

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

Large accelerated filer <input type="checkbox"/>	Accelerated filer <input type="checkbox"/>
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Non-accelerated filer <input checked="" type="checkbox"/>	Smaller reporting company <input checked="" type="checkbox"/>
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Emerging growth company <input checked="" type="checkbox"/>	
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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	3,450,000	\$24.92	\$85,974,000	\$10,421

(1) Includes 450,000 shares of Common Stock issuable upon exercise of the Underwriters' option to purchase additional shares. See "Underwriting."

(2) Estimated solely for the purpose of computing the amount of the registration fee pursuant to Rule 457(c) under the Securities Act of 1933, as amended, and is based on the average of the high and low sales prices of the registrant's common stock as reported on the Nasdaq Global Select Market on May 3, 2019.

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.

Table of Contents

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 May 6, 2019

Preliminary prospectus

3,000,000 shares



Common stock

Twist Bioscience Corporation is offering 3,000,000 shares of its common stock.

Our common stock is listed on the Nasdaq Global Select Market under the symbol "TWST." The last reported sale price of our common stock on the Nasdaq Global Select Market on May 2, 2019 was \$24.24 per share.

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
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 450,000 additional shares of common stock from us at the public offering price less the underwriting discounts and commissions.

Investing in our common stock involves a high degree of risk. See the section entitled "[Risk factors](#)" beginning on page 20 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 , 2019.

Joint book running managers

J.P. Morgan

, 2019

Cowen

Lead manager

Baird

Evercore ISI

[Table of Contents](#)

Table of contents

Prospectus summary	1
The offering	15
Summary consolidated financial information	17
Risk factors	20
Special note regarding forward-looking statements	23
Use of proceeds	25
Dividend policy	27
Capitalization	28
Dilution	30
Principal stockholders	33
Description of capital stock	36
Shares eligible for future sale	41
Material U.S. federal income tax considerations for non-U.S. holders	43
Underwriting	48
Legal matters	59
Experts	59
Where you can find more information	59
Incorporation of certain information by reference	60

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 United States 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, and the information incorporated by reference herein, are the property of their respective holders. Solely for convenience, the trademarks and trade names in this prospectus, and the information incorporated by reference herein, 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 the information in our filings with the Securities and Exchange Commission, or SEC, incorporated by reference in this prospectus, before deciding to invest in our common stock. Investors should carefully consider the information set forth in 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 and genomics 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 700 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. According to BCC Research, in calendar year

Table of Contents

2017, the market for synthetic biology products was approximately \$4.4 billion and is expected to grow to \$13.9 billion by calendar year 2022. 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. We have leveraged 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, and we are pursuing vertical market opportunities in 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.

In February 2018, we launched an innovative and comprehensive sample preparation kit for next generation sequencing. 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, saving both time and sequencing costs.

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 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 presented early proof-of-concept for both our GPCR library and our antibody optimization solution at a recent industry meeting. In addition, we signed an agreement with LakePharma, a leading contract research, development and manufacturing organization, to offer our antibody discovery solutions to their customers and to offer our customers their early development services.

We also aim to explore development of DNA as a digital data storage medium via internal research and industry partnerships. We are currently working with Microsoft and the University of Washington on a DARPA-funded project to increase the speed of storing data by a factor of ten. In addition, we applied for a significantly larger government contract to expedite our efforts in making DNA data storage commercially viable, and we are currently in contract negotiations to receive this non-dilutive financing.

From inception to March 31, 2019, we have sold our products to more than 700 customers. In fiscal year 2018 we served 717 customers and reported \$25.4 million in revenue including \$14.9 million to the industrial chemicals sector, \$5.8 million in revenues to over 300 institutions in the academic research sector, \$0.5 million the agricultural sector and \$4.2 million healthcare sector. The industrial chemicals segment includes sales \$8.7 million to Ginkgo Bioworks (which we believe is the largest purchaser of synthetic DNA). Our healthcare sector sales include \$2.1 million in NGS products sales to diagnostic companies and \$1.2 million sales to 13 of the top 20 pharmaceutical companies by revenue. The agricultural sector includes \$0.2 million in sales to four of the largest agricultural biotechnology companies.

Table of Contents

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. Based on market research, 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 through 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 and (vi) launching our e-commerce platform to existing customers in October 2017.
- 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

Table of Contents

entry into the biologics drug discovery and early development and (vi) signing a new agreement with Ginkgo Bioworks to deliver up to approximately 1.3 billion base pairs over a period of four years.

- In 2019, we (i) launched our five kilobase genes at a price significantly lower than our competitors, (ii) opened up our Twist API to any customer who would like to integrate it within their workflow, (iii) continued to grow our NGS product line with the introduction of several products to our early access customers including: the Twist Fast Hybridization and Wash Kit, Twist Universal Blockers, Twist Universal Adapter System and the Twist Mechanical Fragmentation Library Prep Kit for highly-degraded samples, (iv) shipped to more than 100 NGS customers with 18 customers now in production, (v) received International Organization for Standardization, or ISO, 9001:2015 and 13485:2016 certifications for our quality management systems for manufacturing our NGS Target Enrichment Panels, the latter for medical device applications and (vi) generated early proof-of-concept data from the GPCR library and antibody optimization software for Twist Biopharma.

We generated revenues of \$25.4 million in fiscal 2018, \$10.8 million in fiscal 2017 and \$2.3 million in fiscal 2016, while incurring net losses of \$71.2 million, \$59.3 million and \$44.1 million in fiscal years 2018, 2017 and 2016, respectively. In the six months ended March 31, 2019, we generated revenues of \$25.0 million while incurring net losses of \$48.6 million. 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 headquarters and manufacturing facilities are located in San Francisco, California. As of March 31, 2019, we had 329 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 26 dedicated commercial consultants across the European Union and the United Kingdom and 14 dedicated commercial consultants across Asia. In May 2018, we received private funding to establish production facilities and commercial operations in China. Through March 31, 2019, we have raised a total of \$360.1 million in net proceeds from the sale of equity securities, including \$69.6 million in net proceeds from our initial public offering in October 2018.

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 \$4.4 billion in calendar year 2017 and is expected to grow to over \$13.9 billion by calendar year 2022. This industry

Table of Contents

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 proprietary 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.

Synthesis and Assembly Comparison

	96-well Plate	Microarray	Twist Bioscience
Amount of DNA	Too much (waste) Nano-mol	Too little (amplification) <Femto-mol	Right amount (no amplification, no waste) Pico-mol
DNA processing	Pooling required	De-pooling required	No pooling No de-pooling
Genes per 96-well	1	96	9,600*

*Full scale capacity chip shown; current chip in production has the capacity to make 6,144 genes

Table of Contents

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
<i>Quality and accuracy</i>	<ul style="list-style-type: none">• Quality and accuracy is a basic requirement for all customers. Deviations from customer specifications can render customers' downstream uses less productive or ineffective.	<ul style="list-style-type: none">• 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.
<i>Cost</i>	<ul style="list-style-type: none">• 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, typically have made their own DNA because of limited budgets relative to the prices charged by legacy DNA suppliers.	<ul style="list-style-type: none">• 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 September 2018, the publicly available pricing of our competitors for clonal DNA ranged from \$0.15—\$2.00 per base pair (assuming an order size of 150 base pairs). Our standard pricing for comparable DNA is \$0.09 per base pair for genes between 300 and 1,800 base pairs in length and \$0.12—\$0.15 per base pair for genes between 3,200 base pairs and 5,000 base

Table of Contents

	Customer desires	Twist Bioscience advantages
<i>Throughput/scale</i>	<ul style="list-style-type: none">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.	<p>pairs. One of the best demonstrations of our cost advantage is that we supply synthetic DNA to four other competing synthetic DNA providers.</p> <ul style="list-style-type: none">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 20 million oligonucleotides per month that can be combined into high-precision oligo pools of various sizes. These oligonucleotides can be used to create multiple products including genes. We currently have the capacity to produce 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.
<i>Turnaround time</i>	<ul style="list-style-type: none">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.	<ul style="list-style-type: none">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.

Table of Contents

	Customer desires	Twist Bioscience advantages
<i>Product offering/ complexity</i>	<ul style="list-style-type: none">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.	<ul style="list-style-type: none">Because we synthesize each oligonucleotide individually, we can customize orders to almost any customer's specifications. We currently offer genes of up to 5,000 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.
<i>Reliability</i>	<ul style="list-style-type: none">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.	<ul style="list-style-type: none">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.
<i>E-commerce capability</i>	<ul style="list-style-type: none">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.	<ul style="list-style-type: none">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.

[Table of Contents](#)

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 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,

Table of Contents

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 in three to five years, new DNA technologies and cost efficiencies could surpass mature information technology hardware solutions 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.

Recent developments

Synthetic Biology Product Line

Expanded product line for genes

In January 2019, we expanded our synthetic biology product portfolio to offer genes up to five kilobases, or 5kb, in length at industry-leading pricing of \$0.15 per base pair with a turnaround time between 15 and 25 days. In the second quarter of fiscal 2019, our average turnaround time for genes 3 to 5kb was approximately 14 days.

Expanded access for synthetic biology products

In January 2019, we made our Application Programming Interface, or Twist API or TAPI, available for all customers interested in designing and building genes and their pathways in one step.

NGS Product Line

ISO Certification

In January 2019, our quality management systems for manufacturing our NGS Target Enrichment Panels in our Mission Bay San Francisco offices received ISO 9001:2015 and 13485:2016 certifications, the latter for medical

[Table of Contents](#)

device applications. In addition to continuing to provide NGS tools to our current customer base, we now have the ability to support customers in more regulated markets that require ISO certification from their key reagent suppliers. We anticipate obtaining these certifications for our new facility in South San Francisco in the fourth quarter of the calendar year.

Expanded product line for NGS

In February 2019, we expanded our NGS product portfolio to add several new product solutions to Early Access customers including Twist Fast Hybridization and Wash Kit, Twist Universal Blockers to allow flexible blocking and improved on-target capture; the Twist Universal Adapter System, to maximize performance for library preparation; and, the Twist Mechanical Fragmentation Library Prep Kit for highly-degraded samples.

Biologics Drug Discovery

Early Proof-of-concept validation of GPCR library and antibody optimization software

In April 2019, we presented early proof-of-concept data that our high-throughput antibody discovery platform identifies functional antibodies against GPCR targets and can readily develop antibodies with affinities in the nanomolar range. These antibodies exhibited multiple modes of action to modulate GPCR activity.

In April 2019, we presented early proof-of-concept data that our antibody optimization software successfully generated anti-PD-1 antibodies with similar or improved binding affinity when compared to certain commercial anti-PD-1 antibodies on the market for cancer therapy.

Collaboration with LakePharma

In April 2019, we announced a strategic collaboration with LakePharma to offer antibody discovery and development solutions to pharmaceutical and biotechnology customers. Under the terms of the agreement, LakePharma will have the ability to offer Twist's proprietary antibody discovery and optimization platforms to their existing and future biopharmaceutical customers as part of their service offerings. One such Twist platform that may be offered is for discovery of novel therapeutic antibodies against a major class of protein drug targets known as GPCRs, which traditionally have been difficult for biologics drug development. GPCRs have been heavily investigated due to their involvement in multiple disease classes, including inflammation, cancer, metabolism, respiratory, and pain. In return, we may offer our customers access to LakePharma's integrated discovery and development services. Each of we and LakePharma will share with each other a percentage of certain revenues generated from customers who purchase services as a result of the collaboration.

Antibody Optimization Service for Pandion

In April 2019, we announced a new collaboration with Pandion Therapeutics, to apply our antibody optimization platform to the targeting arm of a bispecific antibody.

DNA Digital Data Storage

Pursuit of grant funding

In March 2019, we entered contract negotiations for a government contract to support our efforts to make DNA data storage commercially viable. We expect these negotiations to take several months to come to resolution.

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" in this prospectus and in our Quarterly Report on Form 10-Q for the quarter ended March 31, 2019, incorporated by reference herein. 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;
- 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 and genomics 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, and the information incorporate by reference herein, 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

Table of Contents

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;
- 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 elected to take advantage of certain of the reduced disclosure obligations in the registration statement of which this prospectus is a part and the documents incorporated herein by reference and may elect to take advantage of other reduced reporting requirements in future filings. As a result, the information that we provide to our stockholders may be different than you might receive from other public reporting companies in which you hold equity interests.

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	3,000,000 shares
Common stock to be outstanding after the offering	31,024,052 shares (31,474,052 if the underwriters exercise their option to purchase additional shares in full)
Option to purchase additional shares of common stock	The underwriters have an option to purchase a maximum of 450,000 additional shares of common stock from us. The underwriters can exercise this option at any time within 30 days from the date of this prospectus.
Use of proceeds	As of March 31, 2019, we had cash, cash equivalents and short-term investments of \$104.3 million. We intend to use the net proceeds from this offering, together with our existing cash, cash equivalents and short-term investments for the following purposes: (i) approximately \$12.0 million to \$14.0 million to improve and update our platform and core technologies by investing in equipment, expanding our NGS research and development capabilities, investing in production software, consolidating in new operation facilities and increasing our capacity; (ii) approximately \$15.0 million to \$18.0 million to expand our commercial operations including marketing, NGS sales and technical services in the United States, Europe and Asia, including \$1.0 million to \$2.0 million for our expansion in China; (iii) approximately \$15.0 million to \$17.0 million to continue to expand in the pharmaceutical biologics drug discovery and DNA data storage markets; (iv) approximately \$13.0 million to \$15.0 million to establish our NGS operations in China and (v) the balance 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.
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 our Quarterly Report on Form 10-Q for the quarter ended March 31, 2019 incorporated by reference herein, and all other information in this prospectus before investing in our common stock.

Table of Contents

Nasdaq Global Select Market “TWST”
symbol

Except as otherwise indicated, all information in this prospectus is based upon 28,024,052 shares of our common stock (including 66,197 unvested shares of restricted common stock subject to our repurchase right) outstanding as of March 31, 2019, and excludes:

- 3,932,469 shares of our common stock issuable upon exercise of stock options outstanding as of March 31, 2019, having a weighted-average exercise price of \$14.58 per share;
- 485,860 shares of our common stock issuable upon the settlement of outstanding restricted stock units as of March 31, 2019;
- 1,397,566 shares of common stock reserved for future grant or issuance under our 2018 Equity Incentive Plan, or the 2018 Plan;
- 275,225 shares of common stock reserved for future grant or issuance under our 2018 Employee Stock Purchase Plan, or the 2018 ESPP;
- 32,064 shares of common stock issuable upon the exercise of outstanding warrants to purchase our common stock outstanding as of March 31, 2019, having an exercise price of \$6.24 per share;
- 16,221 shares of our common stock issuable upon the exercise of outstanding warrants to purchase common stock outstanding as of March 31, 2019, having an exercise price of \$7.84 per share;
- 18,854 shares of our common stock, issuable upon the exercise of outstanding warrants to purchase common stock outstanding as of March 31, 2019, having an exercise price of \$14.85 per share; and
- 7,531 shares of our common stock issuable upon the exercise of outstanding warrants to purchase common stock outstanding as of March 31, 2019, having an exercise price of \$21.24 per share.

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

- no exercise or termination of outstanding stock options or warrants after March 31, 2019; and
- no exercise by the underwriters of their 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 incorporated by reference in this prospectus, as well as the information in the sections titled “Selected consolidated financial data” and “Management’s discussion and analysis of financial condition and results of operations” appearing in our Annual Report on Form 10-K for the fiscal year ended September 31, 2018, or our 2018 Annual Report, and from our Quarterly Report on Form 10-Q for the quarter ended March 31, 2019, or our Quarterly Report, which are incorporated by reference herein.

We derived the summary consolidated statements of operations and comprehensive loss data for the fiscal years ended September 30, 2016, 2017 and 2018 from our audited consolidated financial statements incorporated by reference in this prospectus from our 2018 Annual Report. We derived the unaudited consolidated statements of operations and comprehensive loss data for the six months ended March 31, 2018 and 2019, and the unaudited consolidated balance sheet data as of March 31, 2019, from our unaudited condensed consolidated financial statements incorporated by reference from our Quarterly Report. We have prepared the unaudited condensed consolidated financial statements as of March 31, 2019 and for the six months ended March 31, 2019 and 2018 on a basis consistent with our audited consolidated financial statements and have included, in our opinion, all adjustments, consisting only of normal recurring adjustments, that we consider necessary for a fair statement of the financial information set forth in those statements. The summary financial data included in this section are not intended to replace the financial statements and related notes incorporated by reference in this prospectus. Our historical results are not necessarily indicative of our future performance, and our interim results are not necessarily indicative of the results to be expected for the full fiscal year.

[Table of Contents](#)

(in thousands, except share and per share amounts)	Year ended September 30,			Six months ended March 31,	
	2016	2017	2018	2018	2019
Consolidated statements of operations and comprehensive loss:					
Revenues	\$ 2,269	\$ 10,767	\$ 25,427	\$ 10,479	\$ 25,049
Operating expenses:					
Cost of revenues	9,421	24,020	32,189	15,593	23,646
Research and development	18,230	19,169	20,347	9,014	16,180
Selling, general and administrative	18,274	26,060	43,450	19,241	34,383
Total operating expenses	<u>\$ 45,925</u>	<u>\$ 69,249</u>	<u>\$ 95,986</u>	<u>\$ 43,848</u>	<u>\$ 74,209</u>
Loss from operations	\$ (43,656)	\$ (58,482)	\$ (70,559)	\$ (33,369)	\$ (49,160)
Interest income	241	412	999	306	1,439
Interest expense	(746)	(905)	(1,313)	(590)	(688)
Other income (expense), net	73	(55)	(121)	(62)	(36)
Loss before income taxes	\$ (44,088)	\$ (59,030)	\$ (70,994)	\$ (33,715)	\$ (48,445)
Provision for income taxes	—	(280)	(242)	(95)	(127)
Net loss attributable to common stockholders	<u>\$ (44,088)</u>	<u>\$ (59,310)</u>	<u>\$ (71,236)</u>	<u>\$ (33,810)</u>	<u>\$ (48,572)</u>
Other comprehensive loss					
Change in unrealized gain (loss) on investments	9	(9)	—	—	13
Foreign currency translation adjustment	—	33	54	21	(236)
Comprehensive loss	<u>\$ (44,079)</u>	<u>\$ (59,286)</u>	<u>\$ (71,182)</u>	<u>\$ (33,789)</u>	<u>\$ (48,795)</u>
Net loss per share attributable to common stockholders—basic and diluted(1)	<u>\$ (23.58)</u>	<u>\$ (24.49)</u>	<u>\$ (25.51)</u>	<u>\$ (12.74)</u>	<u>\$ (2.06)</u>
Weighted average shares used in computing net loss per share attributable to common stockholders—basic and diluted(1)	<u>1,869,631</u>	<u>2,422,243</u>	<u>2,792,743</u>	<u>2,653,805</u>	<u>23,539,617</u>

(1) See Note 15 of the notes to our audited annual consolidated financial statements included in our 2018 Annual Report incorporated by reference herein and Note 12 of the notes to our unaudited condensed consolidated financial statements included in our Quarterly Report incorporated by reference in this prospectus for a description of the method used to compute basic and diluted net loss per share attributable to common stockholders.

[Table of Contents](#)

(In thousands) (unaudited)	As of March 31, 2019	
	Actual	As adjusted(2)(3)
Consolidated balance sheet data:		
Cash, cash equivalents, and short-term investments	\$ 104,324	\$ 171,658
Working capital	102,411	169,745
Total assets	140,170	207,504
Total liabilities	24,690	24,690
Additional paid-in capital	375,043	442,377
Accumulated deficit	(259,427)	(259,427)
Total stockholders' equity	115,480	182,814

- (2) The as adjusted balance sheet data reflects the sale of 3,000,000 shares of common stock offered by us in this offering at an assumed public offering price of \$24.24 per share, which is the last reported sale price of our common stock on the Nasdaq Global Select Market on May 2, 2019, after deducting underwriting discounts and commissions and estimated offering expenses payable by us.
- (3) A \$1.00 increase (decrease) in the assumed public offering price of \$24.24 per share, which is the last reported sale price of our common stock on the Nasdaq Global Select Market on May 2, 2019, would increase or decrease the as adjusted amount of each of cash, cash equivalents and short-term investments, working capital, total assets and total stockholders' equity by approximately \$2.8 million, assuming the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting underwriting discounts and commissions and estimated offering expenses payable by us. A 100,000 share increase or decrease in the number of shares offered by us at the assumed public offering price of \$24.24 per share would increase (decrease) the as adjusted amount of each of cash, cash equivalents and short-term investments, working capital, total assets and total stockholders equity by \$2.3 million after deducting underwriting discounts and commissions and estimated offering expenses payable by us.

Risk factors

Investing in our common stock involves a high degree of risk. Before investing in our common stock, you should consider carefully the risks described below, together with the other information contained in this prospectus or incorporated by reference in this prospectus, including the risks and uncertainties discussed under "Risk Factors" in our Quarterly Report on Form 10-Q for the quarter ended March 31, 2019, which are incorporated by reference herein in their entirety. If any of the risks incorporated by reference herein or set forth below occur, our business, financial condition, results of operations and future growth prospects could be materially and adversely affected. In these circumstances, the market price of our common stock could decline, and you may lose all or part of your investment.

Risks relating to owning our common stock and this offering

Our share price may be volatile, and you may be 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;
- supply chain and production disruption due to our moving primary manufacturing facilities to a new location;
- 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.

Table of Contents

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 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.

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 depends on the research and reports that securities or industry analysts publish about us or our business. We do not and will not have any control over our 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 March 31, 2019, upon the closing of this offering, we will have 31,024,052 shares of common stock outstanding, assuming no exercise of the underwriters' option to purchase additional shares or 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. We, our executive officers and directors, and certain of our existing security holders, have agreed not to sell or transfer any common stock or securities convertible into, exchangeable for, exercisable for, or repayable with common stock, for 90 days after the date of this prospectus without first obtaining the written consent of the underwriters. 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

Table of Contents

sale." For more information regarding the lock-up agreements with the underwriters see the section of this prospectus captioned "Underwriting."

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 intend to use the proceeds from this offering primarily to improve and update our platform and core technologies, to expand our sales and marketing capabilities in the United States, and in other geographies, including China, to establish our operations in China, to continue to expand in the pharmaceutical 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.

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 \$18.40 per share, the difference between the assumed public offering price of \$24.24 per share, which is last reported sale price of our common stock on the Nasdaq Global Select Market on May 2, 2019, and the net tangible book value per share of our common stock as of March 31, 2019, after giving effect to the issuance of shares of our common stock in this offering. Furthermore, if the underwriters exercise their option to purchase additional shares, 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, including the documents incorporated by reference herein, includes forward-looking statements within the meaning of the federal securities laws. We make such forward-looking statements pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995 and other 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 expectations regarding our ability to effectively produce and deliver our sample preparation kits for next generation sequencing, and the kits' ability to leverage our platform to improve the accuracy of the downstream sequencing analysis;
- our ability to successfully move our manufacturing operations from our San Francisco facility to our South San Francisco facility and our ability to obtain relevant ISO certifications for the new facility on a timely basis;
- our ability to effectively manage our growth;
- our ability to successfully enter new markets and manage our international expansion including in China;
- our ability to protect our intellectual property, including our proprietary DNA synthesis platform and technology related to our next generation sample preparation kits;
- 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;

Table of Contents

- 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” and elsewhere and incorporated by reference in this prospectus.

In addition, in this prospectus, including the documents incorporated by reference herein, 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, including the documents incorporated by reference herein, 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 or as of the date on which they were made. 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, the documents incorporated by reference herein 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.

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 \$67.3, or approximately \$77.6 if the underwriters exercise their option to purchase additional shares of our common stock in full, assuming a public offering price of \$24.24 per share, which is the last reported sale price of our common stock on the Nasdaq Global Select Market on May 2, 2019, after deducting underwriting discounts and commissions and estimated offering expenses payable by us.

A \$1.00 increase or decrease in the assumed public offering price of \$24.24 per share, which is the last reported sale price of our common stock on the Nasdaq Global Select Market on May 2, 2019, would increase or decrease our net proceeds from this offering by approximately \$2.8 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 100,000 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 \$2.3 million, assuming no change in the assumed 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 March 31, 2019, we had cash, cash equivalents and short-term investments of \$104.3 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 for the following purposes:

- Approximately \$12.0 million to \$14.0 million to improve and update our platform and core technologies by investing in equipment, expanding our NGS research and development capabilities, investing in production software, consolidating in new operation facilities and increasing our capacity;
- Approximately \$15.0 million to \$18.0 million to expand our commercial operations including marketing, NGS sales and technical services in the United States, Europe and Asia, including \$1.0 million to \$2.0 million for our expansion in China;
- Approximately \$15.0 million to \$17.0 million to continue to expand in the pharmaceutical biologics drug discovery and DNA data storage markets;
- Approximately \$13.0 million to \$15.0 million to establish our NGS operations in China; 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.

Table of Contents

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 the section hereof entitled "Risk factors", as well as our Quarterly Report on Form 10-Q for the quarter ended March 31, 2019, which is incorporated by reference herein.

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.

Table of Contents

Capitalization

The following table sets forth our cash, cash equivalents and short-term investments and capitalization as of March 31, 2019 on:

- An actual basis; and
- An as adjusted basis, giving effect to the sale and issuance of shares of our common stock by us in this offering, based upon the assumed public offering price of \$24.24 per share, which is the last reported sale price of our common stock on the Nasdaq Global Select Market on May 2, 2019, after deducting 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 incorporated by reference in this prospectus.

	As of March 31, 2019	
(In thousands, except share and per share data)	Actual	As adjusted(1)
Cash, cash equivalents and short-term investments	\$ 104,324	\$ 171,658
Total debt	\$ 9,161	\$ 9,161
Stockholders' equity:		
Preferred stock, \$0.00001 par value: 10,000,000 shares authorized, no shares issued and outstanding, actual; 10,000,000 share authorized, no shares issued and outstanding as adjusted	—	—
Common stock, \$0.00001 par value: 100,000,000 shares authorized, 28,024,052 shares issued and outstanding, actual; 100,000,000 shares authorized, 31,024,052 shares issued and outstanding as adjusted	—	—
Additional paid-in capital	375,043	442,377
Accumulated other comprehensive income (deficit)	(136)	(136)
Accumulated deficit	(259,427)	(259,427)
Total stockholders' equity	115,480	182,814
Total capitalization	\$ 124,641	\$ 191,975

- (1) Each \$1.00 increase or decrease in the assumed public offering price of \$24.24 per share, which is the last reported sale price on the Nasdaq Global Select Market on May 2, 2019, would increase or decrease, as applicable, our cash, cash equivalents and short-term investments and total stockholders' equity and total capitalization by approximately \$2.8 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 underwriting discounts and commissions and estimated offering expenses payable by us. Each increase or decrease of 100,000 shares in the number of shares offered by us would increase or decrease the amount of our cash, cash equivalents, and short-term investments and total stockholders' equity by approximately \$2.3 million, assuming a public offering price of \$24.24 per share, which is the last reported sale price on the Nasdaq Global Select Market on May 2, 2019, after deducting underwriting discounts and commissions and estimated offering expenses payable by us.

Except as otherwise indicated, all information in this prospectus is based upon 28,024,052 shares of our common stock (including 66,197 unvested shares of restricted common stock subject to our repurchase right) outstanding as of March 31, 2019, and excludes:

- 3,932,469 shares of our common stock issuable upon exercise of stock options outstanding as of March 31, 2019, having a weighted-average exercise price of \$14.58 per share;
- 485,860 shares of our common stock issuable upon the settlement of outstanding restricted stock units as of March 31, 2019;
- 1,397,566 shares of common stock reserved for future grant or issuance under the 2018 Plan;

Table of Contents

- 275,225 shares of common stock reserved for future grant or issuance under the 2018 ESPP;
- 32,064 shares of common stock issuable upon the exercise of outstanding warrants to purchase our common stock outstanding as of March 31, 2019, having an exercise price of \$6.24 per share;
- 16,221 shares of our common stock issuable upon the exercise of outstanding warrants to purchase common stock outstanding as of March 31, 2019, having an exercise price of \$7.84 per share;
- 18,854 shares of our common stock, issuable upon the exercise of outstanding warrants to purchase common stock outstanding as of March 31, 2019, having an exercise price of \$14.85 per share; and
- 7,531 shares of our common stock issuable upon the exercise of outstanding warrants to purchase common stock outstanding as of March 31, 2019, having an exercise price of \$21.24 per share.

[Table of Contents](#)

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 as adjusted net tangible book value per share of our common stock after this offering. Our historical net tangible book value as of March 31, 2019 was \$113.7 million, or \$4.06 per share of common stock. Our net tangible book value per share represents total tangible assets less total liabilities divided by the number of shares of common stock outstanding as of March 31, 2019.

After giving effect to our sale of 3,000,000 shares of our common stock in this offering at an assumed public offering price of \$24.24 per share, which is the last reported sale price of our common stock on the Nasdaq Global Select Market on May 2, 2019, after deducting underwriting discounts and commissions and estimated offering expenses payable by us, our as adjusted net tangible book value as of March 31, 2019 would have been \$181.1 million, or \$5.84 per share. This represents an immediate increase in net tangible book value of \$1.78 per share to our existing stockholders and an immediate dilution of \$18.40 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 public offering price per share	\$24.24
Historical net tangible book value per share as of March 31, 2019	\$4.06
As adjusted net tangible book value per share after giving effect to this offering	5.84
Dilution in net tangible book value per share to new investors in this offering	\$18.40

Each \$1.00 increase or decrease in the assumed public offering price of \$24.24 per share, which is the last reported sale price of our common stock on the Nasdaq Global Select Market on May 2, 2019, would increase or decrease, as applicable, our as adjusted net tangible book value by approximately \$2.8 million, or approximately \$0.09 per share, and would increase or decrease, as applicable, dilution per share to new investors in this offering by \$0.91, 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 underwriting discounts and commissions and estimated offering expenses payable by us. An increase or decrease of 100,000 shares in the number of shares offered by us would increase or decrease, as applicable, our as adjusted net tangible book value by approximately \$2.3 million, and would decrease or increase dilution per share to new investors in this offering by approximately \$0.05 per share and \$0.06 per share, respectively, assuming a public offering price of \$24.24 per share, which is the last reported sale price of our common stock on the Nasdaq Global Select Market on May 2, 2019, and after deducting underwriting discounts and commissions and estimated offering expenses payable by us. The 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 option to purchase additional shares in full, the as adjusted net tangible book value per share would be \$6.08 per share, and the dilution per share to new investors in this offering would be \$18.16 per share.

Table of Contents

The following table summarizes the as adjusted basis as described above, as of March 31, 2019, 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 public offering price of \$24.24 per share, which is the last reported sale price of our common stock on the Nasdaq Global Select Market on May 2, 2019, before deducting 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	28,024,052	90.3%	\$373,250,578	83.7%	\$ 13.32
New investors	3,000,000	9.7%	\$ 72,720,000	16.3%	\$ 24.24
Total	31,024,052	100.0%	\$445,970,578	100.0%	\$ 14.37

Each \$1.00 increase or decrease in the assumed public offering price of \$24.24 per share, which is the last reported sale price of our common stock on the Nasdaq Global Select Market on May 2, 2019, 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 \$2.8 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 underwriting discounts and commissions and estimated offering expenses payable by us. An increase or decrease of 100,000 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 \$2.3 million, assuming a public offering price of \$24.24 per share, which is the last reported sale price of our common stock on the Nasdaq Global Select Market on May 2, 2019, and after deducting 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 32,517,051 shares, or 91.6% 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 8.4% 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 \$431.4 million, or 85.6% 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 14.4% of the total consideration paid by stockholders after this offering, and (3) the weighted average price per share paid by existing stockholders would decrease to \$13.27 per share.

Assuming the exercise of all of our outstanding options and warrants as of March 31, 2019, 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	32,517,051	91.6%	\$431,353,238	85.6%	\$ 13.27
New investors	3,000,000	8.4%	\$ 72,720,000	14.4%	\$ 24.24
Total	35,517,051	100.0%	\$504,073,238	100.0%	\$ 14.19

Table of Contents

Except as otherwise indicated, all information in this prospectus is based upon 28,024,052 shares of our common stock (including 66,197 unvested shares of restricted common stock subject to our repurchase right) outstanding as of March 31, 2019, and excludes:

- 3,932,469 shares of our common stock issuable upon exercise of stock options outstanding as of March 31, 2019, having a weighted-average exercise price of \$14.58 per share;
- 485,860 shares of our common stock issuable upon the settlement of outstanding restricted stock units as of March 31, 2019;
- 1,397,566 shares of common stock reserved for future grant or issuance under the 2018 Plan;
- 275,225 shares of common stock reserved for future grant or issuance under the 2018 ESPP;
- 32,064 shares of common stock issuable upon the exercise of outstanding warrants to purchase our common stock outstanding as of March 31, 2019, having an exercise price of \$6.24 per share;
- 16,221 shares of our common stock issuable upon the exercise of outstanding warrants to purchase common stock outstanding as of March 31, 2019, having an exercise price of \$7.84 per share;
- 18,854 shares of our common stock, issuable upon the exercise of outstanding warrants to purchase common stock outstanding as of March 31, 2019, having an exercise price of \$14.85 per share; and
- 7,531 shares of our common stock issuable upon the exercise of outstanding warrants to purchase common stock outstanding as of March 31, 2019, having an exercise price of \$21.24 per share.

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.

Principal stockholders

The following table and footnotes set forth information with respect to the beneficial ownership of our common stock as of March 31, 2019, 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 March 31, 2019.

Our calculation of the percentage of beneficial ownership prior to this offering is based on 28,024,052 shares of common stock outstanding as of March 31, 2019. 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 March 31, 2019 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.

Table of Contents

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	Common stock	Options exercisable within 60 days	Shares beneficially owned prior to the offering		Shares beneficially owned after the offering	
			Aggregate number of shares beneficially owned	%	Aggregate number of shares beneficially owned	%
5% or more stockholders:						
Entities affiliated with ARCH Venture Partners(1)	3,361,568	—	3,361,568	12.0%	10.8%	
Ever Alpha Fund L.P.(2)	3,294,961	—	3,294,961	11.8%	10.6%	
Illumina, Inc.(3)	1,773,530	—	1,773,530	6.3%	5.7%	
Entities affiliated with Tao Capital Partners(4)	1,665,838	—	1,665,838	5.9%	5.9%	
Named executive officers and directors:						
Emily M. Leproust(5)	708,330	331,793	1,040,123	3.7%	3.3%	
James M. Thorburn(6)	—	176,749	176,749	*	*	
Mark Daniels(7)	21,355	104,569	125,924	*	*	
William Banyai(8)	708,330	253,508	961,838	3.4%	3.1%	
Robert Chess(9)	69,822	35,521	105,343	*	*	
Frederick B. Craves(10)	66,771	—	66,771	*	*	
Paul A. Conley	—	—	—	*	*	
Keith Crandell(11)	3,361,568	—	3,361,568	12.0%	10.8%	
Jan Johannessen	—	—	—	*	*	
Xiaoying Mai(11)	—	—	—	*	*	
Robert Ragusa(3)	1,773,530	—	1,773,530	6.3%	5.7%	
All directors and executive officers as a group(12) (15 persons)	7,472,563	1,338,743	8,634,557	29.4%	26.7%	

* Represents beneficial ownership of less than one percent of the outstanding shares of our common stock.

- (1) Based on a Schedule 13G filed by ARCH Venture Fund VII, L.P., or ARCH VII, on February 14, 2019. Consists of (i) 2,407,422 shares held of record by ARCH VII and (ii) 954,146 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.
- (2) Based on a Schedule 13G filed by Ever Alpha Fund L.P. on February 14, 2019. Consists of 3,294,961 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 Zihai, 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.
- (3) Based on a Schedule 13G filed by Illumina, Inc. on April 3, 2019. Consists of 1,773,530 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.

Table of Contents

- (4) Based on a Schedule 13G filed by Tao Invest LLC on February 12, 2019. Consists of (i) 1,218,815 shares held of record by Tao Invest LLC, (ii) 89,880 shares held of record by Tao Invest II LLC, and (iii) 257,143 shares held of record by Tao Invest III LLC. Tao Capital Management LP is the managing member of each of Tao Invest LLC, Tao Invest II LLC and Tao Invest III LLC. 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. Each of Tao Capital Management LP, Tao Capital Management Inc, and Messers Pritzker and Perkovich may be deemed to share voting and dispositive power of the shares held of record by Tao Invest LLC, Tao Invest II LLC and Tao Invest III LLC. The address for each of the entities identified in this footnote is 1 Letterman Drive, Building C, Suite 420, San Francisco, CA 94129.
- (5) Consists of (i) 708,330 shares of common stock and (ii) 331,793 shares issuable upon the exercise of early-exercisable stock options, 188,747 of which would be vested within 60 days after March 31, 2019.
- (6) Consists of 176,749 shares issuable upon the exercise of early-exercisable stock options, 47,869 of which would be vested within 60 days after March 31, 2019.
- (7) Consists of (i) 21,355 shares of common stock and (ii) 104,569 shares issuable upon the exercise of early-exercisable stock options, 48,954 of which would be vested within 60 days after March 31, 2019.
- (8) Consists of (i) 708,330 shares of common stock and (ii) 253,508 shares issuable upon the exercise of early-exercisable stock options, 156,128 of which would be vested within 60 days after March 31, 2019.
- (9) Consists of (i) 69,822 shares of common stock and (ii) 35,521 shares issuable upon the exercise of early-exercisable stock options, 11,248 of which would be vested within 60 days after March 31, 2019.
- (10) Consists of 66,771 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.
- (11) Xiaoying Mai does not have voting and dispositive power over the shares held of record by Ever Alpha Fund L.P.
- (12) Consists of (i) 7,472,563 shares of common stock and (ii) 1,338,743 shares of common stock that may be acquired pursuant to the exercise of stock options within 60 days after March 31, 2019.

Description of capital stock

General

Our authorized capital stock consists of 100,000,000 shares of common stock, \$0.00001 par value per share, and 10,000,000 shares of preferred stock, \$0.00001 par value per share, all of which preferred stock will be undesignated. The following information is intended as a summary only and is qualified in its entirety by reference to our amended and restated certificate of incorporation, and amended and restated bylaws, copies of which are incorporated by reference as exhibits to the registration statement, of which this prospectus forms a part, and to the applicable provisions of Delaware General Corporation Law.

Common stock

As of March 31, 2019, we had 28,024,052 shares of common stock issued and outstanding, held of record by approximately 231 stockholders of record. Based on shares outstanding as of March 31, 2019, upon completion of this offering, there will be 31,024,052 shares of our common stock outstanding.

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 amended and restated 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

Our board of directors has the authority, without further action by the stockholders, to issue up to 10,000,000 shares of preferred stock, \$0.00001 par value per share, in one or more series. The board of directors also has 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 our initial public offering, no shares of convertible preferred stock are outstanding. We currently have no plans to issue any shares of convertible preferred stock.

Warrants

As of March 31, 2019, we had warrants outstanding to purchase 74,670 shares of our common stock at exercise prices ranging from approximately \$6.24 to \$21.24 per share. Each outstanding warrant contains provisions for

Table of Contents

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 March 31, 2019, we had outstanding options to purchase 3,932,469 shares of our common stock under our 2018 Plan and 1,397,566 shares remained available for future awards.

Registration rights

Based on the number of shares outstanding as of March 31, 2019, under our amended and restated registration rights agreement, the holders of up to approximately 11.9 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 our initial public 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 March 31, 2019, the holders of approximately million shares of our common stock (on an as-converted basis), or their transferees, are entitled to certain demand registration rights. 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.

[Table of Contents](#)

Form S-3 registration rights

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 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 has 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 provides 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 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 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

[Table of Contents](#)

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

Our board of directors is divided into three classes, one class of which is elected each year by our stockholders. The directors in each class serve three-year terms. For more information on the classified board, see "Directors, executive officers and corporate governance" in our 2018 Annual Report. A third party may be discouraged from making a tender offer or otherwise attempting to obtain control of us as it is 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 do not provide for 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 requires 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 certain provisions of our bylaws also requires 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

Table of Contents

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.

Our amended and restated certificate of incorporation 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, any action or proceeding asserting a claim as to which the Delaware General Corporation Law confers jurisdiction upon the Court of Chancery of the State of Delaware or any action asserting a claim against us that is governed by the internal affairs doctrine, subject in each case to the Court of Chancery having personal jurisdiction over the parties named as defendants therein. Our amended and restated certificate of incorporation further provides that the federal district courts of the United States will be the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act. Although our amended and restated certificate of incorporation contains the choice of forum provision described above, it is possible that a court could find that such a provision is inapplicable for a particular claim or action or that such provision is unenforceable.

Transfer agent and registrar

The transfer agent and registrar for our common stock is American Stock Transfer & Trust Company, LLC. The transfer agent and registrar's address is 6201 15th Avenue, Brooklyn, NY 11219, and its telephone number is (718) 921-8124.

Listing

Our common stock is listed on the Nasdaq Global Select Market under the trading symbol "TWST."

Shares eligible for future sale

Prior to our initial public offering, there was no 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 March 31, 2019, when this offering is complete, we will have an aggregate of 31,024,052 shares of common stock outstanding, assuming no exercise of outstanding options or warrants and no exercise of the underwriters' option to purchase additional shares.

Of the outstanding shares, all of the 3,000,000 shares sold in this offering will be freely tradable, and the 5,750,000 shares sold in our initial public offering, as well as any shares sold in this offering upon exercise of the underwriters' option to purchase additional shares, are freely tradable in the public market without restriction or further registration under the Securities Act of 1933, as amended, or the Securities Act, unless the shares are held by any of our "affiliates" as such term is defined in Rule 144 of the Securities Act. All remaining shares of common stock held by existing stockholders immediately prior to the completion of this offering will be "restricted securities" as such term is defined in Rule 144. These restricted securities were issued and sold by us in private transactions and are eligible for public sale only if registered under the Securities Act or if they qualify for an exemption from registration under the Securities Act, including the exemptions provided by Rule 144 or Rule 701, which rules are summarized below.

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 90 days from the date of this prospectus, subject to certain exceptions. These agreements, and the exceptions thereto, are described beginning on page 48 of this prospectus in the section titled "Underwriting."

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-

Table of Contents

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 310,240 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 Select 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 March 31, 2019, 2,936,088 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.

Registration rights

The holders of an aggregate of approximately 11.9 million shares of our common stock, or their transferees, are 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 tradable 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 the 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;
- brokers or 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 owner and the activities of the partnership or entity.

[Table of Contents](#)

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

In the future, if we make any distributions on shares of our common stock, 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

Table of Contents

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 the 30% 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 certain 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 fair market value of our "U.S. real property interests" comprised at least half of the fair market 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

Table of Contents

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 in connection with the failure 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. While withholding under FATCA would have applied also, 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

[Table of Contents](#)

Treasury regulations are issued, recently proposed Treasury regulations eliminate FATCA withholding on payments of gross proceeds entirely and limit FATCA withholding on these “pass-thru” payments to those payments made two years after the date on which applicable final Treasury regulations are issued. Taxpayers generally may rely on these proposed Treasury regulations until 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.

[Table of Contents](#)

Underwriting

We are offering the shares of common stock described in this prospectus through a number of underwriters. J.P. Morgan Securities LLC, Cowen and Company, LLC and Evercore Group L.L.C. 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	
Evercore Group L.L.C.	
Robert W. Baird & Co. Incorporated	
Total	3,000,000

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 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. 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 450,000 additional shares of common stock from us. 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

Table of Contents

approximately \$1.0 million. 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 \$40,000).

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 90 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 certain 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 90 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;

Table of Contents

- 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.

Table of Contents

We have agreed to indemnify the underwriters against certain liabilities, including liabilities under the Securities Act.

Our common stock is listed on the Nasdaq Global Select 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 Select Market, in the over-the-counter market or otherwise.

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.

[Table of Contents](#)

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.

[Table of Contents](#)

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.

Table of Contents

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,

Table of Contents

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,

Table of Contents

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.

Table of Contents

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 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.

[Table of Contents](#)

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 38,041 shares of our common stock.

Experts

The financial statements incorporated in this Prospectus by reference to the Annual Report on Form 10-K for the year ended September 30, 2018 have been so incorporated in reliance on the report 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 or incorporated by reference 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 and the documents incorporated by reference herein. 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. The Securities and Exchange Commission 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.

We are 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 at the website of the Securities and Exchange Commission referred to above.

Incorporation of certain information by reference

The SEC allows us to “incorporate by reference” information from other documents that we file with it, which means that we can disclose important information to you by referring you to those documents. The information incorporated by reference is considered to be part of this prospectus. Information in this prospectus supersedes information incorporated by reference that we filed with the SEC prior to the date of this prospectus.

We incorporate by reference into this prospectus and the registration statement of which this prospectus is a part the information or documents listed below that we have filed with the SEC:

- our Annual Report on Form 10-K for the year ended September 30, 2018, filed with the SEC on December 20, 2018;
- our Quarterly Reports on Form 10-Q for the quarters ended December 31, 2018 and March 31, 2019, filed with the SEC on February 11, 2019 and May 2, 2019, respectively; and
- our Current Reports on Form 8-K filed with the SEC on November 7, 2018, November 21, 2018 and February 7, 2019.

We will furnish without charge to you, on written or oral request, a copy of any or all of the documents incorporated by reference, including exhibits to these documents. You should direct any requests for documents to Twist Bioscience Corp., 455 Mission Bay Boulevard South, Suite 545, San Francisco, CA 94158. Copies of the above reports may also be accessed on the SEC's website at www.sec.gov or our web site at <http://www.twistbioscience.com>.

Any statement contained in a document incorporated or deemed to be incorporated by reference in this prospectus will be deemed modified, superseded or replaced for purposes of this prospectus to the extent that a statement contained in this prospectus modifies, supersedes or replaces such statement. 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 this prospectus modifies, supersedes or replaces such statement.

3,000,000 shares



Common stock

Prospectus

Joint book running managers

J.P. Morgan

Cowen

Evercore ISI

Lead manager

Baird

, 2019

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, the FINRA filing fee and the Nasdaq Global Select Market listing fee.

	<u>Amount to be paid</u>
Securities and Exchange Commission registration fee	10,421
FINRA filing fee	13,396
Printing and engraving expenses	200,000
Legal fees and expenses	325,000
Accounting fees and expenses	450,000
Transfer Agent and Registrar fees	5,000
Miscellaneous fees and expenses	19,364
Total	\$ 1,023,181

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 September 30, 2018, we issued stock options to certain of our service providers, executive officers and directors to purchase an aggregate of 3,155,503 shares of the Company's common stock under the 2013 Plan, with exercise prices ranging from \$0.00001 to \$11.89 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.

Table of Contents

- On May 23, 2016, we issued an aggregate of 320,776 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 \$5.95 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 2,491,483 shares of our Series C convertible preferred stock at a purchase price of \$14.85 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 64,127 shares of our common stock and 26,385 shares of our Series C and D convertible preferred stock, with exercise prices ranging from approximately \$6.24 per share to \$21.2446 per share. An additional warrant to purchase 64,126 shares of common stock at an exercise price of \$6.24 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 403,009 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 10,326,454 shares of our Series D convertible preferred stock at a purchase price of \$21.24 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 believe 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.

[Table of Contents](#)

Item 16. Exhibits and financial statement schedules

(a) *Exhibits.*

Exhibit Number	Description	Filed / furnished / incorporated by reference from Form	Incorporated by reference from exhibit number	Date filed
1.1	Form of Underwriting Agreement.	Filed herewith		
3.1	Amended and Restated Certificate of Incorporation.	8-K	3.1	11/7/2018
3.2	Amended and Restated Bylaws.	8-K	3.2	11/7/2018
4.1	Form of common stock certificate.	S-1/A	4.1	10/17/2018
4.2	Reserved.			
4.3	Amended and Restated Registration Rights Agreement by and among Twist Bioscience Corporation and certain holders of its capital stock dated March 19, 2018.	S-1/A	4.3	10/17/2018
4.4	Warrant to Purchase Stock by and between Twist Bioscience Corporation and Silicon Valley Bank, dated October 8, 2013.	S-1	4.4	10/3/2018
4.5	Warrant to Purchase Stock by and between Twist Bioscience Corporation and Silicon Valley Bank, dated September 2, 2014.	S-1	4.5	10/3/2018
4.6	Warrant to Purchase Stock by and between Twist Bioscience Corporation and Silicon Valley Bank, dated December 22, 2015.	S-1	4.6	10/3/2018
4.7	Warrant to Purchase Stock by and between Twist Bioscience Corporation and Silicon Valley Bank, dated March 28, 2016.	S-1	4.7	10/3/2018
4.8	Warrant to Purchase Common Stock by and between Twist Bioscience Corporation and Life Science Loans II, LLC, dated September 6, 2017.	S-1	4.8	10/3/2018
4.9	Warrant to Purchase Common Stock by and between Twist Bioscience Corporation and Silicon Valley Bank, dated September 6, 2017.	S-1	4.9	10/3/2018
5.1	Opinion of Orrick, Herrington & Sutcliffe LLP.	Filed herewith		
10.1+	2013 Stock Plan and forms of agreement thereunder.	S-1	10.1	10/3/2018
10.2+	2018 Equity Incentive Plan and forms of agreement thereunder.	S-1/A	10.2	10/17/2018
10.3+	2018 Employee Stock Purchase Plan.	S-1/A	10.3	10/17/2018

[Table of Contents](#)

Exhibit Number	Description	Filed / furnished / incorporated by reference from Form	Incorporated by reference from exhibit number	Date filed
10.4+	Executive Incentive Bonus Plan.	S-1	10.4	10/3/2018
10.5+	Amended and Restated Employment Agreement by and between Twist Bioscience Corporation and Emily M. Leproust.	S-1/A	10.5	10/26/2018
10.6+	Amended and Restated Employment Agreement by and between Twist Bioscience Corporation and James Thorburn.	S-1/A	10.6	10/26/2018
10.7+	Amended and Restated Employment Agreement by and between Twist Bioscience Corporation and Mark Daniels.	S-1/A	10.7	10/26/2018
10.8+	Form of Indemnification Agreement between Twist Bioscience Corporation and each of its Officers and Directors.	S-1/A	10.8	10/17/2018
10.9	Fourth Amended and Restated Loan and Security Agreement by and between Twist Bioscience Corporation, Silicon Valley Bank and certain other co-borrowers, dated September 6, 2017.	S-1	10.9	10/3/2018
10.10	Lease Agreement by and between Twist Bioscience Corporation and ARE-San Francisco No. 19, LLC, dated July 26, 2013.	S-1	10.10	10/3/2018
10.10.1	First Amendment to Lease by and between Twist Bioscience Corporation and ARE-San Francisco No. 19, LLC, dated August 7, 2013.	S-1	10.10.1	10/3/2018
10.10.2	Second Amendment to Lease by and between Twist Bioscience Corporation and ARE-San Francisco No. 19, LLC, dated May 19, 2015.	S-1	10.10.2	10/3/2018
10.10.3	Third Amendment to Lease by and between Twist Bioscience Corporation and ARE-San Francisco No. 19, LLC, dated September 23, 2015.	S-1	10.10.3	10/3/2018
10.10.4	Fourth Amendment to Lease by and between Twist Bioscience Corporation and ARE-San Francisco No. 19, LLC, dated January 6, 2016.	S-1	10.10.4	10/3/2018
10.10.5	Fifth Amendment to Lease by and between Twist Bioscience Corporation and ARE-San Francisco No. 19, LLC, dated April 12, 2016.	S-1	10.10.5	10/3/2018
10.10.6	Sixth Amendment to Lease by and between Twist Bioscience Corporation and ARE-San Francisco No. 19, LLC, dated February 8, 2019.	10-Q	10.1	5/1/2019

[Table of Contents](#)

Exhibit Number	Description	Filed / furnished / incorporated by reference from Form	Incorporated by reference from exhibit number	Date filed
10.11	Lease Agreement by and between Twist Bioscience Corporation and ARE-San Francisco No. 32, LLC dated March 21, 2018.	S-1	10.11	10/3/2018
10.11.1	First Amendment to Lease by and between Twist Bioscience Corporation and ARE-San Francisco No. 32, LLC, dated March 21, 2019.	10-Q	10.2	5/1/2019
10.12	Sublease Agreement by and between Twist Bioscience Corporation and Blade Therapeutics, Inc., dated May 25, 2016.	S-1	10.12	10/3/2018
10.13†	Supply Agreement by and between Twist Bioscience Corporation and Ginkgo Bioworks, Inc., dated March 2, 2018.	S-1	10.13	10/3/2018
10.14†	End User Supply Agreement by and between Twist Bioscience Corporation and FUJIFILM Dimatix, Inc., dated November 5, 2015.	S-1	10.14	10/3/2018
21.1	List of subsidiaries of the Registrant.	10-K	21.1	12/20/2018
23.1	Consent of PricewaterhouseCoopers, Independent Registered Public Accounting Firm.	Filed herewith		
23.2	Consent of Orrick, Herrington & Sutcliffe LLP (included in Exhibit 5.1).			
24.1	Power of Attorney (reference is made to the signature page hereto).			

+ Indicates a management contract or compensatory plan.

† Confidential treatment has been granted for certain portions of this exhibit (indicated by asterisks). Such information has been omitted and filed separately with the SEC.

(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

Table of Contents

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.

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 May 6, 2019.

TWIST BIOSCIENCE CORPORATION

By: /s/ Emily M. Leproust

Emily M. Leproust

President, Chief Executive Officer and Director

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 or her 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
<u>/s/ Emily M. Leproust</u> Emily M. Leproust	President, Chief Executive Officer and Director (principal executive officer)	May 6, 2019
<u>/s/ James M. Thorburn</u> James M. Thorburn	Chief Financial Officer (principal financial officer and accounting officer)	May 6, 2019
<u>/s/ William Banyai</u> William Banyai	Director	May 6, 2019
<u>/s/ Robert Chess</u> Robert Chess	Director	May 6, 2019
<u>/s/ Paul A. Conley</u> Paul A. Conley	Director	May 6, 2019
<u>/s/ Keith Crandell</u> Keith Crandell	Director	May 6, 2019

[Table of Contents](#)

Signature	Title	Date
/s/ Frederick Craves Frederick Craves	Director	May 6, 2019
/s/ Jan Johannessen Jan Johannessen	Director	May 6, 2019
/s/ Xiaoying Mai Xiaoying Mai	Director	May 6, 2019
/s/ Robert Ragusa Robert Ragusa	Director	May 6, 2019

TWIST BIOSCIENCE CORPORATION

[●] Shares of Common Stock

Underwriting Agreement

[●], 2019

J. P. Morgan Securities LLC
 Cowen and Company, LLC
 Evercore Group L.L.C.

As Representatives of the
 several Underwriters listed
 in Schedule 1 hereto

c/o J. P. Morgan Securities LLC
 383 Madison Avenue
 New York, New York 10179

c/o Cowen and Company, LLC
 599 Lexington Avenue
 New York, New York 10022

c/o Evercore Group L.L.C.
 55 East 52nd Street
 New York, New York 10055

Ladies and Gentlemen:

Twist Bioscience Corporation, a Delaware corporation (the “Company”), proposes to issue and sell to the several underwriters listed in Schedule 1 hereto (the “Underwriters”), for whom you are acting as representatives (the “Representatives”), an aggregate of [●] shares of common stock, par value \$0.00001 per share (the “Common Stock”), of the Company (the “Underwritten Shares”) and, at the option of the Underwriters, up to an additional [●] shares of Common Stock of the Company (the “Option Shares”). The Underwritten Shares and the Option Shares are herein referred to as the “Shares”. The shares of Common Stock of the Company to be outstanding after giving effect to the sale of the Shares are referred to herein as the “Stock”.

The Company hereby confirms its agreement with the several Underwriters concerning the purchase and sale of the Shares, as follows:

1. Registration Statement. The Company has prepared and filed with the Securities and Exchange Commission (the “Commission”) under the Securities Act of 1933, as amended, and the rules and regulations of the Commission thereunder (collectively, the “Securities Act”), a registration statement on Form S-1 (File No. 333-[●]), including a prospectus, relating to the Shares. Such registration statement, as amended at the time it became effective, including the information, if any, deemed pursuant to Rule 430A, 430B or 430C under the Securities Act to be part of the registration statement at the time of its effectiveness (“Rule 430 Information”), is referred to herein as the “Registration Statement”; and as used herein, the term “Preliminary Prospectus” means each prospectus included in such registration

statement (and any amendments thereto) before effectiveness, any prospectus filed with the Commission pursuant to Rule 424(a) under the Securities Act and the prospectus included in the Registration Statement at the time of its effectiveness that omits Rule 430 Information, and the term "Prospectus" means the prospectus in the form first used (or made available upon request of purchasers pursuant to Rule 173 under the Securities Act) in connection with confirmation of sales of the Shares. If the Company has filed an abbreviated registration statement pursuant to Rule 462(b) under the Securities Act (the "Rule 462 Registration Statement"), then any reference herein to the term "Registration Statement" shall be deemed to include such Rule 462 Registration Statement. Any reference in this underwriting agreement (this "Agreement") to the Registration Statement, any Preliminary Prospectus or the Prospectus shall be deemed to refer to and include the documents incorporated by reference therein pursuant to Item 12 of Form S-1 under the Securities Act, as of the effective date of the Registration Statement or the date of such Preliminary Prospectus or the Prospectus, as the case may be. Capitalized terms used but not defined herein shall have the meanings given to such terms in the Registration Statement and the Prospectus.

At or prior to the Applicable Time (as defined below), the Company had prepared the following information (collectively with the pricing information set forth on Annex A, the "Pricing Disclosure Package"): a Preliminary Prospectus dated [●], 2019 and each "free-writing prospectus" (as defined pursuant to Rule 405 under the Securities Act) listed on Annex A hereto.

"Applicable Time" means [●] [P.M.], New York City time, on [●], 2019.

2. Purchase of the Shares.

(a) The Company agrees to issue and sell the Underwritten Shares to the several Underwriters as provided in this Agreement, and each Underwriter, on the basis of the representations, warranties and agreements set forth herein and subject to the conditions set forth herein, agrees, severally and not jointly, to purchase from the Company the respective number of Underwritten Shares set forth opposite such Underwriter's name in Schedule 1 hereto at a price per share (the "Purchase Price") of \$[●].

In addition, the Company agrees to issue and sell the Option Shares to the several Underwriters as provided in this Agreement, and the Underwriters, on the basis of the representations, warranties and agreements set forth herein and subject to the conditions set forth herein, shall have the option to purchase, severally and not jointly, from the Company the Option Shares at the Purchase Price less an amount per share equal to any dividends or distributions declared by the Company and payable on the Underwritten Shares but not payable on the Option Shares.

If any Option Shares are to be purchased, the number of Option Shares to be purchased by each Underwriter shall be the number of Option Shares which bears the same ratio to the aggregate number of Option Shares being purchased as the number of Underwritten Shares set forth opposite the name of such Underwriter in Schedule 1 hereto (or such number increased as set forth in Section 10 hereof) bears to the aggregate number of Underwritten Shares being purchased from the Company by the several Underwriters, subject, however, to such adjustments to eliminate any fractional Shares as the Representatives in their sole discretion shall make.

The Underwriters may exercise the option to purchase Option Shares at any time in whole, or from time to time in part, on or before the thirtieth day following the date of the Prospectus, by written notice from the Representatives to the Company. Such notice shall set forth the aggregate number of Option Shares as to which the option is being exercised and the date and time when the Option Shares are to

be delivered and paid for, which may be the same date and time as the Closing Date (as hereinafter defined) but shall not be earlier than the Closing Date nor later than the tenth full business day (as hereinafter defined) after the date of such notice (unless such time and date are postponed in accordance with the provisions of Section 10 hereof). Any such notice shall be given at least two business days prior to the date and time of delivery specified therein.

(b) The Company understands that the Underwriters intend to make a public offering of the Shares, and initially to offer the Shares on the terms set forth in the Pricing Disclosure Package. The Company acknowledges and agrees that the Underwriters may offer and sell Shares to or through any affiliate of an Underwriter.

(c) Payment for the Shares shall be made by wire transfer in immediately available funds to the account specified by the Company to the Representatives in the case of the Underwritten Shares, at the offices of Latham & Watkins LLP, counsel for the Underwriters, at 140 Scott Drive, Menlo Park, CA 94025 at [●] A.M., New York City time, on [●], 2019, or at such other time or place on the same or such other date, not later than the fifth business day thereafter, as the Representatives and the Company may agree upon in writing or, in the case of the Option Shares, on the date and at the time and place specified by the Representatives in the written notice of the Underwriters' election to purchase such Option Shares. The time and date of such payment for the Underwritten Shares is referred to herein as the "Closing Date", and the time and date for such payment for the Option Shares, if other than the Closing Date, is herein referred to as the "Additional Closing Date".

Payment for the Shares to be purchased on the Closing Date or the Additional Closing Date, as the case may be, shall be made against delivery to J.P. Morgan Securities LLC for the respective accounts of the several Underwriters of the Shares to be purchased on such date in definitive form registered in such names and in such denominations as J.P. Morgan Securities LLC shall request in writing not later than two full business days prior to the Closing Date or the Additional Closing Date, as the case may be, with any transfer taxes payable in connection with the sale of such Shares duly paid by the Company. Delivery of the Shares shall be made through the facilities of The Depository Trust Company ("DTC") unless the Representatives shall otherwise instruct. The certificates for the Shares will be made available for inspection and packaging by the Representatives at the office of DTC or its designated custodian not later than 1:00 P.M., New York City time, on the business day prior to the Closing Date or the Additional Closing Date, as the case may be.

(d) The Company acknowledges and agrees that the Underwriters are acting solely in the capacity of an arm's length contractual counterparty to the Company with respect to the offering of Shares contemplated hereby (including in connection with determining the terms of the offering) and not as a financial advisor or a fiduciary to, or an agent of, the Company or any other person. Additionally, neither the Representatives nor any other Underwriter is advising the Company or any other person as to any legal, tax, investment, accounting or regulatory matters in any jurisdiction. The Company shall consult with its own advisors concerning such matters and shall be responsible for making its own independent investigation and appraisal of the transactions contemplated hereby, and the Underwriters shall have no responsibility or liability to the Company with respect thereto. Any review by the Underwriters of the Company, the transactions contemplated hereby or other matters relating to such transactions will be performed solely for the benefit of the Underwriters and shall not be on behalf of the Company.

3. Representations and Warranties of the Company. The Company represents and warrants to each Underwriter that:

(a) *Preliminary Prospectus.* No order preventing or suspending the use of any Preliminary Prospectus has been issued by the Commission, and each Preliminary Prospectus included in the Pricing Disclosure Package, at the time of filing thereof, complied in all material respects with the Securities Act, and no Preliminary Prospectus, at the time of filing thereof, contained any untrue statement of a material fact or omitted to state a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; provided that the Company makes no representation or warranty with respect to any statements or omissions made in reliance upon and in conformity with information relating to any Underwriter furnished to the Company in writing by such Underwriter through the Representatives expressly for use in any Preliminary Prospectus, it being understood and agreed that the only such information furnished by any Underwriter consists of the information described as such in Section 7(b) hereof.

(b) *Pricing Disclosure Package.* The Pricing Disclosure Package as of the Applicable Time did not, and as of the Closing Date and as of the Additional Closing Date, as the case may be, will not, contain any untrue statement of a material fact or omit to state a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; provided that the Company makes no representation or warranty with respect to any statements or omissions made in reliance upon and in conformity with information relating to any Underwriter furnished to the Company in writing by such Underwriter through the Representatives expressly for use in such Pricing Disclosure Package, it being understood and agreed that the only such information furnished by any Underwriter consists of the information described as such in Section 7(b) hereof. No statement of material fact included in the Prospectus has been omitted from the Pricing Disclosure Package and no statement of material fact included in the Pricing Disclosure Package that is required to be included in the Prospectus has been omitted therefrom.

(c) *Issuer Free Writing Prospectus.* Other than the Registration Statement, the Preliminary Prospectus and the Prospectus, the Company (including its agents and representatives, other than the Underwriters in their capacity as such) has not prepared, used, authorized, approved or referred to and will not prepare, use, authorize, approve or refer to any “written communication” (as defined in Rule 405 under the Securities Act) that constitutes an offer to sell or solicitation of an offer to buy the Shares (each such communication by the Company or its agents and representatives (other than a communication referred to in clause (i) below) an “Issuer Free Writing Prospectus”) other than (i) any document not constituting a prospectus pursuant to Section 2(a)(10)(a) of the Securities Act or Rule 134 under the Securities Act or (ii) the documents listed on Annex A hereto, each electronic road show and any other written communications approved in writing in advance by the Representatives, such approval not to be unreasonably withheld or delayed. Each such Issuer Free Writing Prospectus, if any, complied in all material respects with the Securities Act, has been or will be (within the time period specified in Rule 433 under the Securities Act) filed in accordance with the Securities Act (to the extent required thereby) and does not conflict with the information contained in the Registration Statement or the Pricing Disclosure Package, and, when taken together with any other Issuer Free Writing Prospectus and the Preliminary Prospectus, in each case, accompanying, or delivered prior to delivery of, such Issuer Free Writing Prospectus, did not, and as of the Closing Date and as of the Additional Closing Date, as the case may be, will not, contain any untrue statement of a material fact or omit to state a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; provided that the Company makes no representation or warranty with respect to any

statements or omissions made in each such Issuer Free Writing Prospectus or Preliminary Prospectus in reliance upon and in conformity with information relating to any Underwriter furnished to the Company in writing by such Underwriter through the Representatives expressly for use in such Issuer Free Writing Prospectus or Preliminary Prospectus; it being understood and agreed that the only such information furnished by any Underwriter consists of the information described as such in Section 7(b) hereof.

(d) *Emerging Growth Company.* From the time of initial confidential submission of the registration statement relating to the Company's initial public offering to the Commission (or, if earlier, the first date on which the Company engaged directly or through any person authorized to act on its behalf in any Testing-the-Waters Communication (as defined below)) through the date hereof, the Company has been and is an "emerging growth company," as defined in Section 2(a) of the Securities Act (an "Emerging Growth Company"). "Testing-the-Waters Communication" means any oral or written communication with potential investors undertaken in reliance on Section 5(d) of the Securities Act.

(e) *Testing-the-Waters Materials.* The Company (i) has not alone engaged in any Testing-the-Waters Communications other than Testing-the-Waters Communications with the consent of the Representatives with entities that are qualified institutional buyers within the meaning of Rule 144A under the Securities Act or institutions that are accredited investors within the meaning of Rule 501 under the Securities Act and (ii) has not authorized anyone other than the Representatives to engage in Testing-the-Waters Communications, in each case in connection with the offering of the Shares. The Company reconfirms that the Representatives have been authorized to act on its behalf in undertaking Testing-the-Waters Communications. The Company has not distributed or approved for distribution any Written Testing-the-Waters Communications other than those listed on Annex B hereto. "Written Testing-the-Waters Communication" means any Testing-the-Waters Communication that is a written communication within the meaning of Rule 405 under the Securities Act. Any individual Written Testing-the-Waters Communication does not conflict with the information contained in the Registration Statement or the Pricing Disclosure Package, complied in all material respects with the Securities Act, and when taken together with the Pricing Disclosure Package as of the Applicable Time, did not, and as of the Closing Date and as of the Additional Closing Date, as the case may be, will not, contain any untrue statement of a material fact or omit to state a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading.

(f) *Registration Statement and Prospectus.* The Registration Statement has been declared effective by the Commission. No order suspending the effectiveness of the Registration Statement has been issued by the Commission, and no proceeding for that purpose or pursuant to Section 8A of the Securities Act against the Company or related to the offering of the Shares has been initiated or, to the knowledge of the Company, threatened by the Commission; as of the applicable effective date of the Registration Statement and any post-effective amendment thereto, the Registration Statement and any such post-effective amendment complied and will comply in all material respects with the applicable requirements of the Securities Act, and did not and will not contain any untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary in order to make the statements therein not misleading; and as of the date of the Prospectus and any amendment or supplement thereto and as of the Closing Date and as of the Additional Closing Date, as the case may be, the Prospectus complied and will comply in all material respects with the Securities Act and will not contain any untrue statement of a

material fact or omit to state a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; provided that the Company makes no representation or warranty with respect to any statements or omissions made in reliance upon and in conformity with information relating to any Underwriter furnished to the Company in writing by such Underwriter through the Representatives expressly for use in the Registration Statement and the Prospectus and any amendment or supplement thereto, it being understood and agreed that the only such information furnished by any Underwriter consists of the information described as such in Section 7(b) hereof.

(g) *Incorporated Documents.* The documents incorporated by reference in the Registration Statement, the Prospectus and the Pricing Disclosure Package, when they were filed with the Commission conformed in all material respects to the requirements of the Securities Exchange Act of 1934, as amended (the “Exchange Act”), and none of such documents contained any untrue statement of a material fact or omitted to state a material fact necessary to make the statements therein, in the light of the circumstances under which they were made, not misleading.

(h) *Financial Statements.* The financial statements (including the related notes thereto) of the Company and its consolidated subsidiaries included or incorporated by reference in the Registration Statement, the Pricing Disclosure Package and the Prospectus comply in all material respects with the applicable requirements of the Securities Act and the Exchange Act, as applicable, and present fairly, in all material respects, the financial position of the Company and its consolidated subsidiaries as of the dates indicated and the results of their operations and the changes in their cash flows for the periods specified; such financial statements have been prepared in conformity with generally accepted accounting principles (“GAAP”) in the United States applied on a consistent basis throughout the periods covered thereby, and any supporting schedules included or incorporated by reference in the Registration Statement present fairly, in all material respects, the information required to be stated therein; and the other financial information included or incorporated by reference in the Registration Statement, the Pricing Disclosure Package and the Prospectus has been derived from the accounting records of the Company and its consolidated subsidiaries and presents fairly, in all material respects, the information shown thereby; and the *pro forma* financial information and the related notes thereto included or incorporated by reference in the Registration Statement, the Pricing Disclosure Package and the Prospectus have been prepared in accordance with the applicable requirements of the Securities Act and the Exchange Act, as applicable, and the assumptions underlying such *pro forma* financial information are reasonable and are set forth in the Registration Statement, the Pricing Disclosure Package and the Prospectus. All disclosures contained or incorporated by reference in the Registration Statement, the Pricing Disclosure Package and the Prospectus regarding “non-GAAP financial measures” (as such term is defined by the rules and regulations of the Commission) comply with Regulation G of the Exchange Act and Item 10 of Regulation S-K of the Securities Act, to the extent applicable.

(i) *No Material Adverse Change.* Since the date of the most recent financial statements of the Company included or incorporated by reference in the Registration Statement, the Pricing Disclosure Package and the Prospectus, (i) there has not been any change in the capital stock (other than the issuance of shares of Common Stock upon exercise of stock options and warrants described as outstanding in, and the grant of options and awards under existing equity incentive plans described in, the Registration Statement, the Pricing Disclosure Package and the Prospectus), short-term debt or long-term debt of the Company or any of its subsidiaries, or any dividend or distribution of any kind declared, set aside for payment, paid or made by the

Company on any class of capital stock, or any material adverse change, or any development that would reasonably be expected to result in a prospective material adverse change, in or affecting the business, properties, management, financial position, stockholders' equity, results of operations or prospects of the Company and its subsidiaries taken as a whole; (ii) neither the Company nor any of its subsidiaries has entered into any transaction or agreement (whether or not in the ordinary course of business) that is material to the Company and its subsidiaries taken as a whole or incurred any liability or obligation, direct or contingent, that is material to the Company and its subsidiaries taken as a whole; and (iii) neither the Company nor any of its subsidiaries has sustained any loss or interference with its business that is material to the Company and its subsidiaries taken as a whole and that is either from fire, explosion, flood or other calamity, whether or not covered by insurance, or from any labor disturbance or dispute or any action, order or decree of any court or arbitrator or governmental or regulatory authority, except in each case as otherwise disclosed in the Registration Statement, the Pricing Disclosure Package and the Prospectus.

(j) *Organization and Good Standing.* The Company and each of its subsidiaries have been duly organized and are validly existing and in good standing under the laws of their respective jurisdictions of organization, are duly qualified to do business and are in good standing in each jurisdiction in which their respective ownership or lease of property or the conduct of their respective businesses requires such qualification, and have all power and authority necessary to own or hold their respective properties and to conduct the businesses in which they are engaged, except where the failure to be so qualified or in good standing or have such power or authority would not, individually or in the aggregate, reasonably be expected to have a material adverse effect on the business, properties, management, financial position, stockholders' equity, results of operations or prospects of the Company and its subsidiaries taken as a whole or on the performance by the Company of its obligations under this Agreement (a "Material Adverse Effect"). The Company does not own or control, directly or indirectly, any corporation, association or other entity other than the subsidiaries listed in Exhibit 21 to the Registration Statement.

(k) *Capitalization.* The Company has an authorized capitalization as set forth in the Registration Statement, the Pricing Disclosure Package and the Prospectus under the heading "Capitalization" and "Description of capital stock" (except for subsequent issuances, if any, pursuant to this Agreement, pursuant to reservations, agreements, or Company Stock Plans (as defined below), or pursuant to the exercise of convertible securities or options referred to in the Prospectus); all the outstanding shares of capital stock of the Company have been duly and validly authorized and issued and are fully paid and non-assessable and are not subject to any pre-emptive or similar rights; except as described in or expressly contemplated by the Pricing Disclosure Package and the Prospectus, there are no outstanding rights (including, without limitation, pre-emptive rights that have not been duly waived or satisfied), warrants or options to acquire, or instruments convertible into or exchangeable for, any shares of capital stock or other equity interest in the Company or any of its subsidiaries, or any contract, commitment, agreement, understanding or arrangement of any kind relating to the issuance of any capital stock of the Company or any such subsidiary, any such convertible or exchangeable securities or any such rights, warrants or options; the capital stock of the Company conforms in all material respects to the description thereof contained in the Registration Statement, the Pricing Disclosure Package and the Prospectus; and all the outstanding shares of capital stock or other equity interests of each subsidiary owned, directly or indirectly, by the Company have been duly and validly authorized and issued, are fully paid and non-assessable (except, in the case of any foreign

subsidiary, for directors' qualifying shares) and are owned directly or indirectly by the Company, free and clear of any lien, charge, encumbrance, security interest, restriction on voting or transfer or any other claim of any third party, except as otherwise described in the Registration Statement, the Pricing Disclosure Package and the Prospectus.

(l) *Stock Options.* With respect to the stock options (the "Stock Options") granted pursuant to the stock-based compensation plans of the Company and its subsidiaries (the "Company Stock Plans"), (i) each Stock Option intended to qualify as an "incentive stock option" under Section 422 of the Internal Revenue Code of 1986, as amended (the "Code") so qualifies, (ii) each grant of a Stock Option was duly authorized no later than the date on which the grant of such Stock Option was by its terms to be effective (the "Grant Date") by all necessary corporate action, including, as applicable, approval by the board of directors of the Company (or a duly constituted and authorized committee thereof) and any required stockholder approval by the necessary number of votes or written consents and the award agreement governing such grant (if any) was duly executed and delivered by each party thereto, (iii) each such grant was made in accordance with the terms of the Company Stock Plans, the Exchange Act and the rules and regulations of the Nasdaq Global Select Market (the "Exchange"), and (iv) each such grant was properly accounted for in accordance with GAAP in the financial statements (including the related notes) of the Company and disclosed in the Company's filings with the Commission in accordance with the Exchange Act. Each Company Stock Plan is accurately described in all material respects in the Registration Statement, the Pricing Disclosure Package and the Prospectus. The Company has not knowingly granted, and there is no and has been no policy or practice of the Company of granting, Stock Options prior to, or otherwise coordinating the grant of Stock Options with, the release or other public announcement of material information regarding the Company or its subsidiaries or their results of operations or prospects.

(m) *Due Authorization.* The Company has full right, power and authority to execute and deliver this Agreement and to perform its obligations hereunder; and all action required to be taken for the due and proper authorization, execution and delivery by it of this Agreement and the consummation by it of the transactions contemplated hereby has been duly and validly taken.

(n) *Underwriting Agreement.* This Agreement has been duly authorized, executed and delivered by the Company.

(o) *The Shares.* The Shares to be issued and sold by the Company hereunder have been duly authorized by the Company and, when issued and delivered and paid for as provided herein, will be duly and validly issued, will be fully paid and nonassessable and will conform to the descriptions thereof in the Registration Statement, the Pricing Disclosure Package and the Prospectus. The issuance of the Shares is not subject to any preemptive or other similar rights to purchase or subscribe for any securities of the Company.

(p) *Listing.* The Shares have been approved for listing on the Exchange, subject to notice of issuance.

(q) *Description of the Underwriting Agreement.* This Agreement conforms in all material respects to the description thereof contained in the Registration Statement, the Pricing Disclosure Package and the Prospectus.

(r) *No Violation or Default.* Neither the Company nor any of its subsidiaries is (i) in violation of its charter or by-laws or similar organizational documents; (ii) in default, and no event has occurred that, with notice or lapse of time or both, would constitute such a default, in the due performance or observance of any term, covenant or condition contained in any indenture, mortgage, deed of trust, loan agreement or other agreement or instrument to which the Company or any of its subsidiaries is a party or by which the Company or any of its subsidiaries is bound or to which any property or asset of the Company or any of its subsidiaries is subject; or (iii) in violation of any law or statute or any judgment, order, rule or regulation of any court or arbitrator or governmental or regulatory authority, except, in the case of clauses (ii) and (iii) above, for any such default or violation that would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect.

(s) *No Conflicts.* The execution, delivery and performance by the Company of this Agreement, the issuance and sale of the Shares and the consummation of the transactions contemplated by this Agreement or the Pricing Disclosure Package and the Prospectus will not (i) conflict with or result in a breach or violation of any of the terms or provisions of, or constitute a default under, result in the termination, modification or acceleration of, or result in the creation or imposition of any lien, charge or encumbrance upon any property, right or asset of the Company or any of its subsidiaries pursuant to, any indenture, mortgage, deed of trust, loan agreement or other agreement or instrument to which the Company or any of its subsidiaries is a party or by which the Company or any of its subsidiaries is bound or to which any property, right or asset of the Company or any of its subsidiaries is subject, (ii) result in any violation of the provisions of the charter or by-laws or similar organizational documents of the Company or any of its subsidiaries or (iii) result in the violation of any law or statute or any judgment, order, rule or regulation of any court or arbitrator or governmental or regulatory authority, except, in the case of clauses (i) and (iii) above, for any such conflict, breach, violation, default, lien, charge or encumbrance that would not, individually or in the aggregate, have a Material Adverse Effect.

(t) *No Integration.* Neither the Company nor any of its affiliates has, prior to the date hereof, made any offer or sale of any securities that would be integrated with the offer and sale of the Shares contemplated by this Agreement pursuant to the Securities Act or the interpretations thereof by the Commission.

(u) *No Consents Required.* No consent, filing, approval, authorization, order, license, registration or qualification of or with any court or arbitrator or governmental or regulatory authority is required for the execution, delivery and performance by the Company of this Agreement, the issuance and sale of the Shares by the Company and the consummation by the Company of the transactions contemplated by this Agreement, except for (i) the registration of the Shares under the Securities Act, (ii) such consents, approvals, authorizations, orders and registrations or qualifications as may be required by the Exchange and under applicable state securities laws in connection with the purchase and distribution of the Shares by the Underwriters and (iii) those that have already been obtained.

(v) *Legal Proceedings.* Except as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus, there are no legal, governmental or regulatory investigations, actions, demands, claims, suits, arbitrations, inquiries or proceedings (“Actions”) pending to which the Company or any of its subsidiaries is a party or to which any property of the Company or any of its subsidiaries is the subject that, individually or in the aggregate, if determined adversely to the Company or any of its subsidiaries, could reasonably be expected to

have a Material Adverse Effect or have a Material Adverse Effect on the power or ability of the Company to perform its obligations under this Agreement or to consummate the transactions contemplated hereby; no such Actions are, to the knowledge of the Company, threatened or contemplated by any governmental or regulatory authority or threatened by others ; and (i) there are no current or pending Actions that are required under the Securities Act to be described in the Registration Statement, the Pricing Disclosure Package or the Prospectus that are not so described in the Registration Statement, the Pricing Disclosure Package and the Prospectus and (ii) there are no statutes, regulations or contracts or other documents that are required under the Securities Act to be filed as exhibits to the Registration Statement or described in the Registration Statement, the Pricing Disclosure Package or the Prospectus that are not so filed as exhibits to the Registration Statement or described in the Registration Statement, the Pricing Disclosure Package and the Prospectus.

(w) *Independent Accountants*. PricewaterhouseCoopers LLP, who have certified certain financial statements of the Company and its subsidiaries, is an independent registered public accounting firm with respect to the Company and its subsidiaries within the applicable rules and regulations adopted by the Commission and the Public Company Accounting Oversight Board (United States) and as required by the Securities Act.

(x) *Title to Real and Personal Property*. The Company and its subsidiaries have good and marketable title to, or have valid rights to lease or otherwise use, all items of real and personal property that are material to the respective businesses of the Company and its subsidiaries, in each case free and clear of all liens, encumbrances, claims and defects and imperfections of title except those that (i) do not materially interfere with the use made and proposed to be made of such property by the Company and its subsidiaries or (ii) could not reasonably be expected, individually or in the aggregate, to have a Material Adverse Effect.

(y) *Intellectual Property*. Except as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus, the Company and its subsidiaries own, or have obtained valid and enforceable licenses for, or other rights to use on reasonable terms, the inventions, patent applications, patents, trademarks (both registered and unregistered), trade names, copyrights, know-how (including trade secrets, and other unpatented and/or unpatentable proprietary information), software, domain names and other intellectual property rights, including registrations and applications for registration thereof (collectively, the "Intellectual Property") described in the Registration Statement, the Pricing Disclosure Package and the Prospectus as being owned or licensed by them; to the Company's knowledge and except as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus, the Company and its subsidiaries own, or have obtained valid and enforceable licenses for, or other rights to use, all Intellectual Property used in, or necessary for the conduct of, their respective businesses as currently conducted or as proposed to be conducted and as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus; except as disclosed in the Registration Statement, the Pricing Disclosure Package and the Prospectus, there is no pending or, to the knowledge of the Company, threatened action, suit, proceeding or claim by others that the Company infringes, misappropriates or otherwise violates, or would, upon the commercialization of any product or service described in the Registration Statement, the Pricing Disclosure Package or the Prospectus, infringe or otherwise misappropriate or violate, any Intellectual Property rights of others, and the Company is unaware of any facts which could form a reasonable basis for any successful claim; and none of the technology employed by the Company has been obtained or is being used by the Company in violation of any contractual obligation binding on the Company or, to the Company's knowledge, upon any of its

officers, directors or employees, and the Company is not aware of any facts that it believes would form a reasonable basis for a successful challenge that any of its employees are in or have ever been in violation of any term of any employment contract, patent disclosure agreement, invention assignment agreement, non-competition agreement, non-solicitation agreement, nondisclosure agreement or any restrictive covenant to or with a former employer where such violation relates to such employee's breach of a confidentiality obligation, obligation to assign to the Company Intellectual Property, or obligation not to use third party Intellectual Property or other proprietary rights on behalf of the Company. To the Company's knowledge, there are no third parties who have established rights to any Intellectual Property described in the Registration Statement, the Pricing Disclosure Package and the Prospectus as exclusively owned or exclusively licensed by the Company, except for licenses granted in writing by the Company or its subsidiaries to any third-parties ("Exclusive Intellectual Property"); except as disclosed in the Registration Statement, the Pricing Disclosure Package and the Prospectus, there is no pending or, to the Company's knowledge, threatened action, suit, proceeding or claim by others challenging the Company's ownership or rights in or to any Exclusive Intellectual Property, and the Company is unaware of any facts which would form a reasonable basis for a successful claim; none of the Exclusive Intellectual Property has been adjudged invalid or unenforceable in whole or in part, and there is no pending or, to the Company's knowledge, threatened action, suit, proceeding or claim by others challenging the validity, enforceability or scope of any Exclusive Intellectual Property, and the Company is unaware of any facts which would form a reasonable basis for a successful claim; to the Company's knowledge, there is no patent or patent application that contains claims that dominate, may dominate or interfere (as such term is described in 35 U.S.C. §135 and 37 C.F.R. 41.100 to 41.208) with the issued or pending claims of any of the Intellectual Property; and to the Company's knowledge, there is no prior art material to any patent or patent application of the Exclusive Intellectual Property that may render any U.S. patent held by the Company invalid or any U.S. patent application held by the Company unpatentable has not been disclosed to the U.S. Patent and Trademark Office.

(z) *Regulatory Matters.* The Company has operated and currently is in compliance with all applicable rules and regulations of the FDA, except where the failure to so operate or be in compliance would not reasonably be expected to have a Material Adverse Effect. The Company has operated and currently is in compliance with all applicable rules, regulations and policies of the U.S. Federal Select Agents Program administered by the Centers for Disease Control and Prevention and the Animal and Plant Health Inspection Service, except where the failure to so operate or be in compliance would not reasonably be expected to have a Material Adverse Effect.

(aa) *No Undisclosed Relationships.* No relationship, direct or indirect, exists between or among the Company or any of its subsidiaries, on the one hand, and the directors, officers, stockholders, customers, suppliers or other affiliates of the Company or any of its subsidiaries, on the other, that is required by the Securities Act to be described in each of the Registration Statement and the Prospectus and that is not so described in such documents and in the Pricing Disclosure Package.

(bb) *Investment Company Act.* The Company is not and, after giving effect to the offering and sale of the Shares and the application of the proceeds thereof received by the Company as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus, will not be required to register as an "investment company" or an entity "controlled" by an "investment company" within the meaning of the Investment Company Act of 1940, as amended, and the rules and regulations of the Commission thereunder.

(cc) *Taxes.* The Company and its subsidiaries have paid all federal, state, local and foreign taxes and filed all tax returns required to be paid or filed through the date hereof (after giving effect to any valid extensions with respect to the filing of tax returns), except where the failure to pay or file would not reasonably be expected to have, individually or in the aggregate, a Material Adverse Effect; and except as otherwise disclosed in the Registration Statement, the Pricing Disclosure Package and the Prospectus, there is no tax deficiency that has been, or could reasonably be expected to be, asserted against the Company or any of its subsidiaries or any of their respective properties or assets and which would reasonably be expected to have, individually or in the aggregate, a Material Adverse Effect.

(dd) *Licenses and Permits.* The Company and its subsidiaries possess, all licenses, certificates, permits and other authorizations issued by, and have made all declarations and filings with, the appropriate federal, state, local or foreign governmental or regulatory authorities that are necessary for the ownership or lease of their respective properties or the conduct of their respective businesses as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus, except where the failure to possess or make the same would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect; and except as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus, neither the Company nor any of its subsidiaries has received notice of any revocation or modification of any such license, certificate, permit or authorization or has any reason to believe that any such license, certificate, permit or authorization will not be renewed in the ordinary course. To the Company's knowledge, no party granting any such licenses has taken any action to limit, suspend or revoke the same.

(ee) *No Labor Disputes.* No labor disturbance by or dispute with employees of the Company or any of its subsidiaries exists or, to the knowledge of the Company, is contemplated or threatened, and the Company is not aware of any existing or imminent labor disturbance by, or dispute with, the employees of any of its or its subsidiaries' principal suppliers, contractors or customers, except as would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect.

(ff) *Certain Environmental Matters.* (i) The Company and its subsidiaries (x) are in compliance with all, and have not violated any, applicable federal, state, local and foreign laws, rules, regulations, requirements, decisions, judgments, decrees, orders and the common law relating to pollution or the protection of human health or safety, the environment, natural resources, hazardous or toxic substances or wastes, pollutants or contaminants (collectively, "Environmental Laws"); (y) have received and are in compliance with all permits, licenses, certificates or other authorizations or approvals required of them under any Environmental Laws to conduct their respective businesses; and (z) have not received notice of any actual or potential liability under or relating to, or any actual or potential violation of, any Environmental Laws, including for the investigation or remediation of any disposal or release of hazardous or toxic substances or wastes, pollutants or contaminants, and have no knowledge of any event or condition that would reasonably be expected to result in any such notice, and (ii) there are no costs or liabilities associated with Environmental Laws of or relating to the Company or its subsidiaries, except in the case of each of (i) and (ii) above, for any such matter as would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect; and (iii) except as described in each of the Pricing Disclosure Package and the Prospectus, (x) there is no proceeding that is pending, or that is known to be contemplated, against the Company or any of its subsidiaries under any Environmental Laws in which a governmental entity is also a party,

other than such proceeding regarding which it is reasonably believed no monetary sanctions of \$100,000 or more will be imposed, (y) the Company and its subsidiaries are not aware of any facts or issues regarding compliance with Environmental Laws, or liabilities or other obligations under Environmental Laws or concerning hazardous or toxic substances or wastes, pollutants or contaminants, that could reasonably be expected to have a material effect on the capital expenditures, earnings or competitive position of the Company and its subsidiaries, and (z) none of the Company or its subsidiaries anticipates material capital expenditures relating to any Environmental Laws.

(gg) *Compliance with ERISA.* (i) Each employee benefit plan, within the meaning of Section 3(3) of the Employee Retirement Income Security Act of 1974, as amended (“ERISA”), for which the Company or any member of its “Controlled Group” (defined as any entity, whether or not incorporated, that is under common control with the Company within the meaning of Section 4001(a)(14) of ERISA or any entity that would be regarded as a single employer with the Company under Section 414(b),(c),(m) or (o) of the Code) would have any liability (each, a “Plan”) has been maintained in compliance with its terms and the requirements of any applicable statutes, orders, rules and regulations, including but not limited to ERISA and the Code; (ii) no prohibited transaction, within the meaning of Section 406 of ERISA or Section 4975 of the Code, has occurred with respect to any Plan, excluding transactions effected pursuant to a statutory or administrative exemption; (iii) for each Plan that is subject to the funding rules of Section 412 of the Code or Section 302 of ERISA, no Plan has failed (whether or not waived), or is reasonably expected to fail, to satisfy the minimum funding standards (within the meaning of Section 302 of ERISA or Section 412 of the Code) applicable to such Plan; (iv) no Plan is, or is reasonably expected to be, in “at risk status” (within the meaning of Section 303(i) of ERISA) and no Plan that is a “multiemployer plan” within the meaning of Section 4001(a)(3) of ERISA is in “endangered status” or “critical status” (within the meaning of Sections 304 and 305 of ERISA); (v) the fair market value of the assets of each Plan exceeds the present value of all benefits accrued under such Plan (determined based on those assumptions used to fund such Plan); (vi) no “reportable event” (within the meaning of Section 4043(c) of ERISA and the regulations promulgated thereunder) has occurred or is reasonably expected to occur; (vii) each Plan that is intended to be qualified under Section 401(a) of the Code is so qualified, and nothing has occurred, whether by action or by failure to act, which would cause the loss of such qualification; (viii) neither the Company nor any member of the Controlled Group has incurred, nor reasonably expects to incur, any liability under Title IV of ERISA (other than contributions to the Plan or premiums to the Pension Benefit Guarantee Corporation, in the ordinary course and without default) in respect of a Plan (including a “multiemployer plan” within the meaning of Section 4001(a)(3) of ERISA); and (ix) none of the following events has occurred or is reasonably likely to occur: (A) a material increase in the aggregate amount of contributions required to be made to all Plans by the Company or its Controlled Group affiliates in the current fiscal year of the Company and its Controlled Group affiliates compared to the amount of such contributions made in the Company’s and its Controlled Group affiliates’ most recently completed fiscal year; or (B) a material increase in the Company and its subsidiaries’ “accumulated post-retirement benefit obligations” (within the meaning of Accounting Standards Codification Topic 715-60) compared to the amount of such obligations in the Company and its subsidiaries’ most recently completed fiscal year, except in each case with respect to the events or conditions set forth in (i) through (ix) hereof, as would not, individually or in the aggregate, have a Material Adverse Effect.

(hh) *Disclosure Controls.* The Company (on a consolidated basis with its subsidiaries) maintains an effective system of “disclosure controls and procedures” (as defined in

Rule 13a-15(e) of the Exchange Act) that complies with the applicable requirements of the Exchange Act and that has been designed to ensure that information required to be disclosed by the Company in reports that it files or submits under the Exchange Act is recorded, processed, summarized and reported within the time periods specified in the Commission's rules and forms, including controls and procedures designed to ensure that such information is accumulated and communicated to the Company's management as appropriate to allow timely decisions regarding required disclosure. The Company (on a consolidated basis with its subsidiaries) has carried out evaluations of the effectiveness of its disclosure controls and procedures as required by Rule 13a-15 of the Exchange Act.

(ii) *Accounting Controls.* The Company (on a consolidated basis with its subsidiaries) maintains systems of "internal control over financial reporting" (as defined in Rule 13a-15(f) of the Exchange Act) that comply with the applicable requirements of the Exchange Act and have been designed by, or under the supervision of, their respective principal executive and principal financial officers, or persons performing similar functions, to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with GAAP. The Company and its subsidiaries maintain internal accounting controls sufficient to provide reasonable assurance that (i) transactions are executed in accordance with management's general or specific authorizations; (ii) transactions are recorded as necessary to permit preparation of financial statements in conformity with GAAP and to maintain asset accountability; (iii) access to assets is permitted only in accordance with management's general or specific authorization; (iv) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action is taken with respect to any differences and (v) interactive data in eXtensible Business Reporting Language included or incorporated by reference in the Registration Statement, the Prospectus and the Pricing Disclosure Package fairly presents the information called for in all material respects and is prepared in accordance with the Commission's rules and guidelines applicable thereto . Except as disclosed in the Registration Statement, the Pricing Disclosure Package and the Prospectus, there are no material weaknesses in the Company's internal controls. The Company's auditors and the Audit Committee of the Board of Directors of the Company have been advised of: (i) all significant deficiencies and material weaknesses in the design or operation of internal controls over financial reporting which have adversely affected or are reasonably likely to adversely affect the Company's ability to record, process, summarize and report financial information; and (ii) any fraud, whether or not material, that involves management or other employees who have a significant role in the Company's internal controls over financial reporting.

(jj) *eXtensible Business Reporting Language.* The interactive data in eXtensible Business Reporting Language included or incorporated by reference in the Registration Statement fairly presents the information called for in all material respects and has been prepared in accordance with the Commission's rules and guidelines applicable thereto.

(kk) *Insurance.* The Company and its subsidiaries have insurance covering their respective properties, operations, personnel and businesses, including business interruption insurance, which insurance is in amounts and insures against such losses and risks as are generally maintained by companies engaged in the same or similar businesses and at the same or a similar stage of development, except where the failure to maintain such insurance could not reasonably be expected to have a Material Adverse Effect; and neither the Company nor any of its subsidiaries has (i) received written notice from any insurer or agent of such insurer that capital

improvements or other expenditures are required or necessary to be made in order to continue such insurance or (ii) any reason to believe that it will not be able to renew its existing insurance coverage as and when such coverage expires or to obtain similar coverage at reasonable cost from similar insurers as may be necessary to continue its business.

(ll) *Cybersecurity; Data Protection.* The Company and its subsidiaries' information technology assets and equipment, computers, systems, networks, hardware, software, websites, applications, and databases (collectively, "IT Systems") are commercially reasonably adequate for, and operate and perform in all material respects as required in connection with the operation of the business of the Company and its subsidiaries as currently conducted, and to the Company's knowledge, free and clear of all material bugs, errors, defects, Trojan horses, time bombs, malware and other corruptants. The Company and its subsidiaries have implemented and maintained commercially reasonable controls, policies, procedures, and safeguards to maintain and protect their material confidential information and the integrity, continuous operation, redundancy and security of all material IT Systems and data (including all personal, personally identifiable, sensitive, confidential or regulated data ("Personal Data")) used in connection with their businesses, and to the Company's knowledge there have been no breaches, violations, outages or unauthorized uses of or accesses to same, except for those that have been remedied without material cost or liability or the duty to notify any other person, nor any material incidents under internal review or investigations relating to the same. The Company and its subsidiaries are presently in material compliance with all applicable laws or statutes and all judgments, orders, rules and regulations of any court or arbitrator or governmental or regulatory authority, internal policies and contractual obligations relating to the privacy and security of IT Systems and Personal Data and to the protection of such IT Systems and Personal Data from unauthorized use, access, misappropriation or modification, except as would not, individually or in the aggregate have a Material Adverse Effect.

(mm) *No Unlawful Payments.* Neither the Company nor any of its subsidiaries nor any director, officer or employee of the Company or any of its subsidiaries nor, to the knowledge of the Company, any agent, affiliate or other person associated with or acting on behalf of the Company or any of its subsidiaries has (i) used any corporate funds for any unlawful contribution, gift, entertainment or other unlawful expense relating to political activity; (ii) made or taken an act in furtherance of an offer, promise or authorization of any direct or indirect unlawful payment or benefit to any foreign or domestic government official or employee, including of any government-owned or controlled entity or of a public international organization, or any person acting in an official capacity for or on behalf of any of the foregoing, or any political party or party official or candidate for political office; (iii) violated or is in violation of any provision of the Foreign Corrupt Practices Act of 1977, as amended, or any applicable law or regulation implementing the OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions, or committed an offence under the Bribery Act 2010 of the United Kingdom or any other applicable anti-bribery or anti-corruption law; or (iv) made, offered, agreed, requested or taken an act in furtherance of any unlawful bribe or other unlawful benefit, including, without limitation, any rebate, payoff, influence payment, kickback or other unlawful or improper payment or benefit. The Company and its subsidiaries have instituted, maintained and enforced, and will continue to maintain and enforce policies and procedures designed to promote and ensure compliance with all applicable anti-bribery and anti-corruption laws.

(nn) *Compliance with Anti-Money Laundering Laws.* The operations of the Company and its subsidiaries are and have been conducted at all times in compliance with applicable financial recordkeeping and reporting requirements, including those of the Currency and Foreign Transactions Reporting Act of 1970, as amended, the applicable money laundering statutes of all jurisdictions where the Company or any of its subsidiaries conducts business, the rules and regulations thereunder and any related or similar rules, regulations or guidelines issued, administered or enforced by any governmental agency (collectively, the “Anti-Money Laundering Laws”) and no action, suit or proceeding by or before any court or governmental agency, authority or body or any arbitrator involving the Company or any of its subsidiaries with respect to the Anti-Money Laundering Laws is pending or, to the knowledge of the Company, threatened.

(oo) *No Conflicts with Sanctions Laws.* Neither the Company nor any of its subsidiaries, directors, officers, or employees, nor, to the knowledge of the Company, any agent, affiliate or other person associated with or acting on behalf of the Company or any of its subsidiaries is currently the subject or the target of any sanctions administered or enforced by the U.S. government, (including, without limitation, the Office of Foreign Assets Control of the U.S. Department of the Treasury (“OFAC”) or the U.S. Department of State and including, without limitation, the designation as a “specially designated national” or “blocked person”), the United Nations Security Council (“UNSC”), the European Union, Her Majesty’s Treasury (“HMT”) or other relevant sanctions authority (collectively, “Sanctions”), nor is the Company or any of its subsidiaries located, organized or resident in a country or territory that is the subject or target of Sanctions, including, without limitation, Cuba, Iran, North Korea, Syria and Crimea (each, a “Sanctioned Country”); and the Company will not directly or indirectly use the proceeds of the offering of the Shares hereunder, or lend, contribute or otherwise make available such proceeds to any subsidiary, joint venture partner or other person or entity (i) to fund or facilitate any activities of or business with any person that, at the time of such funding or facilitation, is the subject or target of Sanctions, (ii) to fund or facilitate any activities of or business in any Sanctioned Country or (iii) in any other manner that will result in a violation by any person (including any person participating in the transaction, whether as underwriter, advisor, investor or otherwise) of Sanctions. For the past five years, the Company and its subsidiaries have not knowingly engaged in and are not now knowingly engaged in any dealings or transactions with any person that at the time of the dealing or transaction is or was the subject or the target of Sanctions or with any Sanctioned Country.

(pp) *No Restrictions on Subsidiaries.* Subject to any restrictions under any applicable laws, no subsidiary of the Company is currently prohibited, directly or indirectly, under any agreement or other instrument to which it is a party or is subject, from paying any dividends to the Company, from making any other distribution on such subsidiary’s capital stock, from repaying to the Company any loans or advances to such subsidiary from the Company or from transferring any of such subsidiary’s properties or assets to the Company or any other subsidiary of the Company, except as otherwise described in the Registration Statement, the Pricing Disclosure Package or the Prospectus.

(qq) *No Broker’s Fees.* Neither the Company nor any of its subsidiaries is a party to any contract, agreement or understanding with any person (other than this Agreement) that would give rise to a valid claim against any of them or any Underwriter for a brokerage commission, finder’s fee or like payment in connection with the offering and sale of the Shares.

(rr) *No Registration Rights.* Except as set forth in the Prospectus, the Registration Statement or the Pricing Disclosure Package, no person has the right to require the Company or any of its subsidiaries to register any securities for sale under the Securities Act by reason of the filing of the Registration Statement with the Commission or the issuance and sale of the Shares.

(ss) *No Stabilization.* The Company has not taken, directly or indirectly, any action designed to or that could reasonably be expected to cause or result in any stabilization or manipulation of the price of the Shares.

(tt) *Margin Rules.* The application of the proceeds received by the Company from the issuance, sale and delivery of the Shares as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus will not violate Regulation T, U or X of the Board of Governors of the Federal Reserve System or any other regulation of such Board of Governors.

(uu) *Forward-Looking Statements.* No forward-looking statement (within the meaning of Section 27A of the Securities Act and Section 21E of the Exchange Act) included or incorporated by reference in any of the Registration Statement, the Pricing Disclosure Package or the Prospectus has been made or reaffirmed without a reasonable basis or has been disclosed other than in good faith.

(vv) *Statistical and Market Data.* Nothing has come to the attention of the Company that has caused the Company to believe that the statistical and market-related data included or incorporated by reference in the Registration Statement, the Pricing Disclosure Package and the Prospectus is not based on or derived from sources that are reliable and accurate in all material respects.

(ww) *Sarbanes-Oxley Act.* There is and has been no failure on the part of the Company or any of the Company's directors or officers, in their capacities as such, to comply with any provision of the Sarbanes-Oxley Act of 2002, as amended, and the rules and regulations promulgated in connection therewith (the "Sarbanes-Oxley Act"), applicable as of the effective date of the Registration Statement, including Section 402 related to loans and Sections 302 and 906 related to certifications.

(xx) *Status under the Securities Act.* At the time of filing the Registration Statement and any post-effective amendment thereto, at the earliest time thereafter that the Company or any offering participant made a *bona fide* offer (within the meaning of Rule 164(h)(2) under the Securities Act) of the Shares and at the date hereof, the Company was not and is not an "ineligible issuer," as defined in Rule 405 under the Securities Act.

(yy) *No Ratings.* There are (and prior to the Closing Date, will be) no debt securities or preferred stock issued or guaranteed by the Company or any of its subsidiaries that are rated by a "nationally recognized statistical rating organization", as such term is defined under Section 3(a)(62) under the Exchange Act.

4. Further Agreements of the Company. The Company covenants and agrees with each Underwriter that:

(a) *Required Filings.* The Company will file the final Prospectus with the Commission within the time periods specified by Rule 424(b) and Rule 430A, 430B or 430C

under the Securities Act, will file any Issuer Free Writing Prospectus to the extent required by Rule 433 under the Securities Act; and the Company will use its best efforts to furnish copies of the Prospectus and each Issuer Free Writing Prospectus (to the extent not previously delivered) to the Underwriters in New York City prior to 10:00 A.M., New York City time, on the business day next succeeding the date of this Agreement in such quantities as the Representatives may reasonably request.

(b) *Delivery of Copies.* The Company will deliver, upon request and without charge, (i) to the Representatives, three signed copies of the Registration Statement as originally filed and each amendment thereto, in each case including all exhibits and consents filed therewith and documents incorporated by reference therein; and (ii) to each Underwriter (A) a conformed copy of the Registration Statement as originally filed and each amendment thereto (without exhibits) and (B) during the Prospectus Delivery Period (as defined below), as many copies of the Prospectus (including all amendments and supplements thereto and documents incorporated by reference therein and each Issuer Free Writing Prospectus) as the Representatives may reasonably request. As used herein, the term "Prospectus Delivery Period" means such period of time after the first date of the public offering of the Shares as in the opinion of counsel for the Underwriters a prospectus relating to the Shares is required by law to be delivered (or required to be delivered but for Rule 172 under the Securities Act) in connection with sales of the Shares by any Underwriter or dealer.

(c) *Amendments or Supplements, Issuer Free Writing Prospectuses.* Before preparing, using, authorizing, approving, referring to or filing any Issuer Free Writing Prospectus, and before filing any amendment or supplement to the Registration Statement or the Prospectus, the Company will furnish to the Representatives and counsel for the Underwriters a copy of the proposed Issuer Free Writing Prospectus, amendment or supplement for review and will not prepare, use, authorize, approve, refer to or file any such Issuer Free Writing Prospectus or file any such proposed amendment or supplement to which the Representatives reasonably object upon advice of counsel.

(d) *Notice to the Representatives.* The Company will advise the Representatives promptly, and confirm such advice in writing (which may be by email), (i) when the Registration Statement has become effective; (ii) when any amendment to the Registration Statement has been filed or becomes effective; (iii) when any supplement to the Prospectus, any Issuer Free Writing Prospectus, any Written Testing-the-Waters Communication or any amendment to the Prospectus has been filed or distributed; (iv) of any request by the Commission for any amendment to the Registration Statement or any amendment or supplement to the Prospectus or the receipt of any comments from the Commission relating to the Registration Statement or any other request by the Commission for any additional information including, but not limited to, any request for information concerning any Testing-the-Waters Communication; (v) of the issuance by the Commission of any order suspending the effectiveness of the Registration Statement or preventing or suspending the use of any Preliminary Prospectus, any of the Pricing Disclosure Package, the Prospectus or any Written Testing-the-Waters Communication or the initiation or to the knowledge of the Company, threatening of any proceeding for that purpose or pursuant to Section 8A of the Securities Act; (vi) of the occurrence of any event or development within the Prospectus Delivery Period as a result of which the Prospectus, any of the Pricing Disclosure Package, any Issuer Free Writing Prospectus or any Written Testing-the-Waters Communication as then amended or supplemented would include any untrue statement of a material fact or omit to state a material fact necessary in order to make the statements therein, in the light of the

circumstances existing when the Prospectus, the Pricing Disclosure Package, any such Issuer Free Writing Prospectus or any Written Testing-the-Waters Communication is delivered to a purchaser, not misleading; and (vii) of the receipt by the Company of any notice with respect to any suspension of the qualification of the Shares for offer and sale in any jurisdiction or the initiation or, to the Company's knowledge, threatening of any proceeding for such purpose; and the Company will use its reasonable best efforts to prevent the issuance of any such order suspending the effectiveness of the Registration Statement, preventing or suspending the use of any Preliminary Prospectus, any of the Pricing Disclosure Package, the Prospectus or any Written Testing-the-Waters Communication or suspending any such qualification of the Shares and, if any such order is issued, will obtain as soon as possible the withdrawal thereof.

(e) *Ongoing Compliance.* (1) If during the Prospectus Delivery Period (i) any event or development shall occur or condition shall exist as a result of which the Prospectus as then amended or supplemented would include any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances existing when the Prospectus is delivered to a purchaser, not misleading or (ii) it is necessary to amend or supplement the Prospectus to comply with law, the Company will promptly notify the Underwriters thereof and forthwith prepare and, subject to paragraph (c) above, file with the Commission and furnish to the Underwriters and to such dealers as the Representatives may designate such amendments or supplements to the Prospectus (or any document to be filed with the Commission and incorporated by reference therein) as may be necessary so that the statements in the Prospectus as so amended or supplemented (or any document to be filed with the Commission and incorporated by reference therein) will not, in the light of the circumstances existing when the Prospectus is delivered to a purchaser, be misleading or so that the Prospectus will comply with law and (2) if at any time prior to the Closing Date (i) any event or development shall occur or condition shall exist as a result of which the Pricing Disclosure Package as then amended or supplemented would include any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances existing when the Pricing Disclosure Package is delivered to a purchaser, not misleading or (ii) it is necessary to amend or supplement the Pricing Disclosure Package to comply with law, the Company will promptly notify the Underwriters thereof and forthwith prepare and, subject to paragraph (c) above, file with the Commission (to the extent required) and furnish to the Underwriters and to such dealers as the Representatives may designate, such amendments or supplements to the Pricing Disclosure Package (or any document to be filed with the Commission and incorporated by reference therein) as may be necessary so that the statements in the Pricing Disclosure Package as so amended or supplemented will not, in the light of the circumstances existing when the Pricing Disclosure Package is delivered to a purchaser, be misleading or so that the Pricing Disclosure Package will comply with law.

(f) *Blue Sky Compliance.* The Company will qualify the Shares for offer and sale under the securities or Blue Sky laws of such jurisdictions as the Representatives shall reasonably request and will continue such qualifications in effect so long as required for distribution of the Shares; provided that the Company shall not be required to (i) qualify as a foreign corporation or other entity or as a dealer in securities in any such jurisdiction where it would not otherwise be required to so qualify, (ii) file any general consent to service of process in any such jurisdiction or (iii) subject itself to taxation with regards to doing business in any such jurisdiction if it is not otherwise so subject.

(g) *Earnings Statement.* The Company will make generally available to its security holders and the Representatives as soon as reasonably practicable an earnings statement that satisfies the provisions of Section 11(a) of the Securities Act and Rule 158 of the Commission promulgated thereunder covering a period of at least twelve months beginning with the first fiscal quarter of the Company occurring after the “effective date” (as defined in Rule 158) of the Registration Statement; provided that the Company will be deemed to have furnished such statements to its security holders and the Representatives to the extent they are filed on the Commission’s Electronic Data Gathering Analysis and Retrieval system (“EDGAR”) or any successor system.

(h) *Clear Market.* For a period of 90 days after the date of the Prospectus, the Company 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, lend or otherwise transfer or dispose of, directly or indirectly, or submit or file with the Commission a registration statement under the Securities Act relating to, any shares of Stock or any securities convertible into or exercisable or exchangeable for Stock, or publicly disclose the intention to make any offer, sale, pledge, disposition or filing, or (ii) enter into any swap or other agreement that transfers, in whole or in part, any of the economic consequences of ownership of the Stock or any such other securities, whether any such transaction described in clause (i) or (ii) above is to be settled by delivery of Stock or such other securities, in cash or otherwise, without the prior written consent of J.P. Morgan Securities LLC and Cowen and Company, LLC on behalf of the Underwriters, other than (a) the Shares to be sold hereunder, (b) any shares of Stock of the Company issued upon the exercise of options granted under Company Stock Plans, (c) the grant or issuance by the Company of employee, consultant, or director stock options or restricted stock in the ordinary course of business under the Company Stock Plans described in the Registration Statement, the Pricing Disclosure Package and the Prospectus, (d) shares registered on Form S-8 relating to the Company Stock Plans described in the Registration Statement, the Pricing Disclosure Package and the Prospectus, (e) the issuance of securities in connection with the acquisition by the Company or any of its subsidiaries of the securities, businesses, property or other assets of another person or entity or pursuant to any employee benefit plan assumed by the Company in connection with any such acquisition, or (f) the issuance of securities in connection with joint ventures, commercial relationships, or other strategic transactions; provided that, (x) in the case of clauses (e) and (f), the aggregate number of shares issued in all such acquisitions and transactions taken together does not exceed 10.0% of the Company’s outstanding common stock following the offering of Common Stock contemplated by this Agreement and (y) each person to whom such shares or securities are issued or granted pursuant to clauses (b), (c), (d), (e) and (f) during the 90-day restriction period described above executes or has executed a “lock-up” agreement in the form of Exhibit A hereto.

(i) *Use of Proceeds.* The Company will apply the net proceeds from the sale of the Shares as described in the Registration Statement, the Pricing Disclosure Package and the Prospectus under the heading “Use of proceeds”.

(j) *No Stabilization.* The Company will not take, directly or indirectly, any action designed to or that could reasonably be expected to cause or result in any stabilization or manipulation of the price of the Stock.

(k) *Exchange Listing.* The Company will use its reasonable best efforts to list, subject to notice of issuance, the Shares on the Exchange.

(l) *Reports.* For a period of two years from the date of this Agreement, so long as the Shares are outstanding, the Company will furnish to the Representatives, as soon as they are available, copies of all reports or other communications (financial or other) furnished to holders of the Shares, and copies of any reports and financial statements furnished to or filed with the Commission or any national securities exchange or automatic quotation system; *provided* the Company will be deemed to have furnished such reports and financial statements to the Representatives to the extent they are filed on EDGAR or any successor system.

(m) *Record Retention.* The Company will, pursuant to reasonable procedures developed in good faith, retain copies of each Issuer Free Writing Prospectus that is not filed with the Commission in accordance with Rule 433 under the Securities Act.

(n) *Filings.* The Company will file with the Commission such reports as may be required by Rule 463 under the Securities Act.

(o) *Emerging Growth Company.* The Company will promptly notify the Representatives if the Company ceases to be an Emerging Growth Company at any time prior to the completion of the distribution of Shares within the meaning of the Securities Act.

5. Certain Agreements of the Underwriters. Each Underwriter hereby represents and agrees that:

(a) It has not used, authorized use of, referred to or participated in the planning for use of, and will not use any “free writing prospectus”, as defined in Rule 405 under the Securities Act (which term includes use of any written information furnished to the Commission by the Company and not incorporated by reference into the Registration Statement and any press release issued by the Company) other than (i) a free writing prospectus that contains no “issuer information” (as defined in Rule 433(h)(2) under the Securities Act) that was not included (including through incorporation by reference) in the Preliminary Prospectus or a previously filed Issuer Free Writing Prospectus, (ii) any Issuer Free Writing Prospectus listed on Annex A or prepared pursuant to Section 3(c) or Section 4(c) above (including any electronic road show), or (iii) any free writing prospectus prepared by such underwriter and approved by the Company in advance in writing (each such free writing prospectus referred to in clauses (i) or (iii), an “Underwriter Free Writing Prospectus”).

(b) It has not and will not, without the prior written consent of the Company, use any free writing prospectus that contains the final terms of the Shares unless such terms have previously been included in a free writing prospectus filed with the Commission; *provided* that Underwriters may use a term sheet substantially in the form of Annex C hereto without the consent of the Company; *provided further* that any Underwriter using such term sheet shall notify the Company, and provide a copy of such term sheet to the Company, prior to, or substantially concurrently with, the first use of such term sheet.

(c) It is not subject to any pending proceeding under Section 8A of the Securities Act with respect to the offering (and will promptly notify the Company if any such proceeding against it is initiated during the Prospectus Delivery Period).

6. Conditions of Underwriters’ Obligations. The obligation of each Underwriter to purchase the Underwritten Shares on the Closing Date or the Option Shares on the Additional Closing Date, as the

case may be, as provided herein is subject to the performance by the Company of its covenants and other obligations hereunder and to the following additional conditions:

(a) *Registration Compliance; No Stop Order.* No order suspending the effectiveness of the Registration Statement shall be in effect, and no proceeding for such purpose or pursuant to Section 8A under the Securities Act shall be pending before or threatened by the Commission; the Prospectus and each Issuer Free Writing Prospectus shall have been timely filed with the Commission under the Securities Act (in the case of an Issuer Free Writing Prospectus, to the extent required by Rule 433 under the Securities Act) and in accordance with Section 4(a) hereof; and all requests by the Commission for additional information shall have been complied with to the reasonable satisfaction of the Representatives.

(b) *Representations and Warranties.* The representations and warranties of the Company contained herein shall be true and correct on the date hereof and on and as of the Closing Date or the Additional Closing Date, as the case may be; and the statements of the Company and its officers made in any certificates delivered pursuant to this Agreement shall be true and correct on and as of the Closing Date or the Additional Closing Date, as the case may be.

(c) *No Material Adverse Change.* No event or condition of a type described in Section 3(h) hereof shall have occurred or shall exist, which event or condition is not described in the Pricing Disclosure Package (excluding any amendment or supplement thereto) and the Prospectus (excluding any amendment or supplement thereto) and the effect of which in the judgment of the Representatives makes it impracticable or inadvisable to proceed with the offering, sale or delivery of the Shares on the Closing Date or the Additional Closing Date, as the case may be, on the terms and in the manner contemplated by this Agreement, the Pricing Disclosure Package and the Prospectus.

(d) *Officer's Certificate.* The Representatives shall have received on and as of the Closing Date or the Additional Closing Date, as the case may be, (x) a certificate on behalf of the Company of the chief executive officer and the chief financial officer of the Company (i) confirming that such officers have carefully reviewed the Registration Statement, the Pricing Disclosure Package and the Prospectus and, to the knowledge of such officers, the representations set forth in Sections 3(b) and 3(f) hereof are true and correct, (ii) confirming that the other representations and warranties of the Company in this Agreement are true and correct and that the Company has complied with all agreements and satisfied all conditions on its part to be performed or satisfied hereunder at or prior to the Closing Date or the Additional Closing Date, as the case may be, and (iii) to the effect set forth in paragraphs (a) and (c) above.

(e) *Comfort Letters.*

(i) On the date of this Agreement and on the Closing Date or the Additional Closing Date, as the case may be, PricewaterhouseCoopers LLP shall have furnished to the Representatives, at the request of the Company, letters, dated the respective dates of delivery thereof and addressed to the Underwriters and the Board of Directors of the Company, in form and substance reasonably satisfactory to the Representatives, containing statements and information of the type customarily included in accountants' "comfort letters" to underwriters with respect to the financial statements and certain financial information contained or incorporated by reference in the Registration Statement, the Pricing Disclosure Package and the Prospectus; provided, that the letter

delivered on the Closing Date or the Additional Closing Date, as the case may be, shall use a “cut-off” date no more than three business days prior to such Closing Date or such Additional Closing Date, as the case may be.

(ii) On the date of this Agreement and on the Closing Date or the Additional Closing Date, as the case may be, the Company shall have furnished to the Representatives a certificate, dated the respective dates of delivery thereof and addressed to the Underwriters, of its chief financial officer with respect to certain financial data contained in the Pricing Disclosure Package and the Prospectus, providing “management comfort” with respect to such information, in form and substance reasonably satisfactory to the Representatives.

(f) *Opinion and 10b-5 Statement of Counsel for the Company.* Orrick, Herrington & Sutcliffe LLP, counsel for the Company, shall have furnished to the Representatives, at the request of the Company, their written opinion and 10b-5 statement, dated the Closing Date or the Additional Closing Date, as the case may be, and addressed to the Underwriters, in form and substance reasonably satisfactory to the Representatives.

(g) *Statement of Litigation Counsel for the Company.* Quinn Emanuel Urquhart & Sullivan, LLP, litigation counsel for the Company, shall have furnished to the Representatives, at the request of the Company, their 10b-5 statement, dated the Closing Date or the Additional Closing Date, as the case may be, and addressed to the Underwriters, in form and substance reasonably satisfactory to the Representatives.

(h) *Opinion of Intellectual Property Counsel for the Company.* Wilson Sonsini Goodrich & Rosati, P.C., intellectual property counsel for the Company, shall have furnished to the Representatives, at the request of the Company, their written opinion, dated the Closing Date or the Additional Closing Date, as the case may be, and addressed to the Underwriters, in form and substance reasonably satisfactory to the Representatives.

(i) *Opinion and 10b-5 Statement of Counsel for the Underwriters.* The Representatives shall have received on and as of the Closing Date or the Additional Closing Date, as the case may be, an opinion and 10b-5 statement, addressed to the Underwriters, of Latham & Watkins LLP, counsel for the Underwriters, with respect to such matters as the Representatives may reasonably request, and such counsel shall have received such documents and information as they may reasonably request to enable them to pass upon such matters.

(j) *No Legal Impediment to Issuance and Sale.* No action shall have been taken and no statute, rule, regulation or order shall have been enacted, adopted or issued by any federal, state or foreign governmental or regulatory authority that would, as of the Closing Date or the Additional Closing Date, as the case may be, prevent the issuance or sale of the Shares; and no injunction or order of any federal, state or foreign court shall have been issued that would, as of the Closing Date or the Additional Closing Date, as the case may be, prevent the issuance or sale of the Shares.

(k) *Good Standing.* The Representatives shall have received on and as of the Closing Date or the Additional Closing Date, as the case may be, satisfactory evidence of the good standing of the Company and its subsidiaries in their respective jurisdictions of organization and their good standing in such other jurisdictions as the Representatives may reasonably request,

in each case in writing or any standard form of telecommunication from the appropriate governmental authorities of such jurisdictions.

(l) *Exchange Listing.* The Shares to be delivered on the Closing Date or Additional Closing Date, as the case may be, shall have been approved for listing on the Exchange, subject to official notice of issuance.

(m) *Lock-up Agreements.* The “lock-up” agreements, each substantially in the form of Exhibit D hereto, between you and certain shareholders and the officers and directors of the Company relating to sales and certain other dispositions of shares of Stock or certain other securities, delivered to you on or before the date hereof, shall be full force and effect on the Closing Date or Additional Closing Date, as the case may be.

(n) *Additional Documents.* On or prior to the Closing Date or the Additional Closing Date, as the case may be, the Company shall have furnished to the Representatives such further certificates and documents as the Representatives may reasonably request.

All opinions, letters, certificates and evidence mentioned above or elsewhere in this Agreement shall be deemed to be in compliance with the provisions hereof only if they are in form and substance reasonably satisfactory to counsel for the Underwriters.

7. Indemnification and Contribution.

(a) *Indemnification of the Underwriters.* The Company agrees to indemnify and hold harmless each Underwriter, its affiliates, directors and officers and each person, if any, who controls such Underwriter within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act, from and against any and all losses, claims, damages and liabilities (including, without limitation, legal fees and other expenses incurred in connection with any suit, action or proceeding or any claim asserted, as such fees and expenses are incurred), joint or several, that arise out of, or are based upon, (i) any untrue statement or alleged untrue statement of a material fact contained in the Registration Statement or caused by any omission or alleged omission to state therein a material fact required to be stated therein or necessary in order to make the statements therein, not misleading, or (ii) any untrue statement or alleged untrue statement of a material fact contained in the Prospectus (or any amendment or supplement thereto), any Preliminary Prospectus, any Issuer Free Writing Prospectus, any “issuer information” filed or required to be filed pursuant to Rule 433(d) under the Securities Act, any Written Testing-the-Waters Communication, any road show as defined in Rule 433(h) under the Securities Act (a “road show”) or any Pricing Disclosure Package (including any Pricing Disclosure Package that has subsequently been amended), or caused by any omission or alleged omission to state therein a material fact necessary in order to make the statements therein, in light of the circumstances under which they were made, not misleading, in each case except insofar as such losses, claims, damages or liabilities arise out of, or are based upon, any untrue statement or omission or alleged untrue statement or omission made in reliance upon and in conformity with any information relating to any Underwriter furnished to the Company in writing by such Underwriter through the Representatives expressly for use therein, it being understood and agreed that the only such information furnished by any Underwriter consists of the information described as such in subsection (b) below.

(b) *Indemnification of the Company.* Each Underwriter agrees, severally and not jointly, to indemnify and hold harmless the Company, its directors, its officers who signed the Registration Statement and each person, if any, who controls the Company within the meaning of Section 15 of the

Securities Act or Section 20 of the Exchange Act to the same extent as the indemnity set forth in paragraph (a) above, but only with respect to any losses, claims, damages or liabilities that arise out of, or are based upon, any untrue statement or omission or alleged untrue statement or omission made in reliance upon and in conformity with any information relating to such Underwriter furnished to the Company in writing by such Underwriter through the Representatives expressly for use in the Registration Statement, the Prospectus (or any amendment or supplement thereto), any Preliminary Prospectus, any Issuer Free Writing Prospectus, any Written Testing-the-Waters Communication, any road show or any Pricing Disclosure Package (including any Pricing Disclosure Package that has subsequently been amended), it being understood and agreed upon that the only such information furnished by any Underwriter consists of the following information in the Prospectus furnished on behalf of each Underwriter: the concession figure appearing in the third paragraph under the caption "Underwriting" and the information contained in the seventh, thirteenth and fourteenth paragraphs under the caption "Underwriting".

(c) *Notice and Procedures.* If any suit, action, proceeding (including any governmental or regulatory investigation), claim or demand shall be brought or asserted against any person in respect of which indemnification may be sought pursuant to either paragraph (a) or (b) above, such person (the "Indemnified Person") shall promptly notify the person against whom such indemnification may be sought (the "Indemnifying Person") in writing; provided that the failure to notify the Indemnifying Person shall not relieve it from any liability that it may have under paragraph (a) or (b) above except to the extent that it has been materially prejudiced (through the forfeiture of substantive rights or defenses) by such failure; and provided, further, that the failure to notify the Indemnifying Person shall not relieve it from any liability that it may have to an Indemnified Person otherwise than under paragraph (a) or (b) above. If any such proceeding shall be brought or asserted against an Indemnified Person and it shall have notified the Indemnifying Person thereof, the Indemnifying Person shall retain counsel reasonably satisfactory to the Indemnified Person (who shall not, without the consent of the Indemnified Person, be counsel to the Indemnifying Person) to represent the Indemnified Person and any others entitled to indemnification pursuant to this Section that the Indemnifying Person may designate in such proceeding and shall pay the reasonable and documented fees and expenses in such proceeding and shall pay the reasonable and documented fees and expenses of such counsel related to such proceeding, as incurred. In any such proceeding, any Indemnified Person shall have the right to retain its own counsel, but the fees and expenses of such counsel shall be at the expense of such Indemnified Person unless (i) the Indemnifying Person and the Indemnified Person shall have mutually agreed to the contrary; (ii) the Indemnifying Person has failed within a reasonable time to retain counsel reasonably satisfactory to the Indemnified Person; (iii) the Indemnified Person shall have reasonably concluded that there may be legal defenses available to it that are different from or in addition to those available to the Indemnifying Person; or (iv) the named parties in any such proceeding (including any impleaded parties) include both the Indemnifying Person and the Indemnified Person and representation of both parties by the same counsel would be inappropriate due to actual or potential differing interests between them. It is understood and agreed that the Indemnifying Person shall not, in connection with any proceeding or related proceeding in the same jurisdiction, be liable for the fees and expenses of more than one separate firm (in addition to any local counsel) for all Indemnified Persons, and that all such fees and expenses shall be paid or reimbursed as they are incurred Any such separate firm for any Underwriter, its affiliates, directors and officers and any control persons of such Underwriter shall be designated in writing by the Representatives and any such separate firm for the Company, its directors, its officers who signed the Registration

Statement and any control persons of the Company shall be designated in writing by the Company. The Indemnifying Person shall not be liable for any settlement of any proceeding effected without its written consent, but if settled with such consent or if there be a final judgment for the plaintiff, the Indemnifying Person agrees to indemnify each Indemnified Person from and against any loss or liability by reason of such settlement or judgment. Notwithstanding the foregoing sentence, if at any time an Indemnified Person shall have requested that an Indemnifying Person reimburse the Indemnified Person for fees and expenses of counsel as contemplated by this paragraph, the Indemnifying Person shall be liable for any settlement of any proceeding effected without its written consent if (i) such settlement is entered into more than 30 days after receipt by the Indemnifying Person of such request and (ii) the Indemnifying Person shall not have reimbursed the Indemnified Person in accordance with such request prior to the date of such settlement. No Indemnifying Person shall, without the written consent of the Indemnified Person (which consent shall not be unreasonably withheld or delayed), effect any settlement of any pending or threatened proceeding in respect of which any Indemnified Person is or could have been a party and indemnification could have been sought hereunder by such Indemnified Person, unless such settlement (x) includes an unconditional release of such Indemnified Person, in form and substance reasonably satisfactory to such Indemnified Person, from all liability on claims that are the subject matter of such proceeding and (y) does not include any statement as to or any admission of fault, culpability or a failure to act by or on behalf of any Indemnified Person.

(d) *Contribution.* If the indemnification provided for in paragraphs (a) and (b) above is unavailable to an Indemnified Person or insufficient in respect of any losses, claims, damages or liabilities referred to therein, then each Indemnifying Person under such paragraph, in lieu of indemnifying such Indemnified Person thereunder, shall contribute to the amount paid or payable by such Indemnified Person as a result of such losses, claims, damages or liabilities (i) in such proportion as is appropriate to reflect the relative benefits received by the Company, on the one hand, and the Underwriters on the other, from the offering of the Shares or (ii) if the allocation provided by clause (i) is not permitted by applicable law, in such proportion as is appropriate to reflect not only the relative benefits referred to in clause (i) but also the relative fault of the Company, on the one hand, and the Underwriters on the other, in connection with the statements or omissions that resulted in such losses, claims, damages or liabilities, as well as any other relevant equitable considerations. The relative benefits received by the Company, on the one hand, and the Underwriters on the other, shall be deemed to be in the same respective proportions as the net proceeds (before deducting expenses) received by the Company from the sale of the Shares and the total underwriting discounts and commissions received by the Underwriters in connection therewith, in each case as set forth in the table on the cover of the Prospectus, bear to the aggregate initial public offering price of the Shares. The relative fault of the Company, on the one hand, and the Underwriters on the other, shall be determined by reference to, among other things, whether the untrue or alleged untrue statement of a material fact or the omission or alleged omission to state a material fact relates to information supplied by the Company or by the Underwriters and the parties' relative intent, knowledge, access to information and opportunity to correct or prevent such statement or omission.

(e) *Limitation on Liability.* The Company and the Underwriters agree that it would not be just and equitable if contribution pursuant to paragraph (d) above were determined by pro rata allocation (even if the Underwriters were treated as one entity for such purpose) or by any other method of allocation that does not take account of the equitable considerations referred to in paragraph (d) above. The amount paid or payable by an Indemnified Person as a result of the losses, claims, damages and liabilities referred to in paragraph (d) above shall be deemed to include, subject to the limitations set forth above, any legal or other expenses incurred by such Indemnified Person in connection with any such action or claim. Notwithstanding the provisions of paragraphs (d) and (e), in no event shall an Underwriter be required to contribute any amount in excess of the amount by which the total underwriting

discounts and commissions received by such Underwriter with respect to the offering of the Shares exceeds the amount of any damages that such Underwriter has otherwise been required to pay by reason of such untrue or alleged untrue statement or omission or alleged omission. No person guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Securities Act) shall be entitled to contribution from any person who was not guilty of such fraudulent misrepresentation. The Underwriters' obligations to contribute pursuant to paragraphs (d) and (e) are several in proportion to their respective purchase obligations hereunder and not joint.

(f) *Non-Exclusive Remedies.* The remedies provided for in this Section 7 are not exclusive and shall not limit any rights or remedies which may otherwise be available to any Indemnified Person at law or in equity.

8. Effectiveness of Agreement. This Agreement shall become effective as of the date first written above.

9. Termination. This Agreement may be terminated in the absolute discretion of the Representatives, by notice to the Company, if after the execution and delivery of this Agreement and on or prior to the Closing Date or, in the case of the Option Shares, prior to the Additional Closing Date (i) trading generally shall have been suspended or materially limited on or by any of the New York Stock Exchange or the Nasdaq Stock Market; (ii) trading of any securities issued or guaranteed by the Company shall have been suspended on any exchange or in any over-the-counter market; (iii) a general moratorium on commercial banking activities shall have been declared by federal or New York State authorities; or (iv) there shall have occurred any outbreak or escalation of hostilities or declaration by the United States of war or any change in financial markets or any calamity or crisis, either within or outside the United States, that, in the judgment of the Representatives, is material and adverse and makes it impracticable or inadvisable to proceed with the offering, sale or delivery of the Shares on the Closing Date or the Additional Closing Date, as the case may be, on the terms and in the manner contemplated by this Agreement, the Pricing Disclosure Package and the Prospectus.

10. Defaulting Underwriter.

(a) If, on the Closing Date or the Additional Closing Date, as the case may be, any Underwriter defaults on its obligation to purchase the Shares that it has agreed to purchase hereunder on such date, the non-defaulting Underwriters may in their discretion arrange for the purchase of such Shares by other persons satisfactory to the Company on the terms contained in this Agreement. If, within 36 hours after any such default by any Underwriter, the non-defaulting Underwriters do not arrange for the purchase of such Shares, then the Company shall be entitled to a further period of 36 hours within which to procure other persons satisfactory to the non-defaulting Underwriters to purchase such Shares on such terms. If other persons become obligated or agree to purchase the Shares of a defaulting Underwriter, either the non-defaulting Underwriters or the Company may postpone the Closing Date or the Additional Closing Date, as the case may be, for up to five full business days in order to effect any changes that in the opinion of counsel for the Company or counsel for the Underwriters may be necessary in the Registration Statement and the Prospectus or in any other document or arrangement, and the Company agrees to promptly prepare any amendment or supplement to the Registration Statement and the Prospectus that effects any such changes. As used in this Agreement, the term "Underwriter" includes, for all purposes of this Agreement unless the context otherwise requires, any person not listed in Schedule 1 hereto that, pursuant to this Section 10, purchases Shares that a defaulting Underwriter agreed but failed to purchase.

(b) If, after giving effect to any arrangements for the purchase of the Shares of a defaulting Underwriter or Underwriters by the non-defaulting Underwriters and the Company as provided in paragraph (a) above, the aggregate number of Shares that remain unpurchased on the Closing Date or the Additional Closing Date, as the case may be, does not exceed one-eleventh of the aggregate number of Shares to be purchased on such date, then the Company shall have the right to require each non-defaulting Underwriter to purchase the number of Shares that such Underwriter agreed to purchase hereunder on such date plus such Underwriter's pro rata share (based on the number of Shares that such Underwriter agreed to purchase on such date) of the Shares of such defaulting Underwriter or Underwriters for which such arrangements have not been made.

(c) If, after giving effect to any arrangements for the purchase of the Shares of a defaulting Underwriter or Underwriters by the non-defaulting Underwriters and the Company as provided in paragraph (a) above, the aggregate number of Shares that remain unpurchased on the Closing Date or the Additional Closing Date, as the case may be, exceeds one-eleventh of the aggregate amount of Shares to be purchased on such date, or if the Company shall not exercise the right described in paragraph (b) above, then this Agreement or, with respect to any Additional Closing Date, the obligation of the Underwriters to purchase Shares on the Additional Closing Date shall terminate without liability on the part of the non-defaulting Underwriters. Any termination of this Agreement pursuant to this Section 10 shall be without liability on the part of the Company, except that the Company will continue to be liable for the payment of expenses as set forth in Section 11 hereof and except that the provisions of Section 7 hereof shall not terminate and shall remain in effect.

(d) Nothing contained herein shall relieve a defaulting Underwriter of any liability it may have to the Company or any non-defaulting Underwriter for damages caused by its default.

11. Payment of Expenses.

(a) Whether or not the transactions contemplated by this Agreement are consummated or this Agreement is terminated, the Company will pay or cause to be paid all costs and expenses actually incurred and incident to the performance of its obligations hereunder, including without limitation, (i) the costs incident to the authorization, issuance, sale, preparation and delivery of the Shares and any taxes payable in that connection; (ii) the costs incident to the preparation, printing and filing under the Securities Act of the Registration Statement, the Preliminary Prospectus, any Issuer Free Writing Prospectus, any Pricing Disclosure Package and the Prospectus (including all exhibits, amendments and supplements thereto) and the distribution thereof; (iii) the fees and expenses of the Company's counsel and independent accountants; (iv) the fees and expenses incurred in connection with the registration or qualification and determination of eligibility for investment of the Shares under the laws of such jurisdictions as the Representatives may designate and the preparation, printing and distribution of a Blue Sky Memorandum and any "Canadian Wrapper" (including the related fees and expenses of counsel for the Underwriters up to a maximum of \$15,000); (v) the cost of preparing stock certificates; (vi) the costs and charges of any transfer agent and any registrar; (vii) all expenses and application fees incurred in connection with any filing with, and clearance of the offering by, FINRA (including the related fees and expenses of counsel for the Underwriters up to a maximum of \$40,000); (viii) all expenses incurred by the Company in connection with any "road show" presentation to potential investors (provided that the cost of any chartered plane to be or used in connection with any "road show" presentation to potential investors will be paid 50% by the Company and 50% by the Underwriters); and (ix) all expenses and application fees related to the listing of the Shares on the Exchange. It is understood, however, that except as provided in this Section 11 or Section 7 hereof, the Underwriters will pay their own costs and expenses, including the fees of their counsel, stock transfer taxes on the resale of any of the Shares owned by them, any advertising expenses

connected with any offers they may make and all travel (except as set forth in clause (viii) above), lodging and other expenses of the Underwriters or any of their employees incurred by them in connection with any "road show" presentation to potential investors.

(b) If (i) this Agreement is terminated pursuant to Section 9, (ii) the Company for any reason fails to tender the Shares for delivery to the Underwriters or (iii) the Underwriters decline to purchase the Shares for any reason permitted under this Agreement, the Company agrees to reimburse the Underwriters for all out-of-pocket costs and expenses (including the fees and expenses of their counsel) actually and reasonably incurred by the Underwriters in connection with this Agreement and the offering contemplated hereby.

12. Persons Entitled to Benefit of Agreement. This Agreement shall inure to the benefit of and be binding upon the parties hereto and their respective successors and the officers and directors and any controlling persons referred to herein, and the affiliates of each Underwriter referred to in Section 7 hereof. Nothing in this Agreement is intended or shall be construed to give any other person any legal or equitable right, remedy or claim under or in respect of this Agreement or any provision contained herein. No purchaser of Shares from any Underwriter shall be deemed to be a successor merely by reason of such purchase.

13. Survival. The respective indemnities, rights of contribution, representations, warranties and agreements of the Company and the Underwriters contained in this Agreement or made by or on behalf of the Company or the Underwriters pursuant to this Agreement or any certificate delivered pursuant hereto shall survive the delivery of and payment for the Shares and shall remain in full force and effect, regardless of any termination of this Agreement or any investigation made by or on behalf of the Company or the Underwriters.

14. Certain Defined Terms. For purposes of this Agreement, (a) except where otherwise expressly provided, the term "affiliate" has the meaning set forth in Rule 405 under the Securities Act; (b) the term "business day" means any day other than a day on which banks are permitted or required to be closed in New York City; (c) the term "subsidiary" has the meaning set forth in Rule 405 under the Securities Act; and (d) the term "significant subsidiary" has the meaning set forth in Rule 1-02 of Regulation S-X under the Exchange Act.

15. Compliance with USA Patriot Act. In accordance with the requirements of the USA Patriot Act (Title III of Pub. L. 107-56 (signed into law October 26, 2001)), the Underwriters are required to obtain, verify and record information that identifies their respective clients, including the Company, which information may include the name and address of their respective clients, as well as other information that will allow the Underwriters to properly identify their respective clients.

16. Miscellaneous.

(a) Notices. All notices and other communications hereunder shall be in writing and shall be deemed to have been duly given if mailed or transmitted and confirmed by any standard form of telecommunication. Notices to the Underwriters shall be given to the Representatives c/o J. P. Morgan Securities LLC, 383 Madison Avenue, New York, New York 10179 (fax: (212) 622-8358); Attention Equity Syndicate Desk; c/o Cowen and Company, LLC, Attention: Head of Equity Capital Markets, Fax 646-562-1249 with a copy to the General Counsel, Fax 646-562-1124; and c/o Evercore Group L.L.C., 55 East 52nd Street, New York, New York 10055, Attention: ECM General Counsel, Fax: 212-857-3101; with copy (which shall not constitute notice) to Latham & Watkins LLP, 140 Scott Drive, Menlo Park,

CA 94025, Attention: Brian J. Cuneo and B. Shayne Kennedy; email: brian.cuneo@lw.com and shayne.kennedy@lw.com. Notices to the Company shall be given to it at Twist Bioscience Corporation, 455 Mission Bay Boulevard South, San Francisco, CA 94158; Attention: Mark Daniels, General Counsel; email: mdaniels@twistbioscience.com; with copy to Orrick, Herrington & Sutcliffe, LLP, 1000 Marsh Road, Menlo Park, CA 94025; Attention: John Bautista and Andrew Thorpe; email: jbautista@orrick.com and a thorpe@orrick.com.

(b) *Governing Law.* This Agreement and any claim, controversy or dispute arising under or related to this Agreement shall be governed by and construed in accordance with the laws of the State of New York.

(c) *Waiver of Jury Trial.* Each of the parties hereto hereby waives any right to trial by jury in any suit or proceeding arising out of or relating to this Agreement.

(d) *Recognition of the U.S. Special Resolution Regimes.*

(i) In the event that any Underwriter that is a Covered Entity becomes subject to a proceeding under a U.S. Special Resolution Regime, the transfer from such Underwriter of this Agreement, and any interest and obligation in or under this Agreement, will be effective to the same extent as the transfer would be effective under the U.S. Special Resolution Regime if this Agreement, and any such interest and obligation, were governed by the laws of the United States or a state of the United States.

(ii) In the event that any Underwriter that is a Covered Entity or a BHC Act Affiliate of such Underwriter becomes subject to a proceeding under a U.S. Special Resolution Regime, Default Rights under this Agreement that may be exercised against such Underwriter are permitted to be exercised to no greater extent than such Default Rights could be exercised under the U.S. Special Resolution Regime if this Agreement were governed by the laws of the United States or a state of the United States.

As used in this Section 16(d):

“BHC Act Affiliate” has the meaning assigned to the term “affiliate” in, and shall be interpreted in accordance with, 12 U.S.C. § 1841(k).

“Covered Entity” means any of the following:

- (i) a “covered entity” as that term is defined in, and interpreted in accordance with, 12 C.F.R. § 252.82(b);
- (ii) a “covered bank” as that term is defined in, and interpreted in accordance with, 12 C.F.R. § 47.3(b); or
- (iii) a “covered FSI” as that term is defined in, and interpreted in accordance with, 12 C.F.R. § 382.2(b).

“Default Right” has the meaning assigned to that term in, and shall be interpreted in accordance with, 12 C.F.R. §§ 252.81, 47.2 or 382.1, as applicable.

“U.S. Special Resolution Regime” means each of (i) the Federal Deposit Insurance Act and the regulations promulgated thereunder and (ii) Title II of the Dodd-Frank Wall Street Reform and Consumer Protection Act and the regulations promulgated thereunder.

(e) *Counterparts*. This Agreement may be signed in counterparts (which may include counterparts delivered by any standard form of telecommunication), each of which shall be an original and all of which together shall constitute one and the same instrument.

(f) *Amendments or Waivers*. No amendment or waiver of any provision of this Agreement, nor any consent or approval to any departure therefrom, shall in any event be effective unless the same shall be in writing and signed by the parties hereto.

(g) *Headings*. The headings herein are included for convenience of reference only and are not intended to be part of, or to affect the meaning or interpretation of, this Agreement.

If the foregoing is in accordance with your understanding, please indicate your acceptance of this Agreement by signing in the space provided below.

Very truly yours,

TWIST BIOSCIENCE CORPORATION

By: _____
Name:
Title:

Accepted: As of the date first written above

J. P. MORGAN SECURITIES LLC
COWEN AND COMPANY, LLC
EVERCORE GROUP L.L.C.

For themselves and on behalf of the
several Underwriters listed
in Schedule 1 hereto.

J. P. MORGAN SECURITIES LLC

By: _____
Authorized Signatory

COWEN AND COMPANY, LLC

By: _____
Authorized Signatory

EVERCORE GROUP L.L.C.

By: _____
Authorized Signatory

[Signature Page to Underwriting Agreement]

<u>Underwriter</u>	<u>Number of Shares</u>
J. P. Morgan Securities LLC	[●]
Cowen and Company, LLC	[●]
Evercore Group L.L.C.	[●]
Robert W. Baird & Co. Incorporated	[●]
Total	[●]

a. Pricing Disclosure Package

[None.]

b. Pricing Information Provided Orally by Underwriters

Price per Share: \$[●]

Number of Shares: [●] Underwritten Shares plus [●] Option Shares

Written Testing-the-Waters Communications

- [Investor Presentation dated [April 2019]]

Twist Bioscience Corporation

Pricing Term Sheet

None.

FORM OF LOCK-UP AGREEMENT

LOCK-UP AGREEMENT

_____, 2019

J.P. MORGAN SECURITIES LLC
COWEN AND COMPANY, LLC
EVERCORE GROUP L.L.C.

As Representatives of
the several Underwriters listed in
Schedule 1 to the Underwriting
Agreement referred to below

c/o J.P. Morgan Securities LLC
383 Madison Avenue
New York, NY 10179

c/o Cowen and Company, LLC
599 Lexington Avenue
New York, NY 10022

c/o Evercore Group L.L.C.
55 East 52nd Street
New York, NY 10055

Re: Twist Bioscience Corporation — Public Offering

Ladies and Gentlemen:

The undersigned understands that you, as Representatives of the several Underwriters, propose to enter into an underwriting agreement (the "Underwriting Agreement") with Twist Bioscience Corporation, a Delaware corporation (the "Company"), providing for the public offering (the "Public Offering") by the several Underwriters named in Schedule 1 to the Underwriting Agreement (the "Underwriters"), of common stock, \$0.00001 per share par value, of the Company (the "Securities").

In consideration of the Underwriters' agreement to purchase and make the Public Offering of the Securities, and for other good and valuable consideration, the receipt of which is hereby acknowledged, the undersigned hereby agrees that, without the prior written consent of J.P. Morgan Securities LLC and Cowen and Company, LLC on behalf of the Underwriters, the undersigned will not, during the period beginning on the date of this letter agreement (this "Letter Agreement") and ending on, but including, the 90th day after the date of the prospectus relating to the Public Offering (the "Prospectus") (such period, the "Restricted Period"), (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 Common Stock, \$0.00001 per share par value, of the Company (the "Common Stock") or any securities convertible into or exercisable or exchangeable for Common Stock (including without limitation, Common Stock or such other securities which may be

deemed to be beneficially owned by the undersigned 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, collectively the “Undersigned’s Shares”), or publicly disclose the intention to make any offer, sale, pledge or disposition thereof, (2) enter into any swap or other agreement that transfers, in whole or in part, any of the economic consequences of ownership of the Undersigned’s Shares, 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 Common Stock or any security convertible into or exercisable or exchangeable for Common Stock without the prior written consent of the Representatives, in each case other than (A) any Securities to be sold by the undersigned pursuant to the Underwriting Agreement, (B) transfers of the Undersigned’s Shares as a bona fide gift or gifts, (C) transfers or dispositions of the Undersigned’s Shares to any trust for the direct or indirect benefit of the undersigned or the immediate family of the undersigned, (D) transfers or dispositions of the Undersigned’s Shares to any corporation, partnership, limited liability company or other entity all of the beneficial ownership interests of which are held by the undersigned or the immediate family of the undersigned, (E) transfers or dispositions of the Undersigned’s Shares by will, other testamentary document or intestate succession to the legal representative, heir, beneficiary or a member of the immediate family of the undersigned, (F) distributions of the Undersigned’s Shares to partners, members or stockholders of the undersigned, (G) transfers to the undersigned’s affiliates or to any investment fund or other entity controlled or managed by, controlling or managing, or under common control with, the undersigned, and (H) transfers pursuant to a *bona fide* third party tender offer, merger, consolidation or other similar transaction made to all holders of the Common Stock and involving a Change of Control of the Company, provided that in the event that the tender offer, merger, consolidation or other such transaction is not completed, the Common Stock owned by the undersigned shall remain subject to the restrictions contained in this Lock-Up Agreement; provided that in the case of any transfer or distribution pursuant to clause (B), (C), (D), (E), (F) or (G), each transferee, donee or distributee shall execute and deliver to the Representatives a lock-up letter in the form of this Letter Agreement; and provided, further, that in the case of any transfer, disposition or distribution pursuant to clause (B), (C), (D), (E), (F) or (G), no filing by any party (donor, donee, transferor or transferee) under the Securities Exchange Act of 1934, as amended (the “Exchange Act”), or other public announcement shall be required or shall be made voluntarily in connection with such transfer or distribution (other than a filing on a Form 5 after the expiration of the Restricted Period referred to above and any such filing shall clearly indicate in the footnotes thereto that the filing relates to the circumstances described in (B), (C), (D), (E), (F) or (G), above, as the case may be, or the filing of a required Schedule 13F or 13G) and any such transfer or distribution shall not involve a disposition for value. For purposes of this Letter Agreement, “immediate family” shall mean any relationship by blood, marriage or adoption, not more remote than first cousin. For purposes of this Letter Agreement, “Change of Control” shall mean the consummation of any bona fide third party tender offer, merger, consolidation or other similar transaction the result of which is that any “person” (as defined in Section 13(d)(3) of the Exchange Act), or group of persons, becomes the beneficial owner (as defined in Rules 13d-3 and 13d-5 of the Exchange Act) of more than 50% of total voting power of the voting stock of the Company. The undersigned now has, and, except as contemplated by clause (A), (B), (C), (D), (E), (F), (G) or (H) above, for the duration of this Letter Agreement will have, good and marketable title to the Undersigned’s Shares, free and clear of all liens, encumbrances, and claims whatsoever, other than any charitable pledge of the Undersigned’s Shares that by its terms could not result in any transfer, disposition or distribution of such shares during the Restricted Period.

Furthermore, notwithstanding the restrictions imposed by this Letter Agreement, the undersigned may, without the prior written consent of the Representatives (i) exercise any outstanding warrant, or any option to purchase shares of Common Stock granted under any stock incentive plan or stock purchase plan of the Company, provided that the underlying shares of Common Stock shall continue to be subject to the restrictions on transfer set forth in this Letter Agreement, (ii) establish a trading plan pursuant to Rule 10b5-1 under the Exchange Act for the transfer of Common Stock, provided that such plan does not

provide for any transfers of Common Stock during the Restricted Period, and provided, further, that no filing under the Exchange Act or other public announcement shall be required or shall be made voluntarily in connection therewith during the Restricted Period, (iii) transfer or dispose of shares of Common Stock acquired in the Public Offering or on the open market following the Public Offering, provided that no filing under the Exchange Act or other public announcement shall be required or shall be made voluntarily in connection with such transfer or disposition during the Restricted Period (other than a required filing on a Schedule 13F or 13G), (iv) transfer or surrender to the Company shares of Common Stock pursuant to any contractual arrangement that provides the Company with an option to repurchase such shares of Common Stock in connection with the termination of the undersigned's employment or other service relationship with the Company, 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 undersigned 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 the circumstances described in this clause (iv) above and no other public announcement shall be required or shall be made voluntarily in connection with such transfer or surrender, and (v) transfer or dispose 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 of Common Stock shall execute and deliver to the Representatives 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 thereto that the filing relates to the circumstances described in this clause (v) above and no other public announcement shall be required or shall be made voluntarily in connection with such transfer or disposition.

With respect to the Public Offering only, the undersigned waives any registration rights relating to registration under the Securities Act of 1933, as amended, of the offer and sale of any Securities owned either of record or beneficially by the undersigned, including any rights to receive notice of the Public Offering.

In furtherance of the foregoing, the Company, and any duly appointed transfer agent for the registration or transfer of the securities described herein, are hereby authorized to decline to make any transfer of securities if such transfer would constitute a violation or breach of this Letter Agreement.

The undersigned hereby represents and warrants that the undersigned has full power and authority to enter into this Letter Agreement. All authority herein conferred or agreed to be conferred and any obligations of the undersigned shall be binding upon the successors, assigns, heirs or personal representatives of the undersigned.

The undersigned understands that, if either the Representatives, on the one hand, or the Company, on the other hand, informs the other, prior to the execution of the Underwriting Agreement, that it has determined not to proceed with the Public Offering, or if the Underwriting Agreement does not become effective by June 30, 2019, or if the Underwriting Agreement (other than the provisions thereof which survive termination) shall terminate or be terminated prior to payment for and delivery of the Common Stock to be sold thereunder, the undersigned shall be released from all obligations under this Letter Agreement. The undersigned understands that the Underwriters are entering into the Underwriting Agreement and proceeding with the Public Offering in reliance upon this Letter Agreement.

This Letter Agreement and any claim, controversy or dispute arising under or related to this Letter Agreement shall be governed by and construed in accordance with the laws of the State of New York.

(Signature Page Follows)

Very truly yours,

IF AN INDIVIDUAL:

By: _____
(duly authorized signature)

Name: _____
(please print full name)

Address:

E-mail: _____

IF AN ENTITY:

By: _____
(please print complete name of entity)

Name: _____
(please print full name)

Title: _____
(please print full title)

Address:

E-mail: _____

[Signature Page to Lock-up Agreement]



Orrick, Herrington & Sutcliffe LLP

The Orrick Building
405 Howard Street

San Francisco, CA 94105-2669

+1 415 773 5700

orrick.com

May 6, 2019

Twist Bioscience Corporation
455 Mission Bay Boulevard
Suite 545
San Francisco, CA 94158

Re: Registration Statement on Form S-1

Ladies and Gentlemen:

We are acting as counsel for Twist Bioscience Corporation, a Delaware corporation (the “Company”), in connection with the registration statement on Form S-1 filed by the Company with the Securities and Exchange Commission (the “Commission”) on May 6, 2019, as amended (the “Registration Statement”), under the Securities Act of 1933, as amended (the “Securities Act”). The Registration Statement relates to the registration of 3,000,000 shares of common stock of the Company, par value \$0.00001 per share, (the “Primary Shares”) and 450,000 shares of which may be purchased by the underwriters pursuant to an option to purchase additional shares (together with the Primary Shares, the “Shares”). We understand that the Shares are to be sold to the underwriters for resale to the public as described in the Registration Statement and pursuant to an underwriting agreement, substantially in the form filed as an exhibit to the Registration Statement, to be entered into by and among the Company and the underwriters (the “Underwriting Agreement”).

In connection with rendering the opinion set forth below, we have examined and relied upon originals or copies, certified or otherwise identified to our satisfaction, of instruments, documents, and records which we deemed relevant and necessary for the purpose of rendering our opinion set forth below. In such examination, we have assumed the following: (a) the authenticity of original documents and the genuineness of all signatures, (b) the conformity to the originals of all documents submitted to us as copies, (c) the representations of officers and employees are correct as to questions of fact, (d) the Registration Statement has been declared effective pursuant to the Securities Act and (e) a pricing committee of the board of directors will have taken action necessary to set the sale price of the Shares.

Our opinion herein is limited to the General Corporation Law of the State of Delaware.

Based upon the foregoing, we are of the opinion that the Shares to be issued and sold by the Company have been duly authorized and, when such Shares are issued and paid for in accordance with the terms of the Underwriting Agreement, will be validly issued, fully paid and non-assessable.

We consent to the filing of this opinion as an exhibit to the Registration Statement, and we further consent to the use of our name under the caption “Legal matters” in the Registration Statement and



Twist Bioscience Corporation
Registration Statement on Form S-1
May 6, 2019
Page 2

the prospectus that forms a part thereof. In giving these consents, we do not thereby admit that we are within the category of persons whose consent is required under Section 7 of the Securities Act or the Rules and Regulations of the Commission promulgated thereunder, nor do we thereby admit that we are "experts" within the meaning of such term as used in the Securities Act with respect to any part of the Registration Statement, including this opinion letter as an exhibit or otherwise.

Very truly yours,

/s/ Orrick, Herrington & Sutcliffe LLP

ORRICK, HERRINGTON & SUTCLIFFE LLP

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We hereby consent to the incorporation by reference in this Registration Statement on Form S-1 of Twist Bioscience Corporation of our report dated December 20, 2018 relating to the financial statements, which appears in Twist Bioscience Corporation's Annual Report on Form 10-K for the year ended September 30, 2018. We also consent to the reference to us under the heading "Experts" in such Registration Statement.

/s/ PricewaterhouseCoopers LLP
San Jose, California
May 6, 2019