2003/71/EC (as amended, including by Directive 2010/73/EU), and includes any relevant implementing measure in the Relevant Member State.

Notice to prospective investors in the United Kingdom

In addition, in the United Kingdom, this document is being distributed only to, and is directed only at, and any offer subsequently made may only be directed at persons who are "qualified investors" (as defined in the Prospectus Directive) (i) who have professional experience in matters relating to investments falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005, as amended, or the Order and/or (ii) who are high net worth companies (or persons to whom it may otherwise be lawfully communicated) falling within Article 49(2)(a) to (d) of the Order (all such persons together being referred to as "relevant persons") or otherwise in circumstances which have not resulted and will not result in an offer to the public of the shares in the United Kingdom within the meaning of the Financial Services and Markets Act 2000.

Any person in the United Kingdom that is not a relevant person should not act or rely on the information included in this document or use it as basis for taking any action. In the United Kingdom, any investment or investment activity that this document relates to may be made or taken exclusively by relevant persons.

Notice to prospective investors in Canada

The shares may be sold only to purchasers purchasing, or deemed to be purchasing, as principal that are accredited investors, as defined in National Instrument 45-106 Prospectus Exemptions or subsection 73.3(1) of the Securities Act (Ontario), and are permitted clients, as defined in National Instrument 31-103 Registration Requirements, Exemptions and Ongoing Registrant Obligations. Any resale of the shares must be made in accordance with an exemption from, or in a transaction not subject to, the prospectus requirements of applicable securities laws.

Securities legislation in certain provinces or territories of Canada may provide a purchaser with remedies for rescission or damages if this prospectus (including any amendment thereto) contains a misrepresentation, provided that the remedies for rescission or damages are exercised by the purchaser within the time limit prescribed by the securities legislation of the purchaser's province or territory. The purchaser should refer to any applicable provisions of the securities legislation of the purchaser's province or territory for particulars of these rights or consult with a legal advisor.

Pursuant to section 3A.3 of National Instrument 33-105 Underwriting Conflicts (NI 33-105), the underwriters are not required to comply with the disclosure requirements of NI 33-105 regarding underwriter conflicts of interest in connection with this offering.

Notice to prospective investors in Switzerland

The shares may not be publicly offered in Switzerland and will not be listed on the SIX Swiss Exchange, or SIX or on any other stock exchange or regulated trading facility in Switzerland. This document does not constitute a prospectus within the meaning of, and has been prepared without regard to the disclosure standards for issuance prospectuses under art. 652a or art. 1156 of the Swiss Code of Obligations or the disclosure standards for listing prospectuses under art. 27 ff. of the SIX Listing Rules or the listing rules of any other stock exchange or regulated trading facility in Switzerland. Neither this document nor any other offering or marketing material relating to the shares or the offering may be publicly distributed or otherwise made publicly available in Switzerland.

Neither this document nor any other offering or marketing material relating to the offering, the Company or the shares has been or will be filed with or approved by any Swiss regulatory authority. In particular, this document will not be filed with, and the offer of shares will not be supervised by, the Swiss Financial Market Supervisory Authority FINMA, or FINMA, and the offer of shares has not been and will not be authorized under the Swiss Federal Act on Collective Investment Schemes, or CISA. The investor protection afforded to acquirers of interests in collective investment schemes under the CISA does not extend to acquirers of shares.

Notice to prospective investors in the Dubai international financial centre, or DIFC

This document relates to an Exempt Offer in accordance with the Markets Rules 2012 of the Dubai Financial Services Authority, or DFSA. This document is intended for distribution only to persons of a type specified in the Markets Rules 2012 of the DFSA. It must not be delivered to, or relied on by, any other person. The DFSA has no responsibility for reviewing or verifying any documents in connection with Exempt Offers. The DFSA has not approved this prospectus supplement nor taken steps to verify the information set forth herein and has no responsibility for this document. The securities to which this document relates may be illiquid and/or subject to restrictions on their resale. Prospective purchasers of the securities offered should conduct their own due diligence on the securities. If you do not understand the contents of this document you should consult an authorized financial advisor.

In relation to its use in the DIFC, this document is strictly private and confidential and is being distributed to a limited number of investors and must not be provided to any person other than the original recipient, and may not be reproduced or used for any other purpose. The interests in the securities may not be offered or sold directly or indirectly to the public in the DIFC.

Notice to prospective investors in the united Arab Emirates

The shares have not been, and are not being, publicly offered, sold, promoted or advertised in the United Arab Emirates (including the Dubai International Financial Centre) other than in compliance with the laws of the United Arab Emirates (and the Dubai International Financial Centre) governing the issue, offering and sale of securities. Further, this prospectus does not constitute a public offer of securities in the United Arab Emirates (including the Dubai International Financial Centre) and is not intended to be a public offer. This prospectus has not been approved by or filed with the Central Bank of the United Arab Emirates, the Securities and Commodities Authority or the Dubai Financial Services Authority.

Notice to prospective investors in Australia

This prospectus:

- does not constitute a product disclosure document or a prospectus under Chapter 6D.2 of the Corporations Act 2001 (Cth) of the Corporations Act;

- has not been, and will not be, lodged with the Australian Securities and Investments Commission, or ASIC, as a disclosure document for the purposes of the Corporations Act and does not purport to include the information required of a disclosure document under Chapter 6D.2 of the Corporations Act;
- does not constitute or involve a recommendation to acquire, an offer or invitation for issue or sale, an offer or invitation to arrange the issue or sale, or an issue or sale, of interests to a "retail client" (as defined in section 761G of the Corporations Act and applicable regulations) in Australia; and
- may only be provided in Australia to select investors who are able to demonstrate that they fall within one or more of the categories of investors, or Exempt Investors, available under section 708 of the Corporations Act.

The shares may not be directly or indirectly offered for subscription or purchased or sold, and no invitations to subscribe for or buy the shares may be issued, and no draft or definitive offering memorandum, advertisement or other offering material relating to any shares may be distributed in Australia, except where disclosure to investors is not required under Chapter 6D of the Corporations Act or is otherwise in compliance with all applicable Australian laws and regulations. By submitting an application for the shares, you represent and warrant to us that you are an Exempt Investor.

As any offer of shares under this document will be made without disclosure in Australia under Chapter 6D.2 of the Corporations Act, the offer of those securities for resale in Australia within 12 months may, under section 707 of the Corporations Act, require disclosure to investors under Chapter 6D.2 if none of the exemptions in section 708 applies to that resale. By applying for the shares you undertake to us that you will not, for a period of 12 months from the date of issue of the shares, offer, transfer, assign or otherwise alienate those securities to investors in Australia except in circumstances where disclosure to investors is not required under Chapter 6D.2 of the Corporations Act or where a compliant disclosure document is prepared and lodged with ASIC.

Notice to prospective investors in Japan

The shares have not been and will not be registered pursuant to Article 4, Paragraph 1 of the Financial Instruments and Exchange Act. Accordingly, none of the shares nor any interest therein may be offered or sold, directly or indirectly, in Japan or to, or for the benefit of, any "resident" of Japan (which term as used herein means any person resident in Japan, including any corporation or other entity organized under the laws of Japan), or to others for re-offering or resale, directly or indirectly, in Japan or to or for the benefit of a resident of Japan, except pursuant to an exemption from the registration requirements of, and otherwise in compliance with, the Financial Instruments and Exchange Act and any other applicable laws, regulations and ministerial guidelines of Japan in effect at the relevant time.

Notice to prospective investors in Hong Kong

The shares have not been offered or sold and will not be offered or sold in Hong Kong, by means of any document, other than (a) to "professional investors" as defined in the Securities and Futures Ordinance (Cap. 571) of Hong Kong and any rules made under that Ordinance; or (b) in other circumstances which do not result in the document being a "prospectus" as defined in the Companies (Winding Up and Miscellaneous Provisions) Ordinance (Cap. 32) of Hong Kong or which do not constitute an offer to the public within the meaning of that Ordinance. No advertisement, invitation or document relating to the shares has been or may be issued or has been or may be in the possession of any person for the purposes of issue, whether in Hong Kong or elsewhere, which is directed at, or the contents of which are likely to be accessed or read by, the public of Hong Kong (except if permitted to do so under the securities laws of Hong Kong) other than with respect to shares which are or are intended to be disposed of only to persons outside Hong Kong or only to "professional investors" as defined in the Securities and Futures Ordinance and any rules made under that Ordinance.

Warning

The contents of this document have not been reviewed by any regulatory authority in Hong Kong. You are advised to exercise caution in relation to the offer. If you are in any doubt about any of the contents of this document, you should obtain independent professional advice.

Notice to prospective investors in Singapore

This prospectus has not been registered as a prospectus with the Monetary Authority of Singapore. Accordingly, this prospectus and any other document or material in connection with the offer or sale, or invitation for subscription or purchase, of shares may not be circulated or distributed, nor may the shares be offered or sold, or be made the subject of an invitation for subscription or purchase, whether directly or indirectly, to persons in Singapore other than (i) to an institutional investor under Section 274 of the Securities and Futures Act, Chapter 289 of Singapore, or the SFA, (ii) to a relevant person pursuant to Section 275(1), or any person pursuant to Section 275(1A), and in accordance with the conditions specified in Section 275 of the SFA, or (iii) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA.

Where the shares are subscribed or purchased under Section 275 of the SFA by a relevant person which is:

a) a corporation (which is not an accredited investor (as defined in Section 4A of the SFA)) the sole business of which is to hold investments and the entire share capital of which is owned by one or more individuals, each of whom is an accredited investor; or

b) a trust (where the trustee is not an accredited investor) whose sole purpose is to hold investments and each beneficiary of the trust is an individual who is an accredited investor,

securities (as defined in Section 239(1) of the SFA) of that corporation or the beneficiaries' rights and interest (howsoever described) in that trust shall not be transferred within six months after that corporation or that trust has acquired the shares pursuant to an offer made under Section 275 of the SFA except:

a) to an institutional investor or to a relevant person defined in Section 275(2) of the SFA, or to any person arising from an offer referred to in Section 275(1A) or Section 276(4)(i)(B) of the SFA;

b) where no consideration is or will be given for the transfer;

c) where the transfer is by operation of law;

d) as specified in Section 276(7) of the SFA; or

e) as specified in Regulation 32 of the Securities and Futures (Offers of Investments) (Shares and Debentures) Regulations 2005 of Singapore.

Notice to prospective investors in Bermuda

Shares may be offered or sold in Bermuda only in compliance with the provisions of the Investment Business Act of 2003 of Bermuda which regulates the sale of securities in Bermuda. Additionally, non-Bermudian persons (including companies) may not carry on or engage in any trade or business in Bermuda unless such persons are permitted to do so under applicable Bermuda legislation.

Notice to prospective investors in Saudi Arabia

This document may not be distributed in the Kingdom of Saudi Arabia except to such persons as are permitted under the Offers of Securities Regulations as issued by the board of the Saudi Arabian Capital Market Authority,

or CMA pursuant to resolution number 2-11-2004 dated 4 October 2004 as amended by resolution number 1-28-2008, as amended, or the CMA Regulations. The CMA does not make any representation as to the accuracy or completeness of this document and expressly disclaims any liability whatsoever for any loss arising from, or incurred in reliance upon, any part of this document. Prospective purchasers of the securities offered hereby should conduct their own due diligence on the accuracy of the information relating to the securities. If you do not understand the contents of this document, you should consult an authorised financial adviser.

Notice to prospective investors in the British Virgin Islands

The shares may be offered to persons located in the British Virgin Islands who are "qualified investors" for the purposes of SIBA. Qualified investors include (i) certain entities which are regulated by the Financial Services Commission in the British Virgin Islands, including banks, insurance companies, licensees under SIBA and public, professional and private mutual funds; (ii) a company, any securities of which are listed on a recognised exchange; and (iii) persons defined as "professional investors" under SIBA, which is any person (a) whose ordinary business involves, whether for that person's own account or the account of others, the acquisition or disposal of property of the same kind as the property, or a substantial part of the property of the Company; or (b) who has signed a declaration that he, whether individually or jointly with his spouse, has net worth in excess of US$1,000,000 and that he consents to being treated as a professional investor.

Notice to prospective investors in China

This prospectus does not constitute a public offer of shares, whether by sale or subscription, in the People's Republic of China, or the PRC. The shares are not being offered or sold directly or indirectly in the PRC to or for the benefit of, legal or natural persons of the PRC.

Further, no legal or natural persons of the PRC may directly or indirectly purchase any of the shares or any beneficial interest therein without obtaining all prior PRC's governmental approvals that are required, whether statutorily or otherwise. Persons who come into possession of this document are required by the issuer and its representatives to observe these restrictions.

Notice to prospective investors in Korea

The shares have not been and will not be registered under the Financial Investments Services and Capital Markets Act of Korea and the decrees and regulations thereunder, or the FSCMA, and the shares have been and will be offered in Korea as a private placement under the FSCMA. None of the shares may be offered, sold or delivered directly or indirectly, or offered or sold to any person for re-offering or resale, directly or indirectly, in Korea or to any resident of Korea except pursuant to the applicable laws and regulations of Korea, including the FSCMA and the Foreign Exchange Transaction Law of Korea and the decrees and regulations thereunder, or the FETL. Furthermore, the purchaser of the shares shall comply with all applicable regulatory requirements (including but not limited to requirements under the FETL) in connection with the purchase of the shares. By the purchase of the shares, the relevant holder thereof will be deemed to represent and warrant that if it is in Korea or is a resident of Korea, it purchased the shares pursuant to the applicable laws and regulations of Korea.

Notice to prospective investors in Malaysia

No prospectus or other offering material or document in connection with the offer and sale of the shares has been or will be registered with the Securities Commission of Malaysia, or Commission for the Commission's approval pursuant to the Capital Markets and Services Act 2007. Accordingly, this prospectus and any other

document or material in connection with the offer or sale, or invitation for subscription or purchase, of the shares may not be circulated or distributed, nor may the shares be offered or sold, or be made the subject of an invitation for subscription or purchase, whether directly or indirectly, to persons in Malaysia other than (i) a closed end fund approved by the Commission; (ii) a holder of a Capital Markets Services Licence; (iii) a person who acquires the shares, as principal, if the offer is on terms that the shares may only be acquired at a consideration of not less than RM250,000 (or its equivalent in foreign currencies) for each transaction; (iv) an individual whose total net personal assets or total net joint assets with his or her spouse exceeds RM3 million (or its equivalent in foreign currencies), excluding the value of the primary residence of the individual; (v) an individual who has a gross annual income exceeding RM300,000 (or its equivalent in foreign currencies) per annum in the preceding twelve months; (vi) an individual who, jointly with his or her spouse, has a gross annual income of RM400,000 (or its equivalent in foreign currencies), per annum in the preceding twelve months; (vii) a corporation with total net assets exceeding RM10 million (or its equivalent in a foreign currencies) based on the last audited accounts; (viii) a partnership with total net assets exceeding RM10 million (or its equivalent in foreign currencies); (ix) a bank licensee or insurance licensee as defined in the Labuan Financial Services and Securities Act 2010; (x) an Islamic bank licensee or takaful licensee as defined in the Labuan Financial Services and Securities Act 2010; and (xi) any other person as may be specified by the Commission; provided that, in the each of the preceding categories (i) to (xi), the distribution of the shares is made by a holder of a Capital Markets Services Licence who carries on the business of dealing in securities. The distribution in Malaysia of this prospectus is subject to Malaysian laws. This prospectus does not constitute and may not be used for the purpose of public offering or an issue, offer for subscription or purchase, invitation to subscribe for or purchase any securities requiring the registration of a prospectus with the Commission under the Capital Markets and Services Act 2007.

Notice to prospective investors in Taiwan

The shares have not been and will not be registered with the Financial Supervisory Commission of Taiwan pursuant to relevant securities laws and regulations and may not be sold, issued or offered within Taiwan through a public offering or in circumstances which constitutes an offer within the meaning of the Securities and Exchange Act of Taiwan that requires a registration or approval of the Financial Supervisory Commission of Taiwan. No person or entity in Taiwan has been authorised to offer, sell, give advice regarding or otherwise intermediate the offering and sale of the shares in Taiwan.

Notice to prospective investors in South Africa

Due to restrictions under the securities laws of South Africa, the shares are not offered, and the offer shall not be transferred, sold, renounced or delivered, in South Africa or to a person with an address in South Africa, unless one or other of the following exemptions applies:

a) the offer, transfer, sale, renunciation or delivery is to:

   i) persons whose ordinary business is to deal in securities, as principal or agent;

   ii) the South African Public Investment Corporation;

   iii) persons or entities regulated by the Reserve Bank of South Africa;

   iv) authorised financial service providers under South African law;

   v) financial institutions recognised as such under South African law;

vi) a wholly-owned subsidiary of any person or entity contemplated in (c), (d) or (e), acting as agent in the capacity of an authorised portfolio manager for a pension fund or collective investment scheme (in each case duly registered as such under South African law); or

vii) any combination of the person in (a) to (f); or

b) the total contemplated acquisition cost of the securities, for any single addressee acting as principal is equal to or greater than ZAR 1,000,000.

No “offer to the public” (as such term is defined in the South African Companies Act, No. 71 of 2008 (as amended or re-enacted), or the South African Companies Act) in South Africa is being made in connection with the issue of the shares. Accordingly, this document does not, nor is it intended to, constitute a “registered prospectus” (as that term is defined in the South African Companies Act) prepared and registered under the South African Companies Act and has not been approved by, and/or filed with, the South African Companies and Intellectual Property Commission or any other regulatory authority in South Africa. Any issue or offering of the shares in South Africa constitutes an offer of the shares in South Africa for subscription or sale in South Africa only to persons who fall within the exemption from “offers to the public” set out in section 96(1)(a) of the South African Companies Act. Accordingly, this document must not be acted on or relied on by persons in South Africa who do not fall within section 96(1)(a) of the South African Companies Act (such persons being referred to as “SA Relevant Persons”). Any investment or investment activity to which this document relates is available in South Africa only to SA Relevant Persons and will be engaged in South Africa only with SA relevant persons.

Legal matters

The validity of the issuance of our common stock offered in this prospectus will be passed upon for us by Orrick, Herrington & Sutcliffe LLP, 1000 Marsh Road, Menlo Park, California 94025. Latham & Watkins LLP, 140 Scott Drive, Menlo Park, California 94025, is acting as counsel for the underwriters in connection with this offering. Orrick, Herrington & Sutcliffe LLP and certain attorneys and investment funds affiliated with the firm own shares of our preferred stock which will be converted into an aggregate of 376,717 shares of common stock immediately prior to the completion of this offering.

Experts

The consolidated financial statements as of September 30, 2017 and 2016 and for each of the two years in the period ended September 30, 2017 included in this prospectus have been so included in reliance on the report (which contains an explanatory paragraph relating to the Company’s ability to continue as a going concern as described in Note 1 to the consolidated financial statements) of PricewaterhouseCoopers LLP, an independent registered public accounting firm, given on the authority of said firm as experts in auditing and accounting.

Where you can find more information

We have filed with the Securities and Exchange Commission a registration statement on Form S-1 under the Securities Act with respect to this offering of our common stock. This prospectus, which constitutes a part of the registration statement, does not contain all of the information set forth in the registration statement, some items of which are contained in exhibits to the registration statement as permitted by the rules and regulations of the Securities and Exchange Commission. For further information with respect to us and our common stock, we refer you to the registration statement, including the exhibits and the financial statements and notes filed as a part of the registration statement. Statements contained in this prospectus concerning the contents of any

contract or any other document are not necessarily complete. If a contract or document has been filed as an exhibit to the registration statement, please see the copy of the contract or document that has been filed. Each statement in this prospectus relating to a contract or document filed as an exhibit is qualified in all respects by the filed exhibit. The exhibits to the registration statement should be referenced for the complete contents of these contracts and documents. You may obtain copies of this information by mail from the Public Reference Section of the Securities and Exchange Commission, 100 F Street, N.E., Room 1580, Washington, D.C. 20549, at prescribed rates. You may obtain information on the operation of the public reference rooms by calling the Securities and Exchange Commission at 1-800-SEC-0330. The Securities and Exchange Commission also maintains an Internet website that contains reports, proxy statements and other information about issuers, like us, that file electronically with the Securities and Exchange Commission. The address of that website is www.sec.gov.

As a result of this offering, we will become subject to the information and reporting requirements of the Exchange Act and, in accordance with this law, will file periodic reports, proxy statements and other information with the Securities and Exchange Commission. These periodic reports, proxy statements and other information will be available for inspection and copying at the Securities and Exchange Commission's public reference facilities and the website of the Securities and Exchange Commission referred to above.

Twist Bioscience Corporation
Index to consolidated financial statements

Report of Independent Registered Public Accounting Firm

The Company has adopted the provisions of ASC 606, *Revenue from Contracts with Customers*, on a full retrospective basis and the accompanying consolidated financial statements for the years ended September 30, 2017 and 2016 reflect the full retrospective adoption of ASC 606. Considering that the earliest adoption period allowed under ASC 606 is the three-month period ended December 31, 2017, the permissible adoption date of ASC 606 for the years ended September 30, 2017 and 2016 as described in Note 2 to the consolidated financial statements has not been consummated at February 8, 2018. When unaudited consolidated financial statements for the three-month period ended December 31, 2017 have been issued that reflect the adoption of ASC 606, we will be in a position to furnish the following report.

/s/ PricewaterhouseCoopers LLP
San Jose, California
February 8, 2018

“Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Twist Bioscience Corporation

In our opinion, the accompanying consolidated balance sheets and the related consolidated statements of operations and comprehensive loss, of redeemable convertible preferred stock and stockholders’ deficit and of cash flows present fairly, in all material respects, the financial position of Twist Bioscience Corporation and its subsidiaries as of September 30, 2017 and 2016 and the results of their operations and their cash flows for the years then ended in conformity with accounting principles generally accepted in the United States of America. These financial statements are the responsibility of the Company’s management. Our responsibility is to express an opinion on these financial statements based on our audits. We conducted our audits of these statements in accordance with the standards of the Public Company Accounting Oversight Board (United States) and in accordance with auditing standards generally accepted in the United States of America. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement. An audit includes examining, on a test basis, evidence supporting the amounts and disclosures in the financial statements, assessing the accounting principles used and significant estimates made by management, and evaluating the overall financial statement presentation. We believe that our audits provide a reasonable basis for our opinion.

The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 1 to the consolidated financial statements, the Company has generated net losses and negative cash flows since inception that raise substantial doubt about its ability to continue as a going concern. Management’s plans in regard to these matters are also described in Note 1. The financial statements do not include any adjustments that might result from the outcome of this uncertainty.

As discussed in Note 2 to the consolidated financial statements, the Company changed the manner in which it accounts for revenue from contracts with customers in 2018.

San Jose, California

February 8, 2018, except for the effects of the change in the manner in which the Company accounts for revenue from contracts with customers as discussed in Note 2 to the consolidated financial statements, as to which the date is [ ]”

Twist Bioscience Corporation
Consolidated balance sheets

(In thousands, except share and per share amounts)	September 30, 2016	September 30, 2017	Pro forma September 30, 2017 (unaudited)
Assets			
Current assets			
Cash and cash equivalents	$ 28,596	$ 31,227	$ 31,227
Short-term investments	27,324	30,977	30,977
Accounts receivable, net	723	2,346	2,346
Inventory	1,228	1,827	1,827
Prepaid expenses and other current assets	1,168	1,492	1,492
Total current assets	$ 59,039	$ 67,869	$ 67,869
Property and equipment, net	14,617	14,834	14,834
Goodwill	1,138	1,138	1,138
Intangible assets, net	1,133	920	920
Restricted cash, non-current	322	202	202
Other non-current assets	214	694	694
Total assets	$ 76,463	$ 85,657	$ 85,657
Liabilities, Redeemable Convertible Preferred Stock and Stockholders' Equity (Deficit)			
Current liabilities			
Accounts payable	$ 2,337	$ 2,849	$ 2,849
Accrued expenses	2,218	2,092	2,092
Accrued payroll	2,403	3,470	3,470
Current portion of long-term debt	1,367	—	—
Other current liabilities	353	1,066	1,066
Total current liabilities	$ 8,678	$ 9,477	$ 9,477
Redeemable convertible preferred stock warrant liability	383	644	—
Long-term debt, net of current portion	9,814	9,154	9,154
Other non-current liabilities	162	107	107
Total liabilities	$ 19,037	$ 19,382	$ 18,738
Commitments and contingencies (Note 8)			
Redeemable convertible preferred stock			
Series A redeemable convertible preferred stock, $0.00001 par value—28,263,133 shares authorized as of September 30, 2016 and 2017; 27,898,391 shares issued and outstanding as of September 30, 2016 and 2017. No shares authorized, issued or outstanding, pro forma as of September 30, 2017 (Liquidation preference of $9,111 as of September 30, 2016 and 2017)	$ 9,141	$ 9,141	$ —
Series B redeemable convertible preferred stock, $0.00001 par value—32,988,887 shares authorized as of September 30, 2016 and 2017; 32,828,281 shares issued and outstanding as of September 30, 2016 and 2017. No shares authorized, issued or outstanding, pro forma as of September 30, 2017 (Liquidation preference of $26,000 as of September 30, 2016 and 2017)	25,900	25,900	—
Series C redeemable convertible preferred stock, $0.00001 par value—24,854,989 shares authorized as of September 30, 2016 and 2017; 24,668,310 shares issued and outstanding as of September 30, 2016 and 2017. No shares authorized, issued or outstanding, pro forma as of September 30, 2017 (Liquidation preference of $37,000 as of September 30, 2016 and 2017)	36,726	36,726	—
Series D redeemable convertible preferred stock, $0.00001 par value—30,442,280 and 64,124,559 shares authorized as of September 30, 2016 and 2017, respectively; 29,096,365 and 59,743,942 shares issued and outstanding as of September 30, 2016 and 2017, respectively. No shares authorized, issued or outstanding, pro forma as of September 30, 2017. (Liquidation preference of $62,432 and $128,193 as of September 30, 2016 and 2017, respectively)	62,270	127,866	—
Total redeemable convertible preferred stock	$ 134,037	$ 199,633	$ —
Stockholders' equity (deficit)			
Common stock, $0.00001 par value—165,000,000 and 210,000,000 shares authorized at September 30, 2016 and September 30, 2017, respectively; 31,151,358 and 31,474,045 shares issued and outstanding at September 30, 2016 and 2017, respectively. 176,612,969 shares issued and outstanding at September 30, 2017 pro forma (unaudited)	$ —	$ —	$ 2
Additional paid-in capital	3,689	6,228	206,503
Accumulated other comprehensive income	9	33	33
Accumulated deficit	(80,309)	(139,619)	(139,619)
Total stockholders' equity (deficit)	$ (76,611)	$ (133,358)	$ 66,919
Total liabilities, redeemable convertible preferred stock and stockholders' equity (deficit)	$ 76,463	$ 85,657	$ 85,657

The accompanying notes are an integral part of these consolidated financial statements.

Twist Bioscience Corporation
Consolidated statements of operations and comprehensive loss

(In thousands, except share and per share amounts)	Year ended September 30, 2016	2017
Revenues	$ 2,269	$ 10,767
Operating expenses:		
Cost of revenues	$ 9,421	$ 24,020
Research and development	18,230	19,169
Selling, general and administrative	18,274	26,060
Total operating expenses	$ 45,925	$ 69,249
Loss from operations	$ (43,656)	$ (58,482)
Interest income	241	412
Interest expense	(746)	(905)
Other income (expense), net	73	(55)
Loss before income taxes	$ (44,088)	$ (59,030)
Provision for income taxes	—	(280)
Net loss attributable to common stockholders	$ (44,088)	$ (59,310)
Other comprehensive loss:		
Change in unrealized gain (loss) on investments	$ 9	$ (9)
Foreign currency translation adjustment	—	33
Comprehensive loss	$ (44,079)	$ (59,286)
Net loss per share attributable to common stockholders—basic and diluted	$ (2.38)	$ (2.47)
Weighted average shares used in computing net loss per share attributable to common stockholders—basic and diluted	18,511,202	23,982,605
Pro forma net loss per share—basic and diluted (unaudited)		$ (0.39)
Pro forma weighted-average shares used in computing pro forma net loss per share—basic and diluted (unaudited)		152,397,059

The accompanying notes are an integral part of these consolidated financial statements.

Twist Bioscience Corporation
Consolidated statements of redeemable convertible preferred stock and stockholders' deficit

(In thousands, except share data)	Series A convertible preferred stock		Series B convertible preferred stock		Series C convertible preferred stock		Series D convertible preferred stock		Common stock		Additional paid-in capital	Other comprehensive income	Accumulated deficit	stockhol d
	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount	Shares	Amount				
Balances as of September 30, 2015	27,898,391	$ 9,141	32,828,281	$25,900	24,668,310	$36,726	—	$ —	23,665,455	$ —	$ 315	$ —	$ (36,221)	$ (3
Issuance of Series D redeemable convertible preferred stock, net of financing costs of $162	—	—	—	—	—	—	29,096,365	62,270	—	—	—	—	—	
Issuance of common stock to owners of Genome Compiler Corporation	—	—	—	—	—	—	—	—	3,990,593	—	2,400	—	—	2
Issuance of restricted common stock to employees	—	—	—	—	—	—	—	—	3,170,000	—	160	—	—	
Vesting of restricted common stock issued to member of the Board of Directors	—	—	—	—	—	—	—	—	—	—	7	—	—	
Exercise of stock options	—	—	—	—	—	—	—	—	390,727	—	110	—	—	
Repurchase of early exercised stock options	—	—	—	—	—	—	—	—	(65,417)	—	—	—	—	
Stock based compensation	—	—	—	—	—	—	—	—	—	—	697	—	—	
Other comprehensive income	—	—	—	—	—	—	—	—	—	—	—	9	—	
Net loss	—	—	—	—	—	—	—	—	—	—	—	—	(44,088)	(4
Balances as of September 30, 2016	27,898,391	$ 9,141	32,828,281	$25,900	24,668,310	$36,726	29,096,365	$ 62,270	31,151,358	$ —	$ 3,689	$ 9	$ (80,309)	$ (7
Issuance of Series D redeemable convertible preferred stock, net of financing costs of $165	—	—	—	—	—	—	30,647,577	65,596	—	—	—	—	—	
Vesting of restricted common stock issued to member of the Board of Directors	—	—	—	—	—	—	—	—	—	—	4	—	—	
Exercise of stock options	—	—	—	—	—	—	—	—	322,687	—	162	—	—	
Issuance of common stock warrants	—	—	—	—	—	—	—	—	—	—	486	—	—	
Stock based compensation	—	—	—	—	—	—	—	—	—	—	1,887	—	—	
Other comprehensive income	—	—	—	—	—	—	—	—	—	—	—	24	—	
Net loss	—	—	—	—	—	—	—	—	—	—	—	—	(59,310)	(5
Balances as of September 30, 2017	27,898,391	$ 9,141	32,828,281	$25,900	24,668,310	$36,726	59,743,942	$127,866	31,474,045	$ —	$ 6,228	$ 33	($ 139,619)	$ (13

The accompanying notes are an integral part of these consolidated financial statements.

Twist Bioscience Corporation
Consolidated statements of cash flows

(in thousands)	Year ended September 30, 2016	2017
Cash flows from operating activities		
Net loss attributable to common stockholders	$(44,088)	$(59,310)
Adjustments to reconcile net loss to net cash used in operating activities		
Depreciation and amortization	4,229	5,021
Loss on disposal of property and equipment	—	507
Stock-based compensation	857	1,891
Non-cash interest expense	160	363
Change in fair value of redeemable convertible preferred stock warrant liability	(68)	261
Amortization of debt discount	78	95
Changes in assets and liabilities, net of impact of business combination:		
Accounts receivable	(702)	(1,623)
Inventory	(1,228)	(599)
Prepaid expenses and other current assets	(318)	(324)
Other non-current assets	(221)	(481)
Accounts payable	466	560
Accrued expenses	1,016	621
Accrued payroll	982	1,067
Other liabilities	245	650
Net cash used in operating activities	(38,592)	(51,301)
Cash flows from investing activities		
Purchases of property and equipment	(6,229)	(6,594)
Proceeds from sale of property and equipment	—	266
Purchases of investments	(27,290)	(40,587)
Maturity of investments	—	36,925
Change in restricted cash	(80)	120
Cash acquired through business combination	254	—
Net cash used in investing activities	(33,345)	(9,870)
Cash flows from financing activities		
Proceeds from issuance of common stock and exercise of stock options	152	205
Proceeds from issuance of Series D redeemable convertible preferred stock, net of issuance costs	62,270	65,596
Borrowings of long-term debt	7,652	2,174
Repayments on long-term debt	(426)	(4,173)
Net cash provided by financing activities	69,648	63,802
Net increase (decrease) in cash and cash equivalents	(2,289)	2,631
Cash and cash equivalents at beginning of year	30,885	28,596
Cash and cash equivalents at end of period	$ 28,596	$ 31,227
Supplemental disclosure of cash flow information		
Interest paid	$ 391	$ 702
Income taxes paid	14	6
Non-cash investing and financing activities		
Property and equipment additions included in accrued liabilities and accounts payable	$ 1,079	$ 285
Fair value of warrants issued in connection with debt	182	486
Fair value of common stock issued to owners of Genome Compiler Corporation	2,400	—

The accompanying notes are an integral part of these consolidated financial statements.

Twist Bioscience Corporation
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1. The company

Twist Bioscience Corporation (the Company) was incorporated in the state of Delaware on February 4, 2013. The Company is a synthetic biology company that has developed a disruptive DNA synthesis platform.

DNA is used in many applications across different industries: industrial chemicals, academic, healthcare and agriculture. For the first two years of its existence, the Company focused on business planning, research, recruiting, raising capital, building prototypes, proving its technology, and preparing for commercial launch. The Company began generating revenues from the sale of synthetic DNA in April 2016.

In April 2016, the Company acquired Genome Compiler Corporation (GCC), a company with research and development operations in Israel, to supplement the Company's digital biology workflow. Aggregate consideration of 4.0 million shares of the Company's common stock were issued to the holders of the outstanding shares of the acquired company in connection with the acquisition. The Company is utilizing GCC's technology and expertise to grow its digital products portfolio, including its e-commerce solution with gene design capabilities.

The Company has a limited operating history and its prospects are subject to risks, expenses and uncertainties frequently encountered by companies in this industry. These risks include, but are not limited to, the uncertainty of availability of additional financing, market acceptance of its products, the ability to retain and attract new customers, and the uncertainty of achieving future profitability.

The Company has generated net losses in all periods since inception. As of September 30, 2017, the Company had an accumulated deficit of $139.6 million and has not generated positive cash flows from operations since inception. Losses are expected to continue as the Company continues to invest in product development, manufacturing, and sales and marketing. Based on its recurring losses from operations incurred since inception, expectation of continuing operating losses for the foreseeable future, and need to raise additional capital to finance its future operations, the Company has concluded that there is substantial doubt about its ability to continue as a going concern within one year after the date that the consolidated financial statements are issued.

The Company has raised multiple rounds of debt and equity financing, including an aggregate of $65.6 million from the sale of preferred stock between March and September of 2017. However, there can be no assurance that additional financing will be successful in raising additional capital or that such capital, if available, will be on terms which are acceptable to us.

If the Company is unable to obtain funding, the Company could be forced to delay, reduce or eliminate some or all of its research and development programs, product portfolio expansion or commercialization efforts, which could adversely affect its business prospects, or the Company may be unable to continue operations. Failure to raise additional capital or generate sufficient cash flows from operations could have a material adverse effect on the Company's ability to achieve its intended business objectives. Although management continues to pursue these plans, there is no assurance that the Company will be successful in obtaining sufficient funding on terms acceptable to the Company to fund continuing operations, if at all.

The accompanying consolidated financial statements do not include any adjustments that might result from the outcome of this uncertainty. Accordingly, the consolidated financial statements have been prepared on a basis

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that assumes the Company will continue as a going concern and which contemplates the realization of assets and satisfaction of liabilities and commitments in the ordinary course of business.

2. Summary of significant accounting policies

Basis of presentation and use of estimates

The presentation of consolidated financial statements in conformity with accounting principles generally accepted in the United States of America requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and disclosure of contingent assets and liabilities as of the date of the consolidated financial statements and the reported amounts of revenue and expenses during the reporting period. Such estimates include the valuation of deferred tax assets, stock-based compensation expense, and the fair value of the Company's common stock and redeemable convertible preferred stock warrant liabilities. Actual results could differ from those estimates. The Company's consolidated financial statements include its wholly-owned subsidiaries. All intercompany balances and accounts are eliminated in consolidation.

Unaudited pro forma consolidated balance sheet information

Immediately prior to the completion of the initial public offering contemplated herein, all outstanding shares of convertible preferred stock will automatically convert into shares of common stock. The unaudited pro forma consolidated balance sheet information at September 30, 2017 gives effect to the conversion of all outstanding shares of the Company's convertible preferred stock into 145,138,924 shares of common stock. It also gives effect to an automatic conversion of warrants to purchase 786,594 shares of redeemable convertible preferred stock into warrants to purchase the same number of shares of common stock, which results in the reclassification of the redeemable convertible preferred stock warrant liability to additional paid-in capital. The unaudited pro forma consolidated balance sheet information does not give effect to the potential proceeds from the Company's contemplated initial public offering.

Risks and uncertainties

The Company relies on third parties for the supply and manufacture of its products, as well as third-party logistics providers. In instances where these parties fail to perform their obligations, the Company may be unable to find alternative suppliers to satisfactorily deliver its products to its customers on time, if at all.

The Company operates in a dynamic and highly competitive industry and believes that changes in any of the following areas could have a material adverse effect on the Company's future financial position, results of operations, or cash flows; ability to obtain future financing; advances and trends in new technologies and industry standards; market acceptance of the Company's products; development of sales channels; certain strategic relationships; litigation or claims against the Company regarding intellectual property, patent, product, regulatory, or other factors; and the ability to attract and retain employees necessary to support its growth.

The Company has expended and expects to continue to expend substantial funds to complete the research and development of its production process. The Company may require additional funds to commercialize its products and may be unable to entirely fund these efforts with its current financial resources. Additional funds may not be available on acceptable terms, if at all. If adequate funds are unavailable on a timely basis from operations or additional sources of financing, the Company may have to delay the sale of the Company's

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products and services which would materially and adversely affect its business, financial condition and operations.

Concentration of credit risk

Financial instruments that potentially subject the Company to a concentration of credit risk consist of cash and cash equivalents, short-term investments and accounts receivable. Substantially all of the Company's cash is held by one financial institution that management believes is of high credit quality. Such deposits may, at times, exceed federally insured limits. The Company's investment policy addresses the level of credit exposure by establishing a minimum allowable credit rating and by limiting the concentration in any one investment.

The Company's accounts receivable is derived from customers located principally in the United States. The Company maintains credit insurance for certain of its customer balances, performs ongoing credit evaluations of its customers, and maintains allowances for potential credit losses on customers' accounts when deemed necessary. The Company does not typically require collateral from its customers. Credit losses historically have not been material. The Company continuously monitors customer payments and maintains an allowance for doubtful accounts based on its assessment of various factors including historical experience, age of the receivable balances, and other current economic conditions or other factors that may affect customers' ability to pay.

Customer concentration

Customers that accounted for equal to or greater than 10% of total revenues were as follows:

	Years ended September 30,	
	2016	**2017**
Customer A	30%	40%
Customer B	11%	0%

One customer accounted for greater than 10% of net accounts receivable as follows:

	September 30,	
	2016	**2017**
Customer A	41%	35%

Cash and cash equivalents

Cash equivalents that are readily convertible to cash are stated at cost, which approximates fair value. The Company considers all highly liquid investments with an original or remaining maturity of three months or less at the time of purchase to be cash equivalents. Cash equivalents primarily consist of investments in money market funds as of September 30, 2016 and 2017.

Short-term investments

The Company invests in various types of securities, including United States government, commercial paper, and corporate debt securities. It classifies its investments as available-for-sale and records them at fair value based upon market prices at period end. Unrealized gains and losses that are deemed temporary in nature are

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recorded in accumulated other comprehensive income (loss) as a separate component of stockholders' equity (deficit). Dividend and interest income are recognized when earned. Realized gains and losses are included in earnings and are derived using the specific identification method for determining the cost of investments sold. The Company may sell these securities at any time for use in current operations.

Accounts receivable

Trade receivables include amounts billed and currently due from customers, recorded at the net invoice value and are not interest bearing. The amounts due are stated at their net estimated realizable value. The Company maintains an allowance for doubtful accounts to provide for the estimated amounts of receivables that will not be collected. The allowance is based upon an assessment of customer creditworthiness, historical payment experience, the age of outstanding receivables and collateral to the extent applicable. The Company re-evaluates such allowance on a regular basis and adjusts its allowance as needed. Once a receivable is deemed to be uncollectible, such balance is charged against the allowance. The Company did not record any allowance for doubtful accounts as of September 30, 2016 and 2017.

The Company's accounts receivable balance consists of the following:

	September 30,	
(in thousands)	**2016**	**2017**
Trade Receivables	$ 664	$ 2,237
Other Receivables	59	109
Accounts Receivable	$ 723	$ 2,346

The Company has a short order-to-invoice lifecycle, as most products can be manufactured within one month. Upon delivery of the products to the customer, the Company invoices the customer. The typical timing of payment is net 30 days, with some customers having payment terms of net 90 days.

Fair value of financial instruments

The carrying amounts of the Company's financial instruments including cash equivalents, accounts payable and accrued liabilities approximate fair value due to their relatively short maturities. The carrying amounts of the redeemable convertible preferred stock warrant liability represent their fair values. Based on the borrowings rates currently available to the Company for loans with similar terms, the carrying value of the Company's long-term debt approximates its fair value (level 2 within the fair value hierarchy).

Inventory

Inventory is stated at the lower of cost or net realizable value. Cost is determined using the first-in, first-out method. Determining net realizable value of inventory involves judgments and assumptions, including projecting selling prices and costs to sell. Provisions are made to reduce excess and obsolete inventories to their estimated net realizable value based on forecasted demand, past experience, the age and nature of inventories.

Property and equipment

Property and equipment are stated at cost. Depreciation is computed using the straight-line method over the estimated useful lives of the assets or the remaining lease term of the respective leasehold improvements

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assets, if any. The Company recorded depreciation expense of $4.1 million and $4.8 million as of September 30, 2016 and 2017, respectively. Estimated lives of property and equipment are as follows:

Laboratory equipment	5 Years
Furniture, fixtures and other equipment	5 Years
Computer equipment	3 Years
Computer software	3 Years
Leasehold improvements	Lesser of useful life or facilities' lease term.

Maintenance and repairs are charged to expense as incurred, and improvements and betterments are capitalized and depreciated through the life of the lease. When assets are retired or otherwise disposed of, the cost and accumulated depreciation are removed from the balance sheet and any resulting gain or loss is reflected in operations in the period realized.

Capitalized software development costs

Costs associated with internal-use software systems, including those to improve e-commerce capabilities, during the application development stage are capitalized. Capitalization of costs begins when the preliminary project stage is completed, management has committed to funding the project, and it is probable that the project will be completed and the software will be used to perform the function intended. Capitalization ceases at the point when the project is substantially complete and is ready for its intended purpose. The capitalized amounts are included in property and equipment, net on the consolidated balance sheets.

Capitalized software development costs, net, were $1.3 million as of September 30, 2017. The Company did not have any capitalized software development costs in prior years. Capitalized costs are amortized using the straight-line method over an estimated useful life of the assets, which is three years.

Long-lived assets

The Company reviews property and equipment and intangibles for impairment whenever events or changes in circumstances indicate that the carrying amount of an asset may not be recoverable. Recoverability is measured by comparison of the carrying amount to the future undiscounted cash flows which the assets are expected to generate. If such assets are considered to be impaired, the impairment to be recognized is measured by the amount by which the carrying amount of the assets exceeds the projected discounted future net cash flows arising from the asset. There have been no such impairments of long-lived assets during the years ended September 30, 2016 and 2017.

Business combinations

Assets acquired and liabilities assumed as part of a business combination are generally recorded at their fair value at the date of acquisition. The excess of purchase price over the fair value of assets acquired and liabilities assumed is recorded as goodwill. Determining the fair value of identifiable assets, particularly intangible assets acquired, and liabilities assumed requires management to make estimates, which are based on all available information and in some cases assumptions with respect to the timing and amount of future revenues and expenses associated with an asset. Costs to effect an acquisition are recorded in general and administrative expenses in the consolidated statements of operations and comprehensive loss as the expenses are incurred.

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Goodwill and purchased intangible assets

Goodwill is evaluated for impairment annually or more frequently if events or changes in circumstances indicate that the carrying value of the asset may not be recoverable. If, based on a qualitative assessment, the Company determines it is more likely than not that goodwill is impaired, a quantitative assessment is performed to determine if the fair value of the Company's sole reporting unit is less than its carrying value.

Purchased intangible assets with finite lives are generally amortized over their estimated useful lives using the straight-line method. The Company reviews intangible assets for impairment whenever events or changes in business circumstances indicate that the carrying amounts of the assets may not be fully recoverable. Impairment assessments inherently involve judgment as to assumptions about expected future cash flows and the impact of market conditions on those assumptions.

Segment information

The Company has one business activity, which is manufacturing of synthetic DNA using its semiconductor based silicon platform and operates as one reportable and operating segment. The Company's chief operating decision-maker, its Chief Executive Officer (CEO), reviews the Company's operating results on an aggregate basis for purposes of allocating resources and evaluating financial performance.

Revenue recognition

Effective October 1, 2017, the Company elected to early adopt the requirements of Accounting Standards Codification (ASC) 606, *Revenue from Contracts with Customers* using the full retrospective method. The Company evaluated the impact on revenues, loss from operations, net loss attributable to common stockholders and basic and diluted earnings per share for all periods presented and concluded that there was no material impact on the Company's consolidated financial statements for all periods presented.

The Company's revenue is generated through the sale of synthetic biology tools, such as synthetic genes, or clonal genes and fragments, oligonucleotides pools, or oligo pools, next generation sequencing, or NGS tools and DNA libraries. The Company accounts for a contract when it has approval and commitment from both parties, the rights of the parties are identified, payment terms are identified, the contract has commercial substance and collectability of consideration is probable.

Contracts with customers are generally in the written form of a purchase order or a quotation, which outline the promised goods and the agreed upon price. Such orders are often accompanied by a Master Supply or Distribution Agreement that establishes the terms and conditions, rights of the parties, delivery terms, and pricing. The Company assesses collectability based on a number of factors, including past transaction history and creditworthiness of the customer.

For all of the Company's contracts to date, the customer orders a specified quantity of a synthetic DNA sequence; therefore, the delivery of the ordered quantity per the purchase order is accounted for as one performance obligation. Some contracts may contain prospective discounts when certain order quantities are exceeded; however, these future discounts are either not significant, not deemed to be incremental to the pricing offered to other customers, or not enforceable options to acquire additional goods. As a result, these discounts do not constitute a material right and do not meet the definition of a separate performance obligation. The Company does not offer retrospective discounts or rebates.

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The transaction price is determined based on the agreed upon rates in the purchase order or master supply agreements applied to the quantity of synthetic DNA that was manufactured and shipped to the customer. The Company's contracts include only one performance obligation – the delivery of the product to the customer. Accordingly, all of the transaction price, net of any discounts, is allocated to the one performance obligation. Therefore, upon delivery of the product, there are no remaining performance obligations. The Company's shipping and handling activities are considered a fulfillment cost. The Company has elected to exclude all sales and value added taxes from the measurement of the transaction price. The Company has not adjusted the transaction price for significant financing since the time period between the transfer of goods and payment is less than one year.

The Company recognizes revenue at a point in time when control of the products is transferred to the customer. Management applies judgment in evaluating when a customer obtains control of the promised good which is generally when the product is shipped or delivered to the customer. The Company's customer contracts generally include a standard assurance warranty to guarantee that its products comply with agreed specifications. The Company reduces revenue by the amount of expected returns which have been insignificant.

The Company has elected the practical expedient to not disclose the consideration allocated to remaining performance obligations and an explanation of when those amounts are expected to be recognized as revenue since the duration of the contracts is less than one year.

Refer to Note 17 for the disaggregation of revenues by geography and by product.

Revenues by industry were as follows:

	Years ended September 30,	
(in thousands)	**2016**	**2017**
Industrial chemicals	$ 960	$ 6,702
Academic research	830	2,709
Healthcare	461	1,226
Agricultural	18	130
Total revenues	$ 2,269	$ 10,767

The Company does not have any contract assets or contract liabilities as of September 30, 2016 and 2017. For all periods presented, the Company did not recognize revenue from amounts that were included in the contract liability balance at the beginning of each period. In addition, for all periods presented, there was no revenue recognized in a reporting period from performance obligations satisfied in previous periods.

Based on the nature of the Company's contracts with customers which are recognized over a term of less than 12 months, the Company has elected to use the practical expedient whereby costs to obtain a contract are expensed as they are incurred.

Research and development

Research and development expenses consist of compensation costs, employee benefits, subcontractors, research supplies, allocated facility related expenses and allocated depreciation and amortization. All research and development costs are expensed as incurred.

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Advertising costs

Costs related to advertising and promotions are expensed to sales and marketing as incurred. Advertising and promotion expenses for the years ended September 30, 2016 and 2017, were $0.2 million and $0.1 million, respectively.

Government contract payments

The Company recognizes payments received from its funded research and development agreement with Defense Advanced Research Projects Agency (DARPA) when milestones are achieved and records them as a reduction of research and development expenses. In the year ended September 30, 2016, milestones met and recorded as a reduction of research and development costs totaled $2.4 million. There were no DARPA payments received during the year ended September 30, 2017.

Redeemable convertible preferred stock warrant liability

Outstanding warrants that are related to the Company's redeemable convertible preferred stock are classified as liabilities on the balance sheet. As the warrants to purchase redeemable convertible preferred stock are exercisable into shares of convertible preferred stock, the Company has recognized a liability for the fair value of its warrants on the consolidated balance sheets upon issuance and subsequently remeasures the liability to fair value at the end of each reporting period until the earlier of the expiration or exercise of the warrants. In connection with the closing of an initial public offering, all of the outstanding warrants to purchase redeemable convertible preferred stock will automatically convert to warrants to purchase common stock, which qualify for equity classification and no further measurement will be required thereafter.

Common stock warrants

Warrants to purchase the Company's common stock issued in conjunction with debt are recorded as additional paid-in-capital and classified as equity on the consolidated balance sheets. During the year ended September 30, 2017, the Company recorded $0.5 million in additional paid-in-capital for the fair value of warrants to purchase common stock issued in connection with long-term debt.

Stock-based compensation

The Company maintains performance incentive plans under which incentive and nonqualified stock options are granted primarily to employees and may be granted to members of the Board of Directors and certain non-employee consultants.

The Company recognizes stock compensation in accordance with ASC 718, *Compensation — Stock Compensation*. ASC 718 requires the recognition of compensation expense, using a fair value based method, for costs related to all stock-based payments including stock options.

The Company recognizes fair value of stock options granted to non-employees as a stock-based compensation expense over the period in which the related services are received. The Company recognizes forfeitures as they occur. The Company believes that the estimated fair value of stock options is more readily measurable than the fair value of the services rendered.

Net loss per share attributable to common stockholders

The Company calculates its basic and diluted net loss per share attributable to common stockholders in conformity with the two-class method required for companies with participating securities. In computing

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diluted net loss attributable to common stockholders, undistributed earnings are re-allocated to reflect the potential impact of dilutive securities. The Company's basic net loss per share attributable to common stockholders is calculated by dividing the net loss attributable to common stockholders by the weighted-average number of shares of common stock outstanding for the period. For purposes of the calculation of diluted net loss per share attributable to common stockholders, convertible preferred stock, unvested shares of common stock issued upon the early exercise of stock options, warrants to purchase redeemable convertible preferred stock, warrants to purchase common stock, unvested restricted common stock and stock options to purchase common stock are considered potentially dilutive securities but have been excluded from the calculation of diluted net loss per share attributable to common stockholders as their effect is antidilutive.

Basic and diluted net loss per share of common stock attributable to common stockholders is calculated by dividing the net loss attributable to common stockholders by the weighted-average number of shares of common stock outstanding during the period, less shares subject to repurchase, and excludes any dilutive effects of employee stock-based awards and warrants. Because the Company has reported a net loss for the years ended September 30, 2016 and 2017, diluted net loss per common share is the same as the basic net loss per share for those years.

The Company considers all series of its convertible preferred stock to be participating securities as they are entitled to receive noncumulative dividends prior and in preference to any dividends on shares of common stock. Due to the Company's net losses, there is no impact on the loss per share calculation in applying the two-class method since the participating securities have no legal obligation to share in any losses.

Unaudited pro forma net loss per share

Pro forma net loss per share, basic and diluted was computed to give effect to the conversion of the Series A, Series B, Series C and Series D convertible preferred stock using the as-if converted method into common shares as though the conversion had occurred as of the beginning of the period or the original date of issuance, if later. Also, the numerator has been adjusted to reverse the fair value adjustments related to the redeemable convertible preferred stock warrants as they will become common stock warrants and at such time will no longer require periodic revaluation.

Income taxes

The Company accounts for income taxes using the asset and liability method whereby deferred tax asset and liability accounts are determined based on differences between financial reporting and tax bases of assets and liabilities and are measured using the enacted tax rates and laws that are currently in effect. Valuation allowances are established where necessary to reduce deferred tax assets to the amounts expected to be realized.

Recent accounting pronouncements

In May 2014, the Financial Accounting Standards Board (FASB) issued Accounting Standards Update (ASU) 2014-09, *Revenue from Contracts with Customers (Topic 606)*, which provides accounting guidance for all revenue arising from contracts with customers, and supersedes most current revenue recognition guidance. The core principle of the new standard is that a company should recognize revenue to depict the transfer of promised goods or services to customers in an amount that reflects the consideration to which the company expects to be entitled in exchange for those goods or services. The two permitted transition methods under the

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new standard are the full retrospective method, in which case the standard would be applied to each prior reporting period presented and the cumulative effect of applying the standard would be recognized at the earliest period shown, or the modified retrospective method, in which case the cumulative effect of applying the standard would be recognized at the date of initial application. The Company has adopted the new revenue standard using the full retrospective method.

In August 2014, the FASB issued ASU 2014-15, *Presentation of Financial Statements—Going Concern* which requires an entity's management to evaluate whether there are conditions or events, considered in the aggregate, that raise substantial doubt about the entity's ability to continue as a going concern within one year after the date that the financial statements are issued or available to be issued and requires disclosure of those conditions and management's plans. This standard is effective for the annual period ending after December 15, 2016, with early adoption permitted. The Company has adopted this standard for the year ended September 30, 2017.

In April 2015, the FASB issued ASU 2015-03, *Simplifying the Presentation of Debt Issuance Costs*. The standard requires that debt issuance costs be presented in the balance sheet as a direct deduction from the carrying amount of the related debt liability, similar to debt discounts. The standard will be effective for financial statements issued for annual periods beginning after December 15, 2015, and interim periods within those annual periods. Adoption of this new standard did not have a material impact on the Company's consolidated financial statements.

In September 2015, the FASB issued ASU 2015-16, *Business Combinations*, to simplify accounting for adjustments made to provisional amounts recognized in a business combination by eliminating the requirement to retrospectively account for those adjustments. This ASU is effective for financial statements issued for fiscal years beginning after December 15, 2015, and interim periods within those fiscal years with early adoption permitted. The amendments in this ASU require that the acquirer record, in the same period's financial statements, the effect on earnings of changes in depreciation, amortization or other income effects as a result of changes to provisional amounts, calculated as if the accounting had been completed at the acquisition date. The adoption of this standard did not have a material impact on the Company's consolidated financial statements.

In November 2015, the FASB issued ASU 2015-17, *Balance Sheet Classification of Deferred Taxes*. The new standard requires that the Company classify all deferred tax assets and liabilities as non-current. The new standard is effective for fiscal years beginning after December 15, 2016, though early adoption is permitted as of the beginning of an earlier interim or annual reporting period. The adoption of this standard did not have a material impact on the Company's consolidated financial statements.

In February 2016, the FASB issued new lease accounting guidance in ASU 2016-02, *Leases*. Under the new guidance, lessees will be required to recognize for all leases (with the exception of short-term leases) at the commencement date: (1) a lease liability, which is a lessee's obligation to make lease payments arising from a lease, measured on a discounted basis; and (2) a right-of-use asset, which is an asset that represents the lessee's right to use, or control the use of, a specified asset for the lease term. The new lease guidance is effective for fiscal years beginning after December 15, 2018, including interim periods within those fiscal years. Early application is permitted. The Company is currently evaluating the impact that the adoption of this standard will have on its consolidated financial statements.

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In March 2016, the FASB issued ASU 2016-09, *Improvements to Employee Share-Based Payment Accounting*, which impacts the accounting for stock-based payment transactions, including income tax consequences. The standard requires the tax impacts of stock-based awards to be reflected in the income statement and also requires excess tax benefits to be classified as an operating cash flow. The standard also allows an entity to elect to account for forfeitures of stock-based awards as they occur. The standard is effective for the annual period beginning after December 15, 2017, with early adoption permitted. The Company early adopted this standard for the year ended September 30, 2016 with no material impact on its consolidated financial statements.

In August 2016, the FASB issued ASU 2016-15, *Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments*, which was intended to reduce diversity in practice in how certain cash receipts and payments are presented and classified in the statement of cash flows. The standard provides guidance in a number of situations including, among others, settlement of zero-coupon bonds, contingent consideration payments made after a business combination, proceeds from the settlement of insurance claims, and distributions received from equity method investees. The ASU also provides guidance for classifying cash receipts and payments that have aspects of more than one class of cash flows. The ASU is effective for fiscal years beginning after December 15, 2017, and interim period within those fiscal years, with early adoption permitted. The amendments in this update should be applied in retrospective transition for each period presented. The Company is currently evaluating the impact that the adoption of this standard will have on its consolidated financial statements.

In November 2016, the FASB has issued ASU 2016-18, *Statement of Cash Flows (Topic 230): Restricted Cash*. This ASU applies to all entities that have restricted cash or restricted cash equivalents and are required to present a statement of cash flows. The ASU requires that a statement of cash flows explain the change during the period in the total of cash, cash equivalents, and amounts generally described as restricted cash or restricted cash equivalents. As a result, amounts generally described as restricted cash and restricted cash equivalents should be included with cash and cash equivalents when reconciling the beginning-of-period and end-of-period total amounts shown on the statement of cash flows. This ASU is effective for fiscal years beginning after December 15, 2017, and interim periods within those fiscal years with early adoption is permitted. The Company is currently evaluating the impact that the adoption of this standard will have on its consolidated financial statements.

In January 2017, the FASB has issued ASU 2017-01, *Business Combinations (Topic 805)*: *Clarifying the Definition of a Business*, clarifying the definition of a business. The ASU affects all companies and other reporting organizations that must determine whether they have acquired or sold a business. The definition of a business affects many areas of accounting including acquisitions, disposals, goodwill, and consolidation. The ASU is effective for annual periods beginning after December 15, 2017, including interim periods within those periods. The Company is currently evaluating the impact that the adoption of this standard will have on its consolidated financial statements.

In January 2017, the FASB issued ASU 2017-04, *Intangibles — Goodwill and Other (Topic 350): Simplifying the Test for Goodwill Impairment.* This ASU simplifies the subsequent measurement of goodwill. The ASU eliminates step 2 from the goodwill impairment test, including for reporting units with a zero or negative carrying amount that fail a qualitative test. An entity still has the option to perform the qualitative assessment for a reporting unit to determine if the quantitative impairment test is necessary. This ASU should be applied on a prospective basis. This ASU is effective for annual or any interim goodwill impairment tests in fiscal years beginning after

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December 15, 2019. Early adoption is permitted for interim or annual goodwill impairment tests performed on testing dates after January 1, 2017. The Company has not yet determined whether it will early adopt this ASU.

In May 2017, the FASB issued ASU 2017-09, *Compensation — Stock Compensation (Topic 718): Scope of Modification Accounting*, which clarifies when to account for a change to the terms or conditions of a stock-based payment award as a modification. Under ASU 2017-09, modification accounting is required only if the fair value, the vesting conditions, or the classification of the award (as equity or liability) changes as a result of the change in terms or conditions. This standard is effective for all entities for annual reporting periods beginning after December 15, 2017, including interim periods within that reporting period. Early adoption is permitted. The Company is evaluating the impact that this standard will have on its consolidated financial statements.

3. Acquisition

In April 2016, pursuant to the terms of an agreement and plan of merger, the Company acquired 100% of the outstanding shares of GCC. GCC was incorporated in Delaware with one subsidiary (Genome Compiler Israel Ltd.) in Tel Aviv, Israel. GCC provided software for genetic engineers and molecular and synthetic biologists. The acquisition of GCC provided the Company with a gene design tool as well as an experienced and highly skilled workforce to complement the Company's operations and develop a digital products portfolio, including an e-commerce solution with synthetic DNA design capabilities.

The results of GCC's operations from the acquisition date forward and the fair values of the acquired assets and liabilities assumed have been included in the consolidated financial statements.

The acquisition was completed in exchange for 4.0 million shares of common stock of the Company which were valued at $2.4 million at the time of the closing of the acquisition. The following table summarizes the fair values of assets acquired, liabilities assumed and goodwill.

(in thousands)	
Cash and cash equivalents	$ 254
Other assets	137
Property and equipment	7
Goodwill	1,138
Intangible assets	1,240
Total assets acquired	2,776
Accounts payable	(180)
Accrued expenses	(173)
Other liabilities	(23)
Net assets acquired	**$2,400**

The fair value of the intangible assets was estimated by determining the present value of estimated future operating cash flows generated from existing technology. The fair values of the intangible assets were estimated by applying the income approach. The income approach is used to estimate fair value based on the income stream, such as cash flows or earnings that an asset can be expected to generate over its useful life. Refer to Note 6 for further discussion on intangible assets acquired from the acquisition.

Goodwill is not deductible for tax purposes and represents the excess of the purchase price over the fair value of the net tangible and intangible assets acquired. The goodwill is attributable to the workforce of the acquired

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business and the synergies expected from the acquisition. Goodwill will not be amortized and will be tested for impairment at least annually. The pro forma effect of this acquisition as if it had occurred at the beginning of the year was not material to the consolidated financial statements.

4. Fair value measurement

The Company assesses the fair value of financial instruments based on the provisions of ASC 820, *Fair Value Measurements*. ASC 820 defines fair value as the exchange price that would be received for an asset or paid to transfer a liability (an exit price) in the principal or most advantageous market for the asset or liability in an orderly transaction between market participants on the measurement date. ASC 820 also establishes a fair value hierarchy which requires an entity to maximize the use of observable inputs and minimize the use of unobservable inputs when measuring fair value. The standard describes three levels of inputs that may be used to measure fair value:

Level 1—Quoted prices in active markets for identical assets or liabilities.

Level 2—Observable inputs other than Level 1 prices such as quoted prices for similar assets or liabilities, quoted prices in markets that are not active, or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities. The Company short-term investments primarily utilizes broker quotes in a non-active market for valuation of its short term investments.

Level 3—Unobservable inputs that are supported by little or no market activity and that are significant to the fair value of the assets or liabilities.

In determining fair value, the Company utilizes valuation techniques that maximize the use of observable inputs and minimize the use of unobservable inputs to the extent possible as well as considers counterparty credit risk in its assessment of fair value.

The following table sets forth the cash, cash equivalents, and short-term investments as of September 30, 2016:

(in thousands)	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
Cash and cash equivalents	$ 28,596	$ —	$ —	$28,596
Short-term investments	27,315	9	—	27,324
Total	$ 55,911	$ 9	$ —	$55,920

The following table sets forth the cash, cash equivalents, and short-term investments as of September 30, 2017:

(in thousands)	Amortized cost	Gross unrealized gains	Gross unrealized losses	Fair value
Cash and cash equivalents	$ 31,227	$ —	$ —	$31,227
Short-term investments	30,977	—	—	30,977
Total	$ 62,204	$ —	$ —	$62,204

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As of September 30, 2016, financial assets and liabilities measured and recognized at fair value are as follows:

(in thousands)	Level 1	Level 2	Level 3	Fair value
Assets				
Money market funds	$28,596	$ —	$ —	$ 28,596
Corporate bonds	—	10,004	—	10,004
Commercial paper	—	3,500	—	3,500
U.S. government treasury bonds	—	13,820	—	13,820
Total	$28,596	$27,324	$ —	$ 55,920
Liabilities				
Redeemable convertible preferred stock warrant liability	$ —	$ —	$ 383	$ 383

As of September 30, 2017, financial assets and liabilities measured and recognized at fair value are as follows:

(in thousands)	Level 1	Level 2	Level 3	Fair value
Assets				
Cash and cash equivalents	$ 3,793	$ –	$ –	$ 3,793
Money market funds	21,494	–	–	21,494
Corporate bonds	–	1,707	–	1,707
Commercial paper	–	22,742	–	22,742
U.S. government treasury bills	12,468	–	–	12,468
Total	$37,755	$24,449	$ –	$ 62,204
Liabilities				
Redeemable convertible preferred stock warrant liability	$ –	$ –	$ 644	$ 644

Unrealized losses on cash equivalents and available–for–sale securities, which have been in an unrealized loss position for greater than twelve months, were not material as of September 30, 2016 and 2017.

Contractual maturities of short–term investments held at September 30, 2017 consists of amounts due within one year with an average maturity of 5.5 months.

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Redeemable convertible preferred stock warrants

The following table provides a reconciliation of beginning and ending balances of the Level 3 instruments during the years ended September 30, 2016 and 2017:

(in thousands)	Series A	Series B	Series C	Series D	Total
Redeemable convertible preferred stock warrant liability:					
Fair value at September 30, 2015	$ 214	$ 55	$ –	$ –	$ 269
Fair value related to issuance of redeemable convertible preferred stock warrants in connection with a loan agreement	–	–	141	41	182
Changes in fair value recorded in other income (expense), net	(30)	2	(33)	(7)	(68)
Fair value as of September 30, 2016	184	57	108	34	383
Change in fair value recorded in other income (expense), net	147	53	44	17	261
Fair value as of September 30, 2017	$ 331	$ 110	$ 152	$ 51	$ 644

5. Balance sheet components

Inventory consists of the following:

	September 30,	
(in thousands)	2016	2017
Raw Materials	$ 847	$1,243
Work-in-process	266	385
Finished Goods	115	199
	$1,228	$1,827

Property and Equipment, net consists of the following:

	September 30,	
(in thousands)	2016	2017
Laboratory equipment	$15,062	$ 16,652
Furniture, fixtures and other equipment	398	553
Computer equipment	1,839	2,018
Computer software	1,082	1,171
Leasehold improvements	2,441	3,301
Construction in progress	1,136	3,080
	21,958	26,775
Less: Accumulated depreciation and amortization	(7,341)	(11,941)
	$14,617	$ 14,834

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6. Goodwill and intangible assets

The Company's goodwill and intangible assets balances are the result of the acquisition of GCC (see Note 3). The Company recorded goodwill of $1.1 million during the year ended September 30, 2016 and there were no changes to the carrying value of goodwill during the year ended September 30, 2017. Total amortization expense related to intangible assets was $0.1 million for the year ended September 30, 2016 and $0.2 million for the year ended September 30, 2017.

The intangible assets balances are presented below:

			September 30, 2016	
(in thousands, except for years)	Useful lives in years	Gross carrying amount	Accumulated amortization	Net book value
Developed Technology	6	$ 1,220	$ (102)	$ 1,118
Tradenames & Trademarks	2	20	(5)	15
Total indefinite-lived intangible assets		$ 1,240	$ (107)	$ 1,133

			September 30, 2017	
	Useful lives in years	Gross carrying amount	Accumulated amortization	Net book value
Developed Technology	6	$ 1,220	$ (305)	$ 915
Tradenames & Trademarks	2	20	(15)	5
Total indefinite-lived intangible assets		$ 1,240	$ (320)	$ 920

Future annual amortization expense is as follows (in thousands):

2018	$ 208
2019	203
2020	203
2022	203
Thereafter	103
	$920

7. Long-term debt

In October 2013, the Company entered into a Loan and Security Agreement (the First Loan) with Silicon Valley Bank (SVB) for loan amounts aggregating up to $3.0 million in a series of up to three advances. The first advance was $2.0 million and the remaining two advances were $0.5 million, each upon achieving the milestone of receiving a minimum of an additional $4.0 million in Series A convertible preferred stock financing through September 30, 2014. Each loan bore interest at a fixed rate equal to 2.25% plus the Prime Rate as published by the Wall Street Journal but not less than 5.5% at the funding date of each advance. The debt provided interest-only payments from October 2013 through September 2014. A final payment fee of $0.2 million was due the earlier of the maturity date of March 2017 or the prepayment, acceleration demand by SVB, or termination of the loan. As part of the agreement, the Company issued a warrant to SVB to purchase 364,742 shares of

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Series A redeemable convertible preferred stock at an exercise price of $0.329 per share. In October 2013, the Company drew down $2.0 million of the loan at an interest rate of 5.5% as the prime rate was 3.25% at the time. In February 2014, the Company drew down the remaining $1.0 million of the First Loan, also at an interest rate of 5.5% as the prime rate was 3.25% at the time.

In September 2014, the Company entered into an Amended and Restated Loan and Security Agreement (the Second Loan) with SVB for loan amounts aggregating up to $10.0 million in a series of up to three advances. The first advance was in the amount of $3.2 million. The second advance was up to $3.8 million at any time after the Company achieved a specified product launch through December 31, 2015. The third advance was up to $3.0 million at any time after the Company achieved cumulative revenue of $5.0 million. Each loan bore interest at the greater of the Prime Rate as published by the Wall Street Journal at the time or 3.25%. The debt provided interest-only payments during the first twelve months. A final payment fee of 3.75% of the aggregate amount loaned was due the earlier of 42 months after the final tranche or the prepayment, acceleration demand by SVB, or termination of the loan. The Second Loan contained a subjective acceleration clause under which the loan could become due and payable to SVB in the event of a material adverse change in the Company's business, as determined by SVB.

At the time of the Second Loan, the Company drew down $3.2 million to refinance the First Loan balance of $3.0 million and the final payment fee of $0.2 million. The Prime Rate and interest rate of the loan was 3.25%. As part of the Second Loan agreement, the Company issued a warrant to SVB to purchase 160,606 shares of Series B redeemable convertible preferred stock at an exercise price of $0.792 per share. The Company accounted for this transaction as a debt modification. The Company did not incur any gains or losses relating to the debt modification.

In April 2015, the Company entered into a Master Loan and Security Agreement with a separate lender for loan amounts not to exceed $3.0 million. In May 2015, the Company borrowed $0.9 million using certain computer equipment as collateral. The term of the loan was 24 months and carried an interest rate of 4.44% with a final payment amount representing 10% of the principal amount of the loan. The loan was paid-off in 2017.

In December 2015, the Company entered into a Second Amended and Restated Loan and Security Agreement with SVB (the Third Loan), for loan amounts aggregating up to $15.0 million in a series of three advances. The Third Loan contained an acceleration clause under which the loan could become due and payable to SVB in certain events of default, including in the event of a material adverse change in the Company's business. The term of the loan was 41 months with an interest rate equal to the greater of (i) the prime rate or (ii) 3.25%, and a final payment fee of 6% of the principal amount loaned. In addition, the Company obtained a revolving loan facility from SVB of up to $5.0 million for which the principal amount outstanding under the revolving line would accrue interest at a floating per annum rate equal to 1.00% above the Prime Rate, which interest was payable monthly.

The first advance, totaling $7.0 million, was drawn in December 2015 and comprised $3.3 million to refinance the Second Loan and a new advance of $3.7 million. The debt provided interest-only payments through December 31, 2016 at which time monthly principal payments become due. In connection with this advance, the Company issued a warrant to purchase 186,679 shares of Series C redeemable convertible preferred stock at an exercise price of $1.4999 per share. The Company accounted for this transaction as a debt modification and did not incur any gains or losses relating to the modification. The second advance, totaling $4.0 million, was drawn in March 2016. In connection with this advance, the Company issued a warrant to purchase 74,567 shares of Series D redeemable convertible preferred stock at an exercise price of $2.1457 per share.

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In April 2016, the Company entered into a Third Amended and Restated Loan and Security Agreement to include GCC as co-borrower on the loan.

In September 2017, the Company entered into a Fourth Amended and Restated Loan and Security Agreement (the Fourth Loan) with SVB for loan amounts aggregating up to $20.0 million in a series of three advances. The first advance provides a principal amount of $10.0 million, the second advance provides a principal amount of $5.0 million and the third advance provides a principal amount of $5.0 million during their respective draw down periods. In connection with the first advance the Company issued a warrant to purchase 634,921 shares of common stock at an exercise price of $0.63 per share. If the Company draws down the second and third advances, the warrants would become exercisable for an additional 634,920 shares of common stock at an exercise price of $0.63 per share. The Fourth Loan contains a subjective acceleration clause under which the Fourth Loan could become due and payable to SVB in the event of a material adverse change in the Company's business. The term of the loan was 51 months with an interest rate of prime plus 3.00% and a final payment fee of $0.7 million.

The first advance, totaling $10.0 million, was drawn in September 2017 and comprised $7.8 million to refinance the Third Loan and a new advance of $2.2 million. The debt provides for interest only payments through December 31, 2018 at which time monthly principal payments become due. In addition, the Company obtained a revolving loan facility for a principal amount of up to $10.0 million for which the principal amount outstanding under the revolving line would accrue interest at a floating per annum rate equal to one percentage point (1.00%) above the prime rate, which interest shall be payable monthly. The Company accounted for this transaction as a debt modification and did not incur any gain or loss relating to the modification.

The Company's credit facilities contain customary representations and warranties and customary affirmative and negative covenants applicable to the Company and its subsidiaries, including, among other things, restrictions on changes in business, management, ownership or business locations, indebtedness, encumbrances, investments, mergers or acquisitions, dispositions, maintenance of collateral accounts, prepayment of other indebtedness, distributions and transactions with affiliates. The credit facilities contain customary events of default subject in certain cases to grace periods and notice requirements, including (a) failure to pay principal, interest and other obligations when due, (b) material misrepresentations, (c) breach of covenants, conditions or agreements in the credit facilities, (d) default under material indebtedness, (e) certain bankruptcy events, (f) a material adverse change; (g) attachment, levy or restraint on business, (h) default with respect to subordinated debt, (i) cross default under the Company's credit facilities, and (j) government approvals being revoked. As of September 30, 2017, all rights, title and interest to the Company's personal property with the exception of the Company's intellectual property, have been pledged as collateral, including cash and cash equivalents, short-term investments, accounts receivable, contractual rights to payment, license agreements, general intangibles, inventory and equipment. The Company was in compliance with all covenants under the loan and security agreement with SVB as of September 30, 2016 and September 30, 2017.

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Future maturities of the loan as of September 30, 2017 are as follows:

(in thousands)	Principal	Interest	Total
Year ending September 30,			
2018	$ —	$ 715	$ 715
2019	2,500	673	3,173
2020	3,333	440	3,773
2021	3,333	194	3,527
2022	834	10	844
	10,000	2,032	12,032
Less: Interest			(2,032)
Total amount of loan principal			10,000
Less unamortized debt discount			(860)
Add accretion of final payment fee			14
			$ 9,154

8. Commitments and contingencies

Litigation

In February 2016, a complaint was filed in the Superior Court of the State of California (County of Santa Clara), dated February 3, 2016 on behalf of Agilent Technologies, Inc. (Agilent), against the Company and its CEO (the Complaint) alleging (i) breach of contract against the CEO, (ii) breach of duty of loyalty against the CEO, and (iii) misappropriation of trade secrets by the Company and the CEO. The Company believes that the complaint is without merit, and intends to vigorously defend itself. The Company is currently unable to predict the ultimate outcome of this matter or estimate a reasonably possible loss or range of loss, and no amounts have been accrued in the consolidated financial statements.

Indemnifications

In the ordinary course of business, the Company enters into agreements that may include indemnification provisions. Pursuant to such agreements, the Company may indemnify, hold harmless and defend the indemnified parties for losses suffered or incurred by the indemnified party. Some of the provisions will limit losses to those arising from third-party actions. In some cases, the indemnification will continue after the termination of the agreement. The maximum potential amount of future payments the Company could be required to make under these provisions is not determinable. To date, the Company has not incurred material costs to defend lawsuits or settle claims related to these indemnification provisions. The Company has also entered into indemnification agreements with its directors and officers that may require it to indemnify its directors and officers against liabilities that may arise by reason of their status or service as directors or officers to the fullest extent permitted by corporate law. The Company also has directors' and officers' insurance.

Leases

In July 2013, the Company entered into a non-cancelable operating lease agreement for office space in San Francisco with an expiration date of July 2016. In July 2014, the Company entered into a non-cancelable

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operating sublease agreement for additional office space in the same building. In May 2015, the Company entered into an amendment to the lease agreement to increase the rentable premises with a new expiration date of September 2016. In June 2015, the sublease agreement was terminated and the lease agreement was amended to include the additional office space. In January 2016, the Company extended the term of the lease for an additional three years with a new expiration date of September 2019.

In July 2014, the Company entered into a non-cancelable operating sublease agreement for office space in San Francisco with an expiration date of September 2016. In November 2015, the Company extended the term of this sublease by two years with a new expiration date of September 2018.

In May 2016, the Company entered into a non-cancelable operating lease agreement for additional space in South San Francisco that expires in May 2019. Future minimum lease payments under all non-cancelable operating leases as of September 30, 2017 are as follows:

(in thousands)	Operating leases
Years ended September 30,	
2018	$ 2,133
2019	1,322
2020	143
Total minimum lease payments	$ 3,598

Rent expense was $1.6 million and $2.2 million for the years ended September 30, 2016 and 2017, respectively. Rent expense is measured based upon amortizing minimum lease payments, including rent escalations under the lease term, using the straight-line method over the term of the lease.

The deferred rent liability was $0.1 million as of September 30, 2016 and 2017.

9. Related party transactions

During the year ended September 30, 2016, the Company sold 1,252,176 shares of Series D redeemable convertible preferred stock. The Company also purchased raw materials from a related party investor in the amount of $1.0 million. Payable balances and receipts and receivable balances with the related party were immaterial as of September 30, 2016.

During the year ended September 30, 2017, the Company sold 1,684,018 shares of Series D redeemable convertible preferred stock. The Company also purchased raw materials from a related party investor in the amount of $2.0 million. Payable balances and receipts and receivable balances with the related party were immaterial as of September 30, 2017.

10. Government research agreement

In April 2014, the Company entered into a fixed fee research agreement with DARPA to develop the capability for large-scale, high-throughput construction of genetic designs. The total initial value of the agreement is $2.4 million which is comprised of eight base milestones with each milestone assigned a certain fixed fee over a 12-month period. The agreement also includes an additional ten optional milestones totaling $2.8 million to be completed over a 12-month period.

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In July 2015, the DARPA agreement was amended to extend the project through the option period of an additional year. In June 2016, the DARPA agreement was amended to remove two remaining milestones from the project reducing the value of the project by $0.6 million.

For the year ended September 30, 2016 a total of $2.4 million was recorded as a reduction in research and development costs. There were no DARPA payments received during the year ended September 30, 2017.

11. Income taxes

The Company recorded an immaterial provision for income taxes during the year ended September 30, 2016 and $0.3 million for the year ended September 30, 2017.

The significant components of the Company's deferred tax assets and liabilities are as follows:

	September 30,	
(in thousands)	**2016**	**2017**
Net operating loss carryforwards	$ 28,854	$ 50,312
Research and development credit carryforwards	1,581	3,050
Accruals	436	724
Other	307	819
Sub-total	31,178	54,905
Less: Valuation allowance	(30,324)	(54,273)
Net deferred tax assets	854	632
Fixed assets	(444)	(274)
Intangible assets	(410)	(358)
Net deferred tax liabilities	(854)	(632)
Total net deferred tax assets	$ —	$ —

The following is a reconciliation of the statutory federal income tax rate to the Company's effective tax rate:

	Years ended September 30,	
	2016	**2017**
Tax expense computed at the federal statutory rate	35%	35%
Change in valuation allowance	(34)%	(35)%
Research and development credit benefit	0%	1%
Other expenses	(1)%	(1)%
Total income tax expense	—%	—%

Based on the available objective evidence, management believes it is more likely than not that the deferred tax assets will not be fully realizable. Accordingly, the Company has provided a full valuation allowance against its deferred tax assets at September 30, 2016 and 2017. For the year ended September 30, 2016, the valuation allowance increased by $14.7 million due to increases in the Company's deferred tax assets against which the Company records a full valuation allowance. The increase is comprised primarily of a $14.6 million increase related to net operating loss carryforwards and a $0.4 million increase in research and development credits

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offset by an increase in deferred tax liabilities for intangible assets and fixed assets of $0.5 million. For the year ended September 30, 2017, the valuation allowance increased by $24.0 million due to increases in the Company's deferred tax assets against which the Company records a full valuation allowance. The increase is comprised primarily of a $21.5 million increase related to net operating loss carryforwards and a $1.5 million increase in research and development credits.

As of September 30, 2016, the Company had net operating loss carryforwards of approximately $77.9 million and $32.0 million available to reduce future taxable income, if any, for federal and state income tax purposes, respectively. As of September 30, 2017, the Company had net operating loss carryforwards of approximately $134.9 million and $81.2 million available to reduce future taxable income, if any, for federal and state income tax purposes, respectively. The net operating losses will begin to expire in 2033.

The Company also had federal and state research and development credit carryforwards of approximately $2.6 million and $2.7 million, respectively, at September 30, 2017 and $1.3 million and $1.4 million, respectively, at September 30, 2016. The federal credits will expire starting in 2033 if not utilized. The California research and development credits have no expiration date. Utilization of the net operating losses and tax credits is subject to annual limitation due to the ownership change limitations provided by the Internal Revenue Code and similar state provisions. Such annual limitations may result in the expiration of the net operating losses and tax credits before utilization.

The provisions of ASC 740-10, *Accounting for Uncertainty in Income Taxes*, prescribe a comprehensive model for the recognition, measurement, and presentation and disclosure in financial statements of any uncertain tax positions that have been taken or expected to be taken on a tax return. The Company has identified uncertain tax positions related to federal and state research and development credits. It is unlikely that the amount of unrecognized tax benefits will materially change over the next year.

The aggregate changes in the balance of gross unrecognized tax benefits are as follows:

(in thousands)	Federal and state
Balance as of September 30, 2015	$ 626
Increases related to tax positions taken during 2016	196
Balance as of September 30, 2016	822
Increases related to tax positions taken during 2017	562
Increases related to tax positions in prior years	241
Balance as of September 30, 2017	$ 1,625

It is the Company's policy to include penalties and interest expense related to income taxes as a component of other expense and interest expense, respectively, as necessary. The Company's management determined that no accrual for interest and penalties was required as of September 30, 2016 and 2017 due to the availability of net operating losses to offset any tax adjustment. The Company's tax years from 2013 through 2016 will remain open for examination by the federal and state authorities for three and four years, respectively, from the date of utilization of any net operating loss or tax credits. The Company does not have federal or state tax examinations in progress.

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12. Warrants

In connection with its long-term debt agreements, the Company issued warrants for its redeemable convertible preferred stock and common stock as follows:

(in thousands, except share and per share data)	Number of shares underlying warrants	Fair value			Exercise price per share
Warrant class/series:	**September 30, 2017**		**Issuance date**	**Expiration date**	
Series A	364,742	$ 331	October 8, 2013	October 8, 2023	$ 0.329
Series B	160,606	110	September 2, 2014	September 2, 2024	$ 0.792
Series C	186,679	152	December, 22, 2015	December 22, 2025	$ 1.500
Series D	74,567	51	March 28, 2016	March 28, 2026	$ 2.146
Total preferred stock warrants	786,594	$ 644			
Common stock warrants	634,921	$ 486	September 6, 2017	September 6, 2027	$ 0.630

The fair value of the Company's warrant to purchase redeemable convertible preferred stocks was derived from values as determined by management and approved by the Board of Directors. Management has determined the fair value based primarily on analyses performed by the Company's third-party valuation specialists under a hybrid valuation method which incorporates the per share values calculated under the Option Pricing Method (OPM) and the Probability-Weighted Expected Return Method (PWERM) weighted appropriately to arrive at a fair market value of the warrants. Valuations performed by third-party valuation specialists were done contemporaneously and used the methodologies, approaches, and assumptions consistent with the American Institute of Certified Public Accountants (AICPA) Accounting and Valuation Guide: *Valuation of Privately-Held-Company Equity Securities Issued as Compensation* and Company specific factors.

On October 8, 2013, in connection with a debt financing arrangement, the Company issued a warrant to purchase 364,742 shares of Series A redeemable convertible preferred stock. The warrant was fully vested and immediately exercisable upon issuance and has an expiration date of October 8, 2023. The Company determined the fair value of the warrant granted was less than $0.1 million on the date of issuance. For the years ending September 30, 2016 and 2017, the Company used a hybrid method and determined the change in fair value of the warrant which was recorded in other income (expense), net.

On September 2, 2014, in connection with a debt financing arrangement, the Company issued a warrant to purchase 160,606 shares of Series B redeemable convertible preferred stock. The warrant was fully vested and immediately exercisable upon issuance and has an expiration date of September 2, 2024. The Company determined the fair value of the warrant granted was less than $0.1 million on the date of issuance. For the years ending September 30, 2016 and 2017, the Company used a hybrid method and determined the change in fair value of the warrant which was recorded in other income (expense), net.

On December 22, 2015, in connection with a debt financing arrangements, the Company issued a warrant to purchase 186,679 shares of Series C redeemable convertible preferred stock. The warrant was fully vested and immediately exercisable upon issuance and has an expiration date of December 22, 2025. The Company determined the fair value of the warrant granted was $0.1 million on the date of issuance. For the years ending

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September 30, 2016 and 2017, the Company used a hybrid method and determined the change in fair value of the warrant which was recorded in other income (expense), net.

On March 28, 2016, in connection with a debt financing arrangement, the Company issued a warrant to purchase 74,567 shares of Series D redeemable convertible preferred stock. The warrant was fully vested and immediately exercisable upon issuance and has an expiration date of March 28, 2026. The Company determined the fair value of the warrant granted was less than $0.1 million on the date of issuance. For the years ending September 30, 2016 and 2017, the Company used a hybrid method and determined the change in fair value of the warrant which was recorded in other income (expense), net.

As these warrants to acquire redeemable convertible preferred stock are classified as liabilities, any potential beneficial conversion feature related to those underlying shares of convertible preferred would not be recognized until such time as the warrant is exercised. At that point, any excess of the fair value of the Company's common stock into which the shares of redeemable convertible preferred are convertible over the effective conversion price, measured as the sum of the carrying amount of the warrant liability and the exercise price of the warrant, would be recognized as a beneficial conversion feature and would reduce earnings available to common stockholders in the calculation of earnings per share.

On September 6, 2017, in connection with the September 2017 debt refinancing, the Company issued a warrant to purchase 634,921 shares of common stock. The warrants were fully vested and immediately exercisable upon issuance and has an expiration date of September 6, 2027. The Company determined the fair value of the warrant granted was $0.5 million.

The fair values of the warrants to purchase common stock were determined using the Black-Scholes option pricing model with the following valuation assumptions:

Expected term (years)	6.25
Expected volatility	65.5%
Risk-free interest rate	2.02%
Dividend yield	0%

13. Redeemable convertible preferred stock

Redeemable convertible preferred stock as of September 30, 2016 and 2017 consists of the following:

(in thousands, except share and per share data)					September 30, 2016
Series	Shares authorized	Outstanding	Price per share	Liquidation amount	Proceeds, net*
A	28,263,133	27,898,391	$ 0.329	$ 9,111	$ 9,141
B	32,988,887	32,828,281	0.792	26,000	25,900
C	24,854,989	24,668,310	1.500	37,000	36,726
D	30,442,280	29,096,365	2.146	62,432	62,270
	116,549,289	114,491,347		$ 134,543	$ 134,037

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(in thousands, except share and per share data) **September 30, 2017**

Series	Shares authorized	Outstanding	Price per share	Liquidation amount	Proceeds, net*
A	28,263,133	27,898,391	$ 0.329	$ 9,111	$ 9,141
B	32,988,887	32,828,281	0.792	26,000	25,900
C	24,854,989	24,668,310	1.500	37,000	36,726
D	64,124,559	59,743,942	2.146	128,193	127,866
	150,231,568	145,138,924		$ 200,304	$ 199,633

* Net of issuance costs.

The holders of preferred stock have various rights and preferences as follows:

Voting rights

The holders of redeemable convertible preferred stock shares are entitled to vote on all matters on which the common stockholders are entitled to vote. Holders of redeemable convertible preferred stock and common stock vote together as a single class, not as separate classes. Each holder of Redeemable convertible preferred stock is entitled to the number of votes equal to the number of common stock shares into which the shares held by such holder are convertible.

Dividends

The holders of shares of Series D redeemable convertible preferred stock are entitled to receive, if declared by the board of directors, noncumulative dividends at the rate of 8% per share of the Series D issue price per annum. After dividends on the Series D redeemable convertible preferred stock have been paid, then the Company may declare and distribute in such year dividends among the holders of shares of Series A, Series B, and Series C redeemable convertible preferred stock on a pari passu basis. No dividends have been declared for any period through September 30, 2017.

Liquidation preference

The holders of redeemable convertible preferred stock are entitled to have their shares redeemed upon the occurrence of certain redemption events. A liquidation or winding up of the Company, a greater than 50% change in control, or a sale of substantially all of its assets, sales or exclusive licenses of all or substantially all of the Company's intellectual property would constitute a redemption event. As the redemption event is outside the control of the Company, all shares of preferred stock have been presented outside of permanent equity. Further, the Company has not adjusted the carrying values of the Series A, Series B, Series C and Series D redeemable convertible preferred stock to the redemption value of such shares, since it is uncertain whether or when a redemption event will occur. Adjustments to increase the carrying value to the redemption values will be made when it becomes probable that such redemption will occur.

In a liquidation, dissolution, or winding-up of the Company, either voluntary or involuntary, each holder of Series D redeemable convertible preferred stock is entitled to be paid in cash before any amount is paid or distributed to the holders of the Series A, Series B or Series C redeemable convertible preferred stock or common stock at an amount per share equal to the greater of $2.146 plus an amount equal to all accrued and declared but unpaid dividends on such share of Series D redeemable convertible preferred stock (adjusted for stock splits, stock dividends, combinations, recapitalizations and the like) and the amount payable on shares of

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Series D redeemable convertible preferred stock had such shares been converted to shares of common stock immediately prior to such liquidation. If the amounts available for distribution by the Company to holders of Series D redeemable convertible preferred stock upon a liquidation are not sufficient to pay the Series D amount due, holders of Series D redeemable convertible preferred stock share ratably in any distribution.

Upon the completion of the initial Series D liquidation amount described above, the remaining assets and funds of the Company available for distribution to its stockholders shall be distributed to each holder of outstanding shares of Series A, Series B and Series C redeemable convertible preferred stock, who shall be entitled to paid in cash, on a pari passu basis based on the relative initial liquidation amount of each series, before any amount shall be paid or distributed to the holders of common stock, an amount per share equal to (i) $0.329, in the case of Series A redeemable convertible preferred stock, (ii) $0.792, in the case of Series B redeemable convertible preferred stock, and (iii) $1.500, in the case of Series C redeemable convertible preferred stock plus an amount equal to all accrued and declared but unpaid dividends on such share of Preferred Stock. Should the Company's legally available assets be insufficient to satisfy the liquidation preferences, the funds will be distributed ratably among the holders of Series A, Series B and Series C redeemable convertible preferred stock in proportion to the preferential amount each holder is otherwise entitled to receive.

Conversion

Each share of Series A, Series B, Series C and Series D redeemable convertible preferred stock is convertible, at the option of the holder, into the number of shares of common stock into which such shares are convertible at the then-effective conversion ratio. The initial conversion price per share for Series A, Series B, Series C and Series D redeemable convertible preferred stock is $0.329, $0.792, $1.500 and $2.146 per share, respectively. The initial conversion price or ratio is subject to adjustment due to securities issued by the Company subject to certain limited exceptions, including securities issued in the acquisition of another entity, lending or equipment leasing transactions, and stock purchases, stock splits, stock dividends, reorganizations and public offerings. The current conversion ratio for each series of redeemable convertible preferred stock is 1:1.

Each share of Series A, Series B, Series C and Series D redeemable convertible preferred stock is convertible into common stock immediately prior to the completion of an initial public offering at a per share price of not less than $2.65 (as adjusted for stock splits, stock dividends, reclassification and the like) in which the Company receives aggregate net proceeds not less than $40,000,000, and the common stock is listed for trading on the New York Stock Exchange or the Nasdaq Global or Global Select Markets. Each share of preferred stock is also convertible into common stock upon the written election of the holders of at least 60% of the then outstanding (i) Series A, Series B, Series C and Series D redeemable convertible preferred stock, voting together as a class on an as-converted to common stock basis and (ii) Series C and Series D redeemable convertible preferred stock voting together as a single class on as-converted to common stock basis.

14. Common stock

The fair value of the shares of common stock underlying the Company's stock options has historically been determined by management and approved by the board of directors. Because there has been no public market for the Company's common stock, management and the board of directors have determined the fair value of the common stock at the time of grant of any options by considering a number of objective and subjective factors, including valuations performed by an independent third-party specialists, valuations of comparable companies, operating and financial performance, the lack of liquidity of the common stock, recent private stock

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sale transactions and general and industry-specific economic outlooks. Valuations performed by third-party valuation specialists were completed and used the methodologies, approaches, and assumptions consistent with the AICPA, Accounting and Valuation Guide: *Valuation of Privately-Held-Company Equity Securities Issued as Compensation* and Company specific factors.

As of September 30, 2017, the Company reserved sufficient shares of common stock for issuance upon conversion of preferred stock and exercise of stock options and warrants. Each share of common stock is entitled to one vote. The holders of shares of common stock are also entitled to receive dividends whenever funds are legally available and when declared by the board of directors, subject to prior rights of the holders of preferred stock.

In February 2013, the Company issued a total of 18,000,000 shares of restricted common stock to Emily Leproust, William Banyai and Bill Peck, or the Founders. The shares were issued at par value of $0.00001 per share in exchange for intellectual property and other assets. Of the shares issued, 20% were vested upon issuance and the remaining 80% were subject to repurchase at par value if the holder was no longer an employee of, or service provider to, the Company. The number of shares subject to repurchase decreases ratably over 48 months starting on February 1, 2013. As of September 30, 2017, all 18,000,000 shares have vested and are no longer subject to a right of repurchase.

In September 2013, the Company issued an additional 1,013,171 shares of restricted common stock to each Founder. The purchase price for the shares was $0.04 per share of common stock. The purchase agreements for the shares stipulate that no shares would vest until the first commercial sale of synthetic biology products or synthetic oligos, or the Milestone. Following the achievement of the Milestone, 100% of the total shares would vests on the 3rd anniversary from the date of the Milestone, subject to the founders' continuous service status. During the year ended September 30, 2015, the Milestone was achieved and vesting commenced. All shares are expected to be fully vested on May 8, 2018, which is the 3rd anniversary of the Milestone. As of September 30, 2017, the total unrecognized compensation cost related to this award that is expected to be recognized over a weighted-average period 0.7 years was immaterial.

The Company issued 523,421 shares of restricted common stock to a board member in March 2014 at a purchase price of $0.04 per share. The shares vest over a 72-month period on a monthly pro-rata basis over the vesting period at the date of grant. Further, upon appointment to the board of directors, the vesting would be over a 36-month period on a monthly pro-rata basis over the vesting period beginning at date of appointment to the board of directors which occurred in July 2014. The agreement includes a repurchase option for the Company whereby, in the event of a voluntary or involuntary termination of the purchaser's continuous service, for any reason, the Company has an irrevocable, exclusive option for a period of three months from such date to repurchase all or any portion of the unvested shares at the termination date at a value of the lesser of the original purchase price per share and the fair market value of the shares. All shares were initially subject to the repurchase option. As of September 30, 2017, all 523,421 shares of common stock had vested under this agreement.

In May 2016, the Company issued 3,170,000 shares of restricted common stock to employees. The purchase price was $0.60 per share. The shares vest monthly over a period of 48 months from the date of issuance and the Company recognized $0.5 million of compensation expense related to the restricted stock during the year ended September 30, 2017. As of September 30, 2017, there was $1.2 million of total unrecognized compensation cost related to this issuance that is expected to be recognized over a weighted-average period of 2.7 years.

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15. Stock option plan

In 2013, the Company established the 2013 Plan, which provides for the granting of stock options to employees, consultants and directors of the Company. Options granted under the 2013 Plan may be either incentive stock options, or ISOs, or nonqualified stock options, or NSOs. ISOs may be granted only to Company employees (including officers and directors who are also employees). NSOs may be granted to Company employees, consultants and directors. As of September 30, 2017, the Company has reserved 34,306,102 shares of common stock for issuance under the 2013 Plan.

The exercise price of an ISO and NSO shall not be less than 100% of the estimated fair value of the shares on the date of grant, respectively, as determined by the board of directors. The exercise price of an ISO granted to an employee who at the time of grant is a 10% shareholder shall not be less than 110% of the estimated fair value of the shares on the date of grant, respectively, as determined by the board of directors. Options granted under the 2013 Plan have a term of ten years and generally vest over a four-year period with 25% of the shares vesting on the first anniversary of the option and the remaining vesting ratably on a monthly basis over the remaining thirty-six months.

Activity under the 2013 Plan from during the years ended September 30, 2016 and September 30, 2017 is summarized below:

	Shares available	Options outstanding	Weighted average exercise price per share	Weighted average remaining contractual term	Aggregate intrinsic value
Outstanding at September 30, 2015	6,377,752	8,711,502	$ 0.47	8.88	$1,138,150
Additional shares authorized	3,299,510	—	—		
Stock options granted	(2,441,000)	2,441,000	0.60		
Stock options exercised	—	(390,727)	0.39		
Stock options forfeited	527,980	(527,980)	0.51		
Restricted shares granted	(3,170,000)	—	—		
Early exercised options repurchased	65,417	—	—		
Outstanding at September 30, 2016	4,659,659	10,233,795	$ 0.50	8.81	$1,343,301
Additional shares authorized	10,251,883	—	—		
Stock options granted	(8,486,040)	8,486,040	0.87		
Stock options exercised	—	(322,687)	0.56		
Stock options forfeited	379,837	(379,837)	0.56		
Outstanding at September 30, 2017	6,805,339	18,017,311	$ 0.67	9.14	$7,147,115
Vested or expected to vest and exercisable at September 30, 2017		18,017,311	$ 0.67	9.14	$7,147,115

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The following table summarizes information about stock options outstanding at September 30, 2017:

	Options outstanding			Options exercisable	
Exercise price	Total outstanding	Weighted average remaining contractual life		Total exercisable	Weighted average exercise price
0.04	902,000	5.26		902,000	$ 0.04
0.12	1,023,479	6.20		1,023,479	0.12
0.60	7,681,792	9.30		7,681,792	0.60
0.63	315,000	7.18		315,000	0.63
0.74	264,000	9.59		264,000	0.74
0.89	7,831,040	9.89		7,831,040	0.89
	18,017,311	9.14		18,017,311	$ 0.67

Stock-based compensation

During the year ended September 30, 2016, the Company granted stock options to employees and non-employees to purchase 2,441,000 shares of common stock with a weighted-average grant date fair value of $0.35. During the year ending September 30, 2017, the Company granted stock options to employees and non-employees to purchase 8,486,040 of common stock with a weighted average grant date fair value of $0.67. The Company recognized stock-based compensation expense of $0.9 million and $1.9 million, for the years ended September 30, 2016 and 2017, respectively. As of September 30, 2017, there was $6.7 million of total unrecognized compensation cost related to non-vested stock options under the 2013 Plan that is expected to be recognized over a weighted-average period of 3.9 years.

Total stock-based compensation expense recognized was as follows:

	Years ended September 30,	
(in thousands)	2016	2017
Cost of revenues	$ 112	$ 202
Research and development	261	575
Selling, general and administrative	484	1,114
Total stock-based compensation	$ 857	$ 1,891

The Company uses the Black-Scholes option pricing model to calculate the grant date fair value of a stock option. The Black-Scholes model requires various assumptions, including the fair value of the Company's common stock, expected term, expected dividend yield and expected volatility.

The expected volatility of the Company's stock options is estimated from the historical volatility of selected public companies with comparable characteristics to it, including similarity in size and lines of business. The expected term of stock options represents the period that the Company's stock-options are expected to be outstanding before being exercised. The risk-free interest rate is based on the implied yield currently available on U.S. treasury notes with terms approximately equal to the expected life of the option. The expected dividend rate is zero as the Company currently has no history or expectation of declaring cash dividends on the Company's common stock.

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The fair value of options granted during the years ended September 30, 2016 and 2017, respectively, were calculated using the weighted average assumptions set forth below:

	Years ended September 30,	
	2016	2017
Expected term (years)	6.25	6.25
Expected volatility	64.4%	65.5%
Risk-free interest rate	1.44%	2.02%
Dividend yield	0%	0%

Shares subject to repurchase

The Company has a right of repurchase with respect to unvested shares issued upon early exercise of options at an amount equal to the original exercise price of each unvested share being repurchased. The Company's right to repurchase these shares lapses pursuant to the vesting schedule of the original grant, which is generally 25% on the first anniversary of the original grant and ratably on a monthly basis over the remaining 36 months. As of September 30, 2017, 442,561 shares remain subject to the Company's right of repurchase.

16. Net loss per share attributable to common stockholders and unaudited pro forma net loss per share

The following table sets forth the computation of the Company's basic and diluted net loss per share attributable to common stockholders:

(in thousands, except share and per share data)	Years ended September 30, 2016	2017
Numerator:		
Net loss attributable to common stockholders	$ (44,088)	$ (59,310)
Denominator:		
Weighted-average shares used in computing net loss per share, basic and diluted	18,511,202	23,982,605
Net loss per share attributable to common stockholders, basic and diluted	$ (2.38)	$ (2.47)

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The potentially dilutive common shares that were excluded from the calculation of diluted net loss per share because their effect would have been antidilutive for the periods presented are as follows:

	Years ended September 30,	
	2016	2017
Shares subject to options to purchase common stock	10,233,795	18,017,311
Unvested restricted shares of common stock	7,518,559	5,086,804
Unvested shares of common stock issued upon early exercise of stock options	770,379	442,561
Shares subject to warrants to purchase redeemable convertible preferred stock	786,594	786,594
Shares of redeemable convertible preferred stock	114,491,347	145,138,924
Total	133,800,674	169,472,194

Unaudited pro forma loss per share

The table presents the calculation of basic and diluted pro forma net loss per share for the year ended September 30, 2017 (in thousands, except share and per share data):

Numerator:	
Net loss attributable to common stockholders, basic and diluted	$ (59,310)
Add: Change in fair value of redeemable convertible preferred stock warrant liability	261
Net loss used in computing pro forma net loss per share, basic and diluted	$ (59,049)
Denominator:	
Weighted-average shares used in computing net loss per share, basic and diluted	23,982,605
Add: Pro forma adjustments to reflect assumed conversion of redeemable convertible preferred stock	128,414,454
Weighted-average shares used in computing pro forma net loss per share, basic and diluted	152,397,059
Pro forma net loss per share, basic and diluted (unaudited)	$ (0.39)

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17. Geographic and product information

The table below sets forth revenues by geographic region, based on ship-to destinations. North America consists of Canada and Mexico; EMEA consists of Europe, Middle East, and Africa; and APAC consists of Japan, China, South Korea, Singapore, Malaysia and Australia.

	Years ended September 30,	
(in thousands)	**2016**	**2017**
United States	$1,769	$ 8,243
EMEA	459	2,023
APAC	41	274
North America	—	227
Total	$2,269	$10,767

The table below sets forth revenues by products.

	Years ended September 30,	
(in thousands)	**2016**	**2017**
Synthetic genes	$1,087	$ 8,122
Oligo pools	862	2,056
DNA libraries	320	517
NGS tools	—	72
Total	$2,269	$10,767

Long lived assets located in the United States are $14.5 million and $14.4 million as of September 30, 2016 and 2017. Long lived assets located outside of the United States were $0.1 million and $0.4 million as of September 30, 2016 and 2017.

18. Subsequent events

On October 20, 2017, the Company issued 1,398,145 shares of Series D redeemable convertible preferred stock for an aggregate purchase price of $3.0 million.

On December 22, 2017, the Tax Cuts and Jobs Act of 2017, or Tax Act, was signed into law. The effect of the Tax Act will be recorded discretely as a component of the Company's provision for income taxes related to continuing operations in the period of enactment. The Tax Act reduced the corporate tax rate from 35% to 21% for tax years beginning after December 31, 2017. A blended rate will apply for non-calendar year companies for the fiscal periods that include the effective date of rate change. Changes in the deferred tax asset valuation allowance assessment due to the Tax Act will also be recorded as part of the Company's provision for income taxes related to continuing operations. The Tax Act repeals the Alternative Minimum Tax for tax years beginning after December 31, 2017. For net operating losses arising after December 31, 2017, utilization is limited to 80% of taxable income with an unlimited carryforward period. The Tax Act allows companies to expense 100% of the cost of qualified property placed in service after September 27, 2017 and before January 1, 2023, with normal depreciation rules applying after that period. Deductions for net interest expense are limited

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to 30% of adjusted taxable income. The Tax Act also introduces new international tax provisions, including a mandatory deemed repatriation tax and the implementation of a territorial system by providing a 100% dividends received deduction. The Tax Act also contains new provisions intended to prevent the erosion of the United States tax base. The Company is in the process of evaluating the impact of the Tax Act on its consolidated financial statements and expects the most significant impact to be a reduction of its deferred tax assets for net operating loss carryforwards offset by a corresponding reduction of the deferred tax asset valuation allowance.

On December 28, 2017, the Company issued 2,884,602 shares of Series D redeemable convertible preferred stock for an aggregate purchase price of $6.2 million.

The Company has performed an evaluation of subsequent events through February 8, 2018, which is the date the audited annual consolidated financial statements were available for issuance.

19. Events subsequent to February 8, 2018 (unaudited)

On March 19, 2018 and May 29, 2018, the Company issued 23,302,418 and 9,320,967 shares of Series D redeemable convertible preferred stock for an aggregate purchase price of $50.0 million and $20.0 million, respectively.

On March 21, 2018, the Company entered into a new non-cancelable lease agreement to rent office space in South San Francisco, California for a period of 84 months. Total minimum lease payments under the lease agreement are $26.6 million, with lease payments ranging from $1.4 million to $4.1 million per year from 2019 to 2026. In connection with the lease agreement, the Company entered into a letter of credit with a financial institution for $0.6 million, which is collateralized by the Company’s cash and cash equivalents.

On July 2, 2018 and July 3, 2018, the Company issued 5,126,530 and 466,048 shares of Series D redeemable convertible preferred stock for an aggregate purchase price of $11.0 million and $1.0 million, respectively.

* * * * *

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Joint book running managers

J.P. Morgan **Cowen**

Co-managers

Allen & Company LLC **Baird**

, 2018

Through and including , 2018 (the 25th day after the date of this prospectus), all dealers that buy, sell or trade in our common shares, whether or not participating in this offering, may be required to deliver a prospectus. This is in addition to the dealers' obligation to deliver a prospectus when acting as underwriters and with respect to their unsold allotments or subscriptions.

Part II

Information not required in prospectus

Item 13. Other expenses of issuance and distribution

The following table sets forth the costs and expenses, other than underwriting discounts and commissions, payable by us in connection with the sale of common stock being registered. All amounts are estimates except the Securities and Exchange Commission registration fee and the FINRA filing fee and the Nasdaq Global Market listing fee.

	Amount to be paid
Securities and Exchange Commission registration fee	*
FINRA filing fee	*
Initial Nasdaq Global Market listing fee	*
Printing and engraving expenses	*
Legal fees and expenses	*
Accounting fees and expenses	*
Blue Sky qualification fees and expenses	*
Transfer Agent and Registrar fees	*
Miscellaneous fees and expenses	*
Total	*

* to be provided by amendment

Item 14. Indemnification of directors and officers

Section 145 of the Delaware General Corporation Law, or the Delaware Law authorizes a court to award, or a corporation's Board of Directors to grant, indemnity to directors and officers in terms sufficiently broad to permit such indemnification under certain circumstances for liabilities (including reimbursement for expenses incurred) arising under the Securities Act of 1933, as amended, or the Securities Act. Article VII of our Amended and Restated Certificate of Incorporation (Exhibit 3.2 hereto) and Article VI of our Bylaws (Exhibit 3.3 hereto) provide for indemnification of our directors, officers, employees and other agents to the maximum extent permitted by Delaware Law. In addition, we have entered into Indemnification Agreements (Exhibit 10.1 hereto) with our officers and directors. These indemnification agreements also generally require us to advance any expenses incurred by the directors or officers as a result of any proceeding against them as to which they could be indemnified. In addition, we have purchased a policy of directors' and officers' liability insurance that insures our directors and officers against the cost of defense, settlement or payment of a judgment in some circumstances. The Underwriting Agreement (Exhibit 1.1) also provides for cross-indemnification among us, and the Underwriters with respect to certain matters, including matters arising under the Securities Act.

Item 15. Recent sales of unregistered securities

Since January 1, 2015, we have issued and sold the following unregistered securities:

- From February 4, 2015 to June 30, 2018, we issued stock options to certain of our service providers, executive officers and directors to purchase an aggregate of 29,950,134 shares of the Company's common stock under the 2013 Plan, with exercise prices ranging from $0.12 to $1.17 per share. No consideration

was received for such stock options. Such issuances were deemed to be exempt from registration under the Securities Act pursuant to benefit plans and contract relating to compensation as provided under Rule 701 promulgated under Section 3(b) of the Securities Act.

- On May 23, 2016, we issued an aggregate of 3,176,000 shares of common stock and stock purchase rights to certain of our service providers, executive officers and directors pursuant to exercises of then-outstanding stock purchase rights under the 2013 Plan, with a purchase price of $0.60 per share. Such issuances were deemed to be exempt from registration under the Securities Act pursuant to benefit plans and contracts relating to compensation as provided under Rule 701 promulgated under Section 3(b) of the Securities Act.
- In May and June 2015, we sold an aggregate of 24,668,310 shares of our Series C convertible preferred stock at a purchase price of $1.4999 per share for an aggregate purchase price of approximately $37 million to 28 investors, each of whom represented to us that it was an accredited investor. Such issuances were deemed to be exempt from registration under the Securities Act in reliance upon Regulation D promulgated under the Securities Act.
- From December 22, 2015 through September 6, 2017, we issued warrants to investors to purchase 634,921 shares of our common stock and 261,246 shares of our Series C and D convertible preferred stock, with exercise prices ranging from approximately $0.63 per share to $2.1457 per share. An additional warrant to purchase 634,920 shares of common stock at an exercise price of $0.63 per share and would be exercisable upon the drawing down of additional loans under our amended and restated loan and security agreement with Silicon Valley Bank dated September 6, 2017. No consideration was received for such warrants. Such issuances were deemed to be exempt from registration under the Securities Act in reliance on Section 4(a)(2) of the Securities Act as by an issuer not involving a public offering.
- Between April and September 2016, we issued an aggregate of 3,990,593 shares of the Company's common stock in connection with our acquisition of Genome Compiler Corporation. This transaction was exempt from the registration requirements of the Securities Act in reliance upon Regulation D promulgated under the Securities Act.
- Between January 2016 and July 3, 2018, we sold an aggregate of 102,242,652 shares of our Series D convertible preferred stock at a purchase price of $2.1457 per share for an aggregate purchase price of approximately $219.38 million to 78 investors, each of whom represented to us that it was an accredited investor and it intended to acquire the securities for investment only and not with a view to the distribution thereof. Such issuances were deemed to be exempt from registration under the Securities Act in reliance upon Regulation D promulgated under the Securities Act.

None of the foregoing transactions involved any underwriters, underwriting discounts or commissions or any public offering, and we believes each transaction was exempt from the registration requirements of the Securities Act as stated above. All recipients of the foregoing transactions either received adequate information about the Company or had access, through their relationships with the Company, to such information. Furthermore, the Company affixed appropriate legends to the share certificates and instruments issued in each foregoing transaction setting forth that the securities had not been registered and the applicable restrictions on transfer.

Item 16. Exhibits and financial statement schedules

(a) *Exhibits.*

The exhibits to the registration statement of which this prospectus is a part are listed in the Exhibit Index attached hereto and incorporated by reference herein.

(b) *Financial statements schedules**.***

No financial statement schedules are provided because the information required to be set forth therein is not applicable or is shown in the consolidated financial statements or notes thereto.

Item 17. Undertakings

The undersigned registrant hereby undertakes to provide to the underwriters at the closing specified in the underwriting agreements certificates in such denominations and registered in such names as required by the underwriters to permit prompt delivery to each purchaser.

Insofar as indemnification for liabilities arising under the Securities Act of 1933 may be permitted to directors, officers and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Act, and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer, or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Act and will be governed by the final adjudication of such issue.

The undersigned registrant hereby undertakes that:

(1) For purposes of determining any liability under the Securities Act of 1933, the information omitted from the form of prospectus filed as part of this registration statement in reliance upon Rule 430A and contained in a form of prospectus filed by the registrant pursuant to Rule 424(b)(1) or (4) or 497(h) under the Securities Act shall be deemed to be part of this registration statement as of the time it was declared effective.

(2) For the purpose of determining any liability under the Securities Act of 1933, each post-effective amendment that contains a form of prospectus shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

Exhibit index

Number	Description
1.1*	Form of Underwriting Agreement.
3.1*	Amended and Restated Certificate of Incorporation of Twist Bioscience Corporation, as amended, as currently in effect.
3.2*	Form of Amended and Restated Certificate of Incorporation of Twist Bioscience Corporation, to be in effect upon the completion of this offering.
3.3#	Bylaws of Twist Bioscience Corporation, as currently in effect.
3.4*	Form of Amended and Restated Bylaws of Twist Bioscience Corporation, to be in effect upon the completion of this offering.
4.1*	Specimen Common Stock Certificate.
4.2*	Amended and Restated Stockholders Agreement by and among Twist Bioscience Corporation and certain holders of its capital stock, dated as of January 8, 2016, as amended as of March 19, 2018.
4.3*	Amended and Restated Registration Rights Agreement by and among Twist Bioscience Corporation and certain holders of its capital stock, dated as of January 8, 2016, as amended as of March 19, 2018.
4.4#	Warrant to Purchase Stock by and between Twist Bioscience Corporation and Silicon Valley Bank dated October 8, 2013.
4.5#	Warrant to Purchase Stock by and between Twist Bioscience Corporation and Silicon Valley Bank dated September 2, 2014.
4.6#	Warrant to Purchase Stock by and between Twist Bioscience Corporation and Silicon Valley Bank dated December 22, 2015.
4.7#	Warrant to Purchase Stock by and between Twist Bioscience Corporation and Silicon Valley Bank dated March 28, 2016.
4.8#	Warrant to Purchase Common Stock by and between Twist Bioscience Corporation and Life Science Loans II, LLC dated September 6, 2017.
4.9#	Warrant to Purchase Common Stock by and between Twist Bioscience Corporation and Silicon Valley Bank dated September 6, 2017.
5.1*	Opinion of Orrick, Herrington & Sutcliffe LLP.
10.1#+	2013 Stock Plan and forms of agreement thereunder.
10.2*+	2018 Equity Incentive Plan and forms of agreement thereunder.
10.3*+	2018 Employee Stock Purchase Plan.
10.4*+	Executive Incentive Bonus Plan.
10.5*+	Amended and Restated Employment Agreement, dated , by and between Twist Bioscience Corporation and Emily M. Leproust.
10.6*+	Amended and Restated Employment Agreement, dated , by and between Twist Bioscience Corporation and William Banyai.
10.7*+	Employment Agreement, dated , by and between Twist Bioscience Corporation and Patrick Weiss.
10.8*+	Employment Agreement, dated , by and between Twist Bioscience Corporation and James M. Thorburn.
10.9*+	2018 Non-Employee Director Compensation Policy.

Number	Description
10.10*+	Form of Indemnification Agreement between Twist Bioscience Corporation and each of its Officers and Directors.
10.11#	Fourth Amended and Restated Loan and Security Agreement, dated September 6, 2017, by and between Silicon Valley Bank, Twist Bioscience Corporation and certain other co-borrowers.
10.12*	Lease Agreement, dated July 26, 2013, by and between ARE—San Francisco No. 19, LLC and Twist Bioscience Corporation.
10.12.1*	First Amendment to Lease, dated August 7, 2013 by and between ARE—San Francisco No. 19, LLC and Twist Bioscience Corporation.
10.12.2*	Second Amendment to Lease, dated May 19, 2015, by and between ARE—San Francisco No. 19, LLC and Twist Bioscience Corporation.
10.12.3*	Third Amendment to Lease, dated September 23, 2015, by and between ARE—San Francisco No. 19, LLC and Twist Bioscience Corporation.
10.12.4*	Fourth Amendment to Lease, dated January 6, 2016, by and between ARE—San Francisco No. 19, LLC and Twist Bioscience Corporation.
10.12.5*	Fifth Amendment to Lease, dated April 12, 2016 by and between ARE—San Francisco No. 19, LLC and Twist Bioscience Corporation.
10.13*	Lease Agreement, dated March 21, 2018, by and between ARE—San Francisco No. 32, LLC and Twist Bioscience Corporation.
10.14*	Sublease Agreement, dated May 25, 2016, by and between Blade Therapeutics, Inc. and Twist Bioscience Corporation.
10.15*†	Supply Agreement, dated March 2, 2018, by and between Ginkgo Bioworks, Inc. and Twist Bioscience Corporation.
10.16*†	End User Supply Agreement, dated November 5, 2015, by and between FUJIFILM Dimatix, Inc. and Twist Bioscience Corporation.
21.1#	List of Subsidiaries.
23.1*	Consent of PricewaterhouseCoopers LLP.
23.2*	Consent of Orrick, Herrington & Sutcliffe LLP (included in Exhibit 5.1).
24.1	Power of Attorney (included in signature page).

* To be filed by amendment.

\+ Indicates a management or compensatory plan.

† Portions of this exhibit (indicated by asterisks) will be omitted pursuant to a request for confidential treatment that will be separately filed with the Securities and Exchange Commission.

\# Previously filed.

Signatures

Pursuant to the requirements of the Securities Act of 1933, the registrant has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the city of San Francisco, State of California on , .

TWIST BIOSCIENCE CORPORATION

By: _____
Emily M. Leproust
President and Chief Executive Officer

Power of attorney

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints, jointly and severally, Emily M. Leproust and Mark Daniels, and each of them, as his attorney-in-fact, with full power of substitution, for him in any and all capacities, to sign any and all amendments to this Registration Statement (including post-effective amendments), and any and all Registration Statements filed pursuant to Rule 462 under the Securities Act of 1933, as amended, in connection with or related to the offering contemplated by this Registration Statement and its amendments, if any, and to file the same, with exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, hereby ratifying and confirming our signatures as they may be signed by our said attorney to any and all amendments to said Registration Statement.

Pursuant to the requirements of the Securities Act of 1933, as amended, this Registration Statement has been signed by the following persons in the capacities and on the dates indicated:

Signature	Title	Date
Emily M. Leproust	President, Chief Executive Officer and Director (principal executive officer)	,
James M. Thorburn	Chief Financial Officer (principal financial officer and accounting officer)	,
William Banyai	Director	,
Robert Chess	Director	,
Paul A. Conley	Director	,
Keith Crandell	Director	,

Signature	Title	Date
Frederick Craves	Director	,
Xiaoying Mai	Director	,
Robert Ragusa	Director	,