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

FORM S-3
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

Assembly Biosciences, Inc.

(Exact name of registrant as specified in its charter)

Delaware

(State or other jurisdiction of incorporation or organization)

20-8729264

(I.R.S. Employer Identification Number)

**331 Oyster Point Blvd., Fourth Floor
South San Francisco, California 94080
(833) 509-4583**

(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

**Jason A. Okazaki
Chief Legal and Business Officer
Assembly Biosciences, Inc.
331 Oyster Point Blvd., Fourth Floor
South San Francisco, California 94080
(833) 509-4583**

(Name, address, including zip code, and telephone number, including area code, of agent for service)

**Copies to:
P. Michelle Gasaway, Esq.
Skadden, Arps, Slate, Meagher & Flom LLP
300 South Grand Avenue, Suite 3400
Los Angeles, California 90071
(213) 687-5000**

Approximate date of commencement of proposed sale to the public: From time to time after this Registration Statement becomes effective.

If the only securities being registered on this Form are being offered pursuant to dividend or interest reinvestment plans, please check the following box.

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, other than securities offered only in connection with dividend or interest reinvestment plans, 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.

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If this Form is a registration statement pursuant to General Instruction I.D. or a post-effective amendment thereto that shall become effective upon filing with the Commission pursuant to Rule 462(e) under the Securities Act, check the following box.

If this Form is a post-effective amendment to a registration statement filed pursuant to General Instruction I.D. filed to register additional securities or additional classes of securities pursuant to Rule 413(b) under the Securities Act, check the following box.

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 Exchange Act.

Large accelerated filer	<input type="checkbox"/>	Accelerated filer	<input checked="" type="checkbox"/>
Non-accelerated filer	<input type="checkbox"/>	Smaller reporting company	<input checked="" type="checkbox"/>
		Emerging growth company	<input type="checkbox"/>

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 pursuant 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(3)	Amount of Registration Fee(4)
Common Stock				
Preferred Stock				
Debt Securities				
Warrants				
Units(5)				
Total	<u>\$300,000,000</u>	<u>N.A.</u>	<u>\$ 300,000,000</u>	<u>\$ 38,940(6)</u>

- (1) The amount to be registered consists of up to \$300,000,000 of an indeterminate amount of common stock, preferred stock, debt securities, warrants and/or units. There is also being registered hereunder such currently indeterminate number of (a) shares of common stock or other securities of the registrant as may be issued upon conversion of, or in exchange for, convertible or exchangeable debt securities and/or preferred stock registered hereby, or (b) shares of preferred stock, common stock, debt securities or units as may be issued upon exercise of warrants registered hereby, as the case may be. Any securities registered hereunder may be sold separately or as units with the other securities registered hereunder.
- (2) The proposed maximum aggregate offering price per unit will be determined from time to time by the registrant in connection with the issuance by the registrant of the securities registered hereunder and is not specified as to each class of security pursuant to General Instruction II.D. of Form S-3 under the Securities Act of 1933, as amended (the Securities Act).
- (3) Estimated solely for purposes of computing the registration fee. No separate consideration will be received for shares of common stock, preferred stock, units and debt securities of the registrant that may be issued upon conversion, exchange or exercise, as applicable, of any preferred stock, debt securities, units or warrants registered hereby.
- (4) The registration fee has been calculated in accordance with Rule 457(o) under the Securities Act.
- (5) Each unit will be issued under a unit agreement and will represent an interest in two or more securities, which may or may not be separable from one another.
- (6) Pursuant to Rule 457(p) under the Securities Act, a registration fee of \$31,125 was paid with respect to securities available for issuance under a Registration Statement on Form S-3 (File No. 333-222366) filed by the registrant on December 29, 2017 and declared effective on January 10, 2018 (the Prior Registration Statement). Pursuant to Rule 457(p) under the Securities Act, \$2,663.57 of the registration fee attributable to unsold securities registered under the Prior Registration Statement is hereby offset against the registration fee due under this registration statement. Pursuant to Rule 415(a)(6) under the Securities Act, the offering of the unsold securities registered under the Prior Registration Statement will be deemed terminated as of the date of effectiveness of this registration statement.

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.

EXPLANATORY NOTE

This registration statement contains:

- a base prospectus covering the offering, issuance and sale by us of up to \$300,000,000 in the aggregate of the securities identified on the cover of this prospectus from time to time in one or more offerings; and
- a prospectus supplement covering the offering, issuance and sale by us of up to a maximum aggregate offering price of \$100,000,000 of our common stock that may be issued and sold under an Open Market Sale AgreementSM (the Sales Agreement) entered into with Jefferies LLC.

The base prospectus immediately follows this explanatory note. The specific terms of any securities to be offered pursuant to the base prospectus will be specified in a prospectus supplement and any related free writing prospectus to the base prospectus. The Sales Agreement prospectus supplement immediately follows the base prospectus. The \$100,000,000 of common stock that may be offered, issued and sold by us under the Sales Agreement prospectus supplement is included in the \$300,000,000 of securities that may be offered, issued and sold by us under the base prospectus. Upon termination of the Sales Agreement, any portion of the \$100,000,000 included in the Sales Agreement prospectus supplement that has not been sold pursuant to the Sales Agreement will be available for sale in other offerings pursuant to the base prospectus, and if no shares have been sold under the Sales Agreement, the full \$100,000,000 will be available for sale in other offerings pursuant to the base prospectus and one or more prospectus supplements and any related free writing prospectus.

The information in this prospectus is not complete and may be changed. These securities may not be sold until the registration statement filed with the Securities and Exchange Commission is effective. This 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 AUGUST 28, 2020**

PROSPECTUS

\$300,000,000



**Common Stock
Preferred Stock
Debt Securities
Warrants
Units**

We may from time to time issue, in one or more series or classes, up to \$300,000,000 of our common stock, preferred stock, debt securities, warrants and/or units. We may offer these securities separately or together in units. We will specify the terms of the securities being offered in one or more prospectus supplements and/or any related free writing prospectuses, which may also supplement, update or amend information contained or incorporated by reference in this prospectus.

We may sell these securities to or through underwriters and also to other purchasers or through agents. We will set forth the names of any underwriters or agents, and any fees, conversions, or discount arrangements, in a prospectus supplement and/or related free writing prospectus.

You should read this prospectus and any prospectus supplement and/or any related free writing prospectuses, as well as the documents incorporated by reference herein or therein, carefully before you invest in our securities.

Our common stock is listed on The Nasdaq Global Select Market under the symbol "ASMB." On August 26, 2020, the last reported sale price of our common stock on The Nasdaq Global Select Market was \$21.04 per share. Our principal executive offices are located at 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080, and our telephone number is (833) 509-4583.

Investing in our securities involves a high degree of risk. You should review carefully the risks and uncertainties described under the heading "[Risk Factors](#)" beginning on page 2 of this prospectus and under similar headings in any applicable prospectus supplement and any related free writing prospectus and in the other documents that are incorporated by reference herein and therein.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if this prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

The date of this Prospectus is _____, 2020.

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ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement that we filed with the Securities and Exchange Commission (the SEC) using a “shelf” registration process. Under this shelf registration process, we may from time to time sell any combination of the securities described in this prospectus in one or more offerings for an aggregate offering price of up to \$300,000,000.

This prospectus provides you with a general description of the securities we may offer. Each time we sell securities, we will provide one or more prospectus supplements and/or related free writing prospectuses that will contain specific information about the terms of the offering. The prospectus supplement and any related free writing prospectus may also supplement, update or change information contained or incorporated by reference in this prospectus. You should read this prospectus, the accompanying prospectus supplement and any related free writing prospectus, together with the additional information described under the heading “Where You Can Find More Information” beginning on page 32 of this prospectus.

You should rely only on the information contained or incorporated by reference in this prospectus and the applicable prospectus supplement, along with the information in any related free writing prospectus filed by us with the SEC. We have not authorized anyone to provide you with different information. This prospectus and the accompanying prospectus supplement and any related free writing prospectus do not constitute an offer to sell or the solicitation of an offer to buy any securities other than the securities described in the accompanying prospectus supplement and any related free writing prospectus or an offer to sell or the solicitation of an offer to buy such securities in any jurisdiction in which such offer or solicitation is not permitted. The information contained in this prospectus, any prospectus supplement and any related free writing prospectus, as well as the documents incorporated by reference herein and therein is accurate only as of their respective dates (or any such earlier date as of which such information is given), regardless of the time of delivery of any such document or the time of any sale of any security. Our business, financial condition, results of operations and prospects may have changed materially since those dates.

This prospectus, any prospectus supplement and any related free writing prospectus, and the documents incorporated by reference herein and therein, may contain estimates, projections and other information concerning our industry, our business, and the markets for certain diseases, including data regarding the estimated size of those markets, and the incidence and prevalence of certain medical conditions. Information that is based on estimates, forecasts, projections, market research or similar methodologies is inherently subject to uncertainties and actual events or circumstances may differ materially from events and circumstances reflected in this information. Unless otherwise expressly stated, we obtained this industry, business, market and other data from reports, research surveys, studies and similar data prepared by market research firms and other third parties, industry, medical and general publications, government data and similar sources. Additionally, while such information has been obtained from sources believed to be reliable, there can be no assurance as to the accuracy or completeness of the included information. The Company has not independently verified any of the data from third-party sources, nor has the Company ascertained the underlying economic assumptions relied upon therein. While such information is believed to be reliable for the purposes used herein, none of the Company, its affiliates, nor their respective directors, officers, employees, members, partners, stockholders or agents make any representation or warranty with respect to the accuracy of such information.

Unless otherwise specified or the context otherwise requires, references in this prospectus to “Assembly,” “we,” “our,” “us” and “the Company” refer, collectively, to Assembly Biosciences, Inc., a Delaware corporation, and its consolidated subsidiaries.

RISK FACTORS

Investing in our securities involves a high degree of risk. You should carefully consider the risks described in the documents incorporated by reference in this prospectus and any applicable prospectus supplement (including our most recent Annual Report on Form 10-K and Quarterly Report on Form 10-Q) and/or any related free writing prospectus, as well as the documents included or incorporated by reference herein and therein, before making an investment decision. The risks described in those documents are not the only ones we face. Our business, financial condition, results of operations and prospects could be materially adversely affected by the materialization of any of these risks. The trading price of our securities could decline due to the materialization of any of these risks, and you may lose all or part of your investment.

CAUTIONARY STATEMENT REGARDING FORWARD-LOOKING STATEMENTS

This prospectus, any applicable prospectus supplement, any related free writing prospectus and the documents that we incorporate by reference herein and therein contain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended (the Securities Act) and Section 21E of the Securities Exchange Act of 1934, as amended (the Exchange Act). All statements other than statements of historical facts contained in this prospectus, any applicable prospectus supplement, any related free writing prospectus and any documents incorporated by reference, including statements regarding our strategy, future operations, future financial position, future revenues, projected costs, prospects, plans and objectives of management, are forward-looking statements. These statements are often, but are not always, made through the use of words or phrases such as “anticipate,” “believe,” “contemplate,” “continue,” “could,” “estimate,” “expect,” “intend,” “may,” “plan,” “potential,” “predict,” “project,” “seek,” “should,” “target,” “will,” “would” and similar expressions, or the negative of these terms, or similar expressions. Accordingly, these statements involve estimates, assumptions and uncertainties that could cause actual results to differ materially from those expressed in them. Any forward-looking statements are qualified in their entirety by reference to the factors discussed throughout this prospectus, any applicable prospectus supplement and any related free writing prospectus, as well as the information and documents incorporated by reference herein and therein, and in particular those factors referenced in the section “Risk Factors.”

Forward-looking statements include, but are not limited to, statements about:

- the initiation, timing, progress and results of clinical trials and nonclinical studies, and our research and development programs;
- the potential impact of the ongoing COVID-19 pandemic on the timing and progress of our ongoing clinical trials, our business, results of operations, liquidity and operations and our ability to mitigate those potential impacts;
- the clinical and therapeutic potential of our product candidates;
- our unproven approach to therapeutic intervention;
- our plans to develop and commercialize our product candidates;
- the potential benefits of our existing collaborations and our ability to establish and maintain collaborations;
- our ability to obtain additional funding;
- the timing or likelihood of regulatory filings and approvals for our product candidates;
- the implementation of our business model, strategic plans for our business, product candidates and technology;
- our commercialization, marketing and manufacturing capabilities and strategy;
- the rate and degree of market acceptance and clinical utility of our products;
- our ability to retain and recruit key personnel;

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- our ability to manage growth;
- our competitive position;
- our intellectual property position;
- developments and projections relating to our competitors and our industry; and
- our estimates regarding expenses, future revenue, capital requirements and needs for additional financing.

The forward-looking statements are based on our management's beliefs and assumptions and on information currently available to our management. These statements involve known and unknown risks, uncertainties and other factors that may cause our actual results or events to be materially different from the plans, intentions and expectations expressed or implied by these forward-looking statements, including, without limitation the risk factors and cautionary statements described in other documents that we file from time to time with the SEC, specifically under "Item 1A: Risk Factors" and elsewhere in our Annual Report on Form 10-K for the year ended December 31, 2019 and in our Quarterly Report on Form 10-Q for the period ended June 30, 2020 and the section of this prospectus and any applicable prospectus supplement titled "Risk Factors."

The forward-looking statements in this prospectus, any applicable prospectus supplement and any related free writing prospectus, as well as the documents incorporated by reference herein and therein, represent our views as of their respective dates. We anticipate that subsequent events and developments will cause our views to change. However, while we may elect to update these forward-looking statements at some point in the future, we assume no obligation to update or revise any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by law. You should, therefore, not rely on these forward-looking statements as representing our views as of any date subsequent to the dates on which they were made.

OUR COMPANY

We are a clinical-stage biotechnology company developing innovative therapeutics targeting chronic hepatitis B virus (HBV) infection and disorders associated with the microbiome. Our HBV Cure program is focused on advancing a new class of potent, oral core inhibitors that have the potential to increase cure rates for chronically infected patients. Our Microbiome program is developing novel oral live microbial biotherapeutic candidates with our fully integrated platform, including a robust process for strain identification and selection, current Good Manufacturing Practice (cGMP) manufacturing expertise and targeted delivery to the lower gastrointestinal tract with the GEMICEL® technology.

Over 250 million people worldwide are chronically infected with HBV. Our HBV Cure program is pursuing multiple drug candidates that inhibit the HBV lifecycle and block the generation of covalently closed circular DNA (cccDNA), with the aim of increasing the current low cure rate for patients with HBV. We have discovered several novel core inhibitors, which are small molecules that directly target and allosterically modulate the HBV core protein.

In recent years, there has been increasing scientific evidence suggesting the therapeutic potential of the human microbiome—the billions of microbes living in and on people—to impact health and disease. Our Microbiome program builds upon experience reported in the literature of successfully treating various disease indications with fecal microbiota transplants and seeks to provide a pharmacologically relevant therapy using a “drug like” approach that delivers targeted and specific microbiome therapies in an oral capsule.

Our Microbiome program consists of a fully integrated platform that includes a biological-function-based strain isolation, identification, characterization and selection process, methods for strain purification and growth under conditions compliant with cGMP requirements, and a licensed patented delivery system that we call GEMICEL®, which is designed to allow for targeted oral delivery of live biologic and conventional therapies to the lower gastrointestinal tract.

We currently have corporate and administrative offices and research laboratory space in South San Francisco, California and research, development and small-scale manufacturing activities in Groton, Connecticut. We also currently have an administrative office and research laboratory space in Shanghai, China and a regulatory office in Beijing, China.

Assembly Biosciences, Inc., formerly known as Ventrus BioSciences, Inc., was incorporated under the laws of the State of Delaware on October 7, 2005, originally under the name South Island Biosciences, Inc. On July 11, 2014, we acquired Assembly Pharmaceuticals, Inc., a private company (the Merger). In connection with the Merger, we changed our name from Ventrus Biosciences, Inc. to Assembly Biosciences, Inc. Our principal executive office is located at 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080 and our telephone number is (833) 509-4583. Our corporate website address is www.assemblybio.com. We do not incorporate the information contained on, or accessible through, our website into this prospectus, and you should not consider it part of this prospectus.

We own various U.S. federal and foreign trademark applications, and unregistered trademarks, including our corporate name and our corporate logo. GEMICEL® is our trademark. This prospectus, any applicable prospectus supplement and any related free writing prospectus and the documents incorporated by reference herein may also contain trademarks and trade names that are the property of their respective owners.

USE OF PROCEEDS

We intend to use the net proceeds from the sale of any securities offered under this prospectus for general corporate purposes unless otherwise indicated in the applicable prospectus supplement or any related free writing prospectus. General corporate purposes may include research and development costs, potential strategic acquisitions of complementary businesses, services or technologies, repayment and refinancing of debt, working capital and capital expenditures. We may temporarily invest the net proceeds in a variety of capital preservation instruments, including investment grade, interest bearing instruments and U.S. government securities, until they are used for their stated purpose. We have not determined the amount of net proceeds to be used specifically for such purposes. As a result, management will retain broad discretion over the allocation of net proceeds.

SECURITIES WE MAY OFFER

This prospectus contains summary descriptions of the securities we may offer from time to time. These summary descriptions are not meant to be complete descriptions of each security. The particular terms of any security will be described in the applicable prospectus supplement and/or any related free writing prospectus.

DESCRIPTION OF CAPITAL STOCK

The following description of our common stock and preferred stock, together with the additional information we include in any applicable prospectus supplement and/or any related free writing prospectus, summarizes the material terms and provisions of the common stock and preferred stock that we may offer under this prospectus. The following description of our capital stock does not purport to be complete and is subject to, and qualified in its entirety by, our Fifth Amended and Restated Certificate of Incorporation (our Certificate of Incorporation) and our amended and restated bylaws (our Bylaws), which are filed as exhibits to the registration statement of which this prospectus forms a part, and by applicable law (including Delaware law).

Authorized Capital Stock

Our authorized capital stock consists of 100,000,000 shares of common stock, par value \$0.001 per share, and 5,000,000 shares of preferred stock, par value \$0.001 per share. As of June 30, 2020, we had 32,807,519 shares of common stock outstanding and no shares of preferred stock outstanding.

Common Stock

The holders of our common stock are entitled to one vote per share on all matters to be voted on by the stockholders, and there are no cumulative voting rights.

The holders of common stock are entitled to receive ratable dividends, if any, payable in cash, in stock or otherwise if, as and when declared from time to time by our board of directors out of funds legally available therefor, subject to any preferential rights that may be applicable to any outstanding preferred stock. In the event of a liquidation, dissolution or winding up of our company, after payment in full of all outstanding debts and other liabilities, the holders of common stock are entitled to share ratably in all remaining assets, subject to prior distribution rights of preferred stock, if any, then outstanding. No shares of common stock have preemptive rights or other subscription rights to purchase additional shares of common stock. There are no redemption or sinking fund provisions applicable to the common stock. All outstanding shares of our common stock are fully paid and nonassessable, and the shares of common stock included in the registration statement of which this prospectus forms a part will be fully paid and nonassessable upon issuance. The rights, preferences and privileges of holders of our common stock will be subject to, and might be adversely affected by, the rights of holders of any preferred stock that we may issue in the future.

Listing

Our common stock is listed on The Nasdaq Global Select Market under the symbol "ASMB." On August 26, 2020, the last reported sale price of our common stock on The Nasdaq Global Select Market was \$21.04 per share.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is VStock Transfer, LLC, Inc. The transfer agent's address is 18 Lafayette Place, Woodmere, New York 11598 and its telephone number is (212) 828-8436.

Preferred Stock

Our board of directors is authorized to issue up to 5,000,000 shares of preferred stock in one or more series without stockholder approval. Our board of directors may determine the rights, preferences, privileges and restrictions, including voting rights, dividend rights, conversion rights, redemption privileges and liquidation

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preferences, of each series of preferred stock. The purpose of authorizing our board of directors to issue preferred stock in one or more series and determine the number of shares in the series and its rights and preferences is to eliminate delays associated with a stockholder vote on specific issuances. The existence of authorized but unissued shares of preferred stock may enable our board of directors to render more difficult or to discourage an attempt to obtain control of us by means of a merger, tender offer, proxy contest or otherwise. The rights of holders of our common stock described above will be subject to, and may be adversely affected by, the rights of any preferred stock that we may designate and issue in the future. The issuance of shares of preferred stock could decrease the amount of earnings and assets available for distribution to holders of shares of common stock. The issuance may also adversely affect the rights and powers, including voting rights, of these holders and may have the effect of delaying, deterring or preventing a change in control of us.

We will incorporate by reference as an exhibit to the registration statement of which this prospectus forms a part the form of any certificate of designation that describes the terms of any series of preferred stock we may offer. This description and the applicable prospectus supplement and/or any related free writing prospectus may include the following terms, among others, where applicable:

- the title and stated value;
- the number of shares authorized;
- the liquidation preference per share;
- the purchase price;
- the dividend rate, period and payment date, and method of calculation for dividends;
- whether dividends will be cumulative or non-cumulative and, if cumulative, the date from which dividends will accumulate;
- the procedures for any auction and remarketing, if any;
- the provisions for a sinking fund, if any;
- the provisions for redemption or repurchase, if applicable, and any restrictions on our ability to exercise those redemption and repurchase rights;
- any listing of the preferred stock on any securities exchange or market;
- whether the preferred stock will be convertible into our common stock, and, if applicable, the conversion price, or how it will be calculated, and the conversion period;
- whether the preferred stock will be exchangeable into debt securities, and, if applicable, the exchange price, or how it will be calculated, and the exchange period;
- voting rights, if any, of the preferred stock;
- preemptive rights, if any;
- restrictions on transfer, sale or other assignment, if any;
- whether interests in the preferred stock will be represented by depositary shares;
- a discussion of any material U.S. federal income tax considerations applicable to the preferred stock;
- the relative ranking and preferences of the preferred stock as to dividend rights and rights if we liquidate, dissolve or wind up our affairs;
- any limitations on issuance of any class or series of preferred stock ranking senior to or on a parity with the series of preferred stock as to dividend rights and rights if we liquidate, dissolve or wind up our affairs; and
- any other specific terms, preferences, rights or limitations of, or restrictions on, the preferred stock.

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When we issue shares of preferred stock under this prospectus, the shares will fully be paid and nonassessable and will not have, or be subject to, any preemptive or similar rights.

Provisions of our Certificate of Incorporation and Bylaws and Delaware Anti-Takeover Law

Certain provisions of the Delaware General Corporation Law (the DGCL), our Certificate of Incorporation and our Bylaws could have the effect of delaying, deferring or discouraging another party from acquiring control of us. These provisions, which are summarized below, are expected to discourage certain types of coercive takeover practices and inadequate takeover bids 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 are also designed in part to encourage anyone seeking to acquire control of us or considering unsolicited tender offers or other unilateral takeover proposals to first negotiate with our board of directors rather than pursue non-negotiated 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. However, we believe that the advantages gained by protecting our ability to negotiate with any unsolicited and potentially unfriendly acquirer outweigh the disadvantages of discouraging such proposals, including those priced above the then-current market value of our common stock, because, among other reasons, the negotiation of such proposals could improve their terms.

Delaware Anti-Takeover Law

We are subject to the provisions of Section 203 of the DGCL (Section 203). In general, Section 203 prohibits a publicly held Delaware corporation from engaging in a “business combination” with an “interested stockholder” for a three-year period following the time that this stockholder becomes an interested stockholder, unless the business combination is approved in a prescribed manner. A “business combination” includes, among other things, 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 such person’s affiliates and associates, owns, or did own within three years prior to such determination, 15% or more of the corporation’s voting stock. Under Section 203, a business combination between a corporation and an interested stockholder is prohibited unless it satisfies one of the following conditions:

- before the stockholder became interested, the board of directors of the corporation approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder;
- upon consummation 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, excluding, for purposes of determining the voting stock outstanding, shares owned by persons who are directors and also officers, and employee stock plans, in some instances; or
- at or after the time the stockholder became interested, the business combination was approved by the board of directors of the corporation and authorized at an annual or special meeting of the stockholders by the affirmative vote of at least two-thirds of the outstanding voting stock that is not owned by the interested stockholder.

Charter Documents

Our Certificate of Incorporation and our Bylaws include a number of provisions that may have the effect of deterring hostile takeovers or delaying or preventing changes in control or management of our company. First, our Certificate of Incorporation and our Bylaws provide that all stockholder action must be effected at a duly called meeting of stockholders and not by a consent in writing. Further, our Bylaws limit who may call special meetings of the stockholders. Our Certificate of Incorporation does not include a provision for cumulative voting for directors. Under cumulative voting, a minority stockholder holding a sufficient percentage of a class of shares

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may be able to ensure the election of one or more directors. Our Bylaws provide that the number of directors on our board, which may range from three to ten directors, shall be exclusively fixed by our board, which has set the number of directors at eight. Newly created directorships resulting from any increase in our authorized number of directors and any vacancies in our board resulting from death, resignation, retirement, disqualification or other cause (including removal from office by a vote of the stockholders) will be filled by a majority of our board then in office. Finally, our Bylaws establish procedures and other terms and conditions, including advance notice procedures, regarding special meeting requests by stockholders holding in the aggregate at least 25% of our outstanding common stock, nomination of candidates for election as directors and stockholder proposals. These and other provisions of our Certificate of Incorporation, our Bylaws and Delaware law could discourage potential acquisition proposals and could delay or prevent a change in control or management of our company.

Our Bylaws also provide that the Court of Chancery of the State of Delaware (or if such court does not have jurisdiction, the Superior Court of Delaware, or if such other court does not have jurisdiction, the United States District Court for the District of Delaware) will be the exclusive forum for: any derivative action or proceeding brought on our behalf; any action asserting a breach of fiduciary duty; any action asserting a claim against us arising pursuant to the DGCL, our Certificate of Incorporation or our Bylaws; or any action asserting a claim against us that is governed by the internal affairs doctrine. The enforceability of similar choice of forum provisions in other companies' organizational documents has been challenged in legal proceedings and, while the Delaware Supreme Court recently upheld the validity of certain choice of forum provisions, it is possible that, in connection with one or more actions or proceedings described above, a court could find the choice of forum provisions contained in our Bylaws to be inapplicable or unenforceable.

DESCRIPTION OF DEBT SECURITIES

The paragraphs below describe the general terms and provisions of the debt securities we may issue. When we offer to sell a particular series of debt securities, we will describe the specific terms of such series, including any additional covenants or other terms or changes to existing covenants or other terms relating to such series, in a prospectus supplement and/or any related free writing prospectus. The prospectus supplement and/or any related free writing prospectus will also indicate whether the general terms and provisions described in this prospectus apply to a particular series of debt securities. We urge you to read any prospectus supplement and/or any related free writing prospectus related to any series of debt securities we may offer under this prospectus, as well as the actual indenture and any related supplemental indenture or officer's certificate containing the terms of the debt securities.

We may offer senior or subordinated debt securities. Each series of debt securities may have different terms. The senior debt securities will be issued under one or more senior indentures, dated as of a date on or prior to such issuance, between us and the trustee identified in the applicable prospectus supplement and/or any related free writing prospectus, each as amended or supplemented from time to time. We will refer to any such indenture throughout this prospectus as the "senior indenture." Any subordinated debt securities will be issued under one or more indentures, dated as of a date on or prior to such issuance, between us and the trustee identified in the applicable prospectus supplement and/or any related free writing prospectus, each as amended or supplemented from time to time. We will refer to any such indenture throughout this prospectus as the "subordinated indenture." We will refer to the trustee under the senior indenture or the subordinated indenture as the "trustee." The senior indenture and the subordinated indenture are sometimes collectively referred to in this prospectus as the "indentures." The indentures will be subject to and governed by the Trust Indenture Act of 1939, as amended (the Trust Indenture Act). We have included copies of the forms of the indentures as exhibits to our registration statement of which this prospectus forms a part, however such forms will be amended and supplemented or replaced by one or more supplemental indentures or officer's certificates or otherwise with respect to the specific terms of any series of debt securities we may offer.

If we issue debt securities at a discount from their principal amount, then, for purposes of calculating the aggregate offering price of the offered securities issued under this prospectus, we will include only the offering price of the debt securities and not the principal amount of the debt securities.

We have summarized below the material provisions of the indentures and the debt securities, or indicated which material provisions will be described in a prospectus supplement and/or any related free writing prospectus. The prospectus supplement and/or any related free writing prospectus relating to any particular securities offered will describe the specific terms of the securities, which may be in addition to or different from the general terms summarized in this prospectus. Because the summary in this prospectus and in any prospectus supplement and/or any related free writing prospectus does not contain all of the information that you may find useful, you should read the documents relating to the securities that are described in this prospectus or in any applicable prospectus supplement and/or any related free writing prospectus. Please read "Where You Can Find More Information" to find out how you can obtain a copy of those documents. Except as otherwise indicated, the terms of the indentures are identical. As used under this caption, the term "debt securities" includes the debt securities being offered by this prospectus and all other debt securities that may be issued by us under the indentures.

General

The indentures:

- do not limit the amount of debt securities that we may issue;
- allow us to issue debt securities in one or more series;
- do not require us to issue all of the debt securities of a series at the same time;
- allow us to reopen a series to issue additional debt securities without the consent of the holders of the debt securities of such series; and

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- provide that the debt securities will be unsecured, except as may be set forth in the applicable prospectus supplement and/or any related free writing prospectus.

Unless we give you different information in the applicable prospectus supplement and/or any related free writing prospectus, the senior debt securities will be unsubordinated obligations and will be equal in right of payment with all of our other unsecured and unsubordinated indebtedness (if any). Payments on the subordinated debt securities will be subordinated in right of payment to the prior payment in full of all of our senior indebtedness, as described under “—Subordination” and in the applicable prospectus supplement and/or any related free writing prospectus.

Each indenture provides that we may, but need not, designate more than one trustee under an indenture. Any trustee under an indenture may resign or be removed and a successor trustee may be appointed to act with respect to the series of debt securities administered by the resigning or removed trustee. If two or more persons are acting as trustee with respect to different series of debt securities, each trustee shall be a trustee of a trust under the applicable indenture separate and apart from the trust administered by any other trustee. Except as otherwise indicated in this prospectus, any action described in this prospectus to be taken by each trustee may be taken by each trustee with respect to, and only with respect to, the one or more series of debt securities for which it is trustee under the applicable indenture.

The prospectus supplement and/or any related free writing prospectus for each offering may include the following terms, among others, where applicable:

- the title of the debt securities and whether they are senior or subordinated;
- the aggregate principal amount of the debt securities being offered, the aggregate principal amount of the debt securities outstanding as of the most recent practicable date and any limit on their aggregate principal amount, including the aggregate principal amount of debt securities authorized;
- the price at which the debt securities will be issued, expressed as a percentage of the principal, and, if other than the principal amount thereof, the portion of the principal amount thereof payable upon declaration of acceleration of the maturity thereof or, if applicable, the portion of the principal amount of such debt securities that is convertible into common stock or other securities of ours or the method by which any such portion shall be determined;
- if convertible, the terms on which such debt securities are convertible, including the initial conversion price or rate and the conversion period and any applicable limitations on the ownership or transferability of common stock or other securities of ours received on conversion;
- the date or dates, or the method for determining the date or dates, on which the principal of the debt securities will be payable;
- the fixed or variable interest rate or rates of the debt securities, or the method by which the interest rate or rates is determined;
- the date or dates, or the method for determining the date or dates, from which interest will accrue;
- the dates on which interest will be payable;
- the record dates for interest payment dates, or the method by which such dates will be determined;
- the persons to whom interest will be payable;
- the basis upon which interest will be calculated if other than that of a 360-day year of twelve 30-day months;
- any make-whole amount or other premium, which is the amount in addition to principal and interest that is required to be paid to the holder of the debt security as a result of any redemption or repurchase or accelerated payment of such debt security, or the method for determining the make-whole amount or other premium;

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- the place or places where the principal of, and any premium or make-whole amount, and interest on, the debt securities will be payable;
- where the debt securities may be surrendered for registration of transfer or conversion or exchange;
- where notices or demands to or upon us in respect of the debt securities and the applicable indenture may be served;
- the times, prices and other terms and conditions upon which we may redeem or repurchase the debt securities;
- any obligation we have to redeem, repay or purchase the debt securities pursuant to any sinking fund or analogous provision or at the option of holders of such securities, and the times and prices at which we must redeem, repay or purchase such securities as a result of such obligation;
- the currency or currencies in which the debt securities are denominated and payable if other than U.S. dollars, which may be a foreign currency or units of two or more foreign currencies or a composite currency or currencies and the terms and conditions relating thereto, and the manner of determining the equivalent of such foreign currency in United States dollars;
- whether the principal of, and any premium or make-whole amount, or interest on, the debt securities are to be payable, at our election or at the election of a holder, in a currency or currencies other than that in which such securities are denominated or stated to be payable, and other related terms and conditions;
- whether the amount of payments of principal of, and any premium or make-whole amount, or interest on, the debt securities may be determined according to an index, formula or other method and how such amounts will be determined;
- whether the debt securities will be in registered form, bearer form, or both, and (1) if in registered form, the person to whom any interest shall be payable, if other than the person in whose name such security is registered at the close of business on the regular record date for such interest, or (2) if in bearer form, the manner in which, or the person to whom, any interest on such security shall be payable if otherwise than upon presentation and surrender upon maturity;
- any restrictions applicable to the offer, sale or delivery of debt securities in bearer form and the terms upon which such securities may be exchanged for securities in registered form and vice versa, if permitted by applicable laws and regulations;
- whether the debt securities are to be issuable initially in temporary global form and whether such securities are to be issuable in permanent global form with or without coupons and, if so, whether beneficial owners of interests in any such permanent global security may, or shall be required to, exchange their interests for other debt securities, and the manner in which interest shall be paid;
- the identity of the depositary for debt securities in registered form, if such series are to be issuable as a global security;
- the date as of which the debt securities in bearer form or in temporary global form shall be dated if other than the original issuance date of the first such security to be issued;
- the applicability, if any, of the defeasance and covenant defeasance provisions described in this prospectus or in the applicable indenture;
- whether and under what circumstances we will pay any additional amounts on the debt securities in respect of any tax, assessment or governmental charge and, if so, whether we will have the option to redeem such securities in lieu of making such a payment;
- whether and under what circumstances the debt securities being offered are convertible into common stock or other securities of ours, as the case may be, including the conversion price or rate and the manner or calculation thereof;

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- the circumstances, if any, specified in the applicable prospectus supplement and/or any related free writing prospectus, under which beneficial owners of interests in the global security may obtain definitive debt securities and the manner in which payments on a permanent global debt security will be made if any debt securities are issuable in temporary or permanent global form;
- any provisions granting special rights to holders of the debt securities upon the occurrence of such events as specified in the applicable prospectus supplement and/or any related free writing prospectus;
- if the debt securities are to be issuable in definitive form only upon receipt of certain certificates or other documents or satisfaction of other conditions, then the form and/or terms of such certificates, documents or conditions;
- the name of the applicable trustee and the nature of any material relationship with us or any of our affiliates, and the percentage of the debt securities necessary to require the trustee to take action;
- any deletions from, modifications of or additions to our events of default or covenants with regard to the debt securities and any change in the right of any trustee or any of the holders to declare the principal amount of any of such securities due and payable;
- applicable CUSIP numbers; and
- any other terms of the debt securities not inconsistent with the provisions of the applicable indenture, as it may be replaced, amended or supplemented.

We may issue debt securities that provide for less than the entire principal amount thereof to be payable upon declaration of acceleration of the maturity of the debt securities. We refer to any such debt securities throughout this prospectus as “original issue discount securities.” The applicable prospectus supplement and/or any related free writing prospectus will describe the U.S. federal income tax consequences and other relevant considerations applicable to original issue discount securities.

We also may issue indexed debt securities. Payments of principal of, and premium and interest on, indexed debt securities are determined with reference to the rate of exchange between the currency or currency unit in which the debt security is denominated and any other currency or currency unit specified by us, to the relationship between two or more currencies or currency units or by other similar methods or formulas specified in the prospectus supplement and/or any related free writing prospectus.

Except as described under “—Merger, Consolidation or Sale of Assets” or as may be set forth in any prospectus supplement and/or any related free writing prospectus, the debt securities will not contain any provisions that would (1) limit our ability to incur indebtedness or (2) afford holders of debt securities protection in the event of (a) a highly leveraged or similar transaction involving us or (b) a change of control or reorganization, restructuring, merger or similar transaction involving us that may adversely affect the holders of the debt securities. In the future, we may enter into transactions, such as the sale of all or substantially all of our assets or a merger or consolidation, that may have an adverse effect on our ability to service our indebtedness, including the debt securities, by, among other things, substantially reducing or eliminating our assets.

Our governing instruments do not define the term “substantially all” as it relates to the sale of assets. Additionally, case law interpreting the term “substantially all” relies upon the facts and circumstances of each particular case. Consequently, to determine whether a sale of “substantially all” of our assets has occurred, a holder of debt securities must review the financial and other information that we have disclosed to the public.

We will provide you with more information in the applicable prospectus supplement and/or any related free writing prospectus regarding any deletions, modifications or additions to the events of default or covenants or other terms that are described above or below.

Payment

Unless we give you different information in the applicable prospectus supplement and/or any related free writing prospectus, the principal of, and any premium or make-whole amount, and interest on, any series of the

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debt securities will be payable at the corporate trust office of the trustee. We will provide you with the address of the trustee in the applicable prospectus supplement and/or any related free writing prospectus. We may also pay interest by mailing a check to the address of the person entitled to it as it appears in the applicable register for the debt securities or by wire transfer of funds to that person at an account maintained within the United States or in accordance with the applicable procedures of the Depository Trust Company (DTC) or any other applicable depository company.

All monies that we pay to a paying agent or a trustee for the payment of the principal of, and any premium or make-whole amount, or interest on, any debt security will be repaid to us if unclaimed at the end of two years after the obligation underlying payment becomes due and payable. After funds have been returned to us, the holder of the debt security may look only to us for payment, without payment of interest for the period which we hold the funds.

Denomination, Interest, Registration and Transfer

Unless otherwise described in the applicable prospectus supplement and/or any related free writing prospectus, the debt securities of any series will be issuable in a minimum denomination of \$1,000 and integral multiples of \$1,000.

Subject to the limitations imposed upon debt securities that are evidenced by a book-entry position in the records of DTC or another depository company rather than by physical delivery of a note, a holder of debt securities of any series may:

- exchange such debt securities for any authorized denomination of other debt securities of the same series and of a like aggregate principal amount and kind upon surrender of such debt securities at the corporate trust office of the applicable trustee or at the office of any transfer agent that we designate for such purpose; and
- surrender such debt securities for registration of transfer or exchange at the corporate trust office of the applicable trustee or at the office of any transfer agent that we designate for such purpose.

Every debt security surrendered for registration of transfer or exchange must be duly endorsed or accompanied by a written instrument of transfer satisfactory to the applicable trustee or transfer agent or, as applicable, comply with the applicable procedures of DTC or another depository company. Payment of a service charge will not be required for any registration of transfer or exchange of any debt securities, but we or the trustee may require payment of a sum sufficient to cover any tax or other governmental charge payable in connection therewith. If in addition to the applicable trustee, the applicable prospectus supplement and/or any related free writing prospectus refers to any transfer agent initially designated by us for any series of debt securities, we may at any time rescind the designation of any such transfer agent or approve a change in the location through which any such transfer agent acts, except that we will be required to maintain a transfer agent in each place of payment for such series. We may at any time designate additional transfer agents for any series of debt securities.

Neither we, nor any trustee, will be required to:

- issue, register the transfer of or exchange debt securities of any series during a period beginning at the opening of business 15 days before the day that the notice of redemption of any debt securities selected for redemption is mailed and ending at the close of business on the day of such mailing;
- register the transfer of or exchange any debt security, or portion thereof, so selected for redemption, in whole or in part, except the unredeemed portion of any debt security being redeemed in part; or
- issue, register the transfer of or exchange any debt security that has been surrendered for repayment at the option of the holder, except the portion, if any, of such debt security not to be so repaid.

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Merger, Consolidation or Sale of Assets

The indentures provide that we may, without the consent of the holders of any outstanding debt securities, (1) consolidate with, (2) sell, lease or convey all or substantially all of our assets to or (3) merge with or into any other entity, provided that:

- either we are the continuing entity, or the successor entity, if other than us, assumes the obligations to (a) pay the principal of, and any premium or make-whole amount, and interest on, all of the debt securities and (b) duly perform and observe all of the covenants and conditions contained in each indenture;
- after giving effect to the transaction, there is no event of default under the indentures and no event which, after notice or the lapse of time, or both, would become such an event of default, occurs and continues; and
- an officers' certificate and legal opinion covering such conditions are delivered to each applicable trustee.

Covenants

Existence

Except as described under “—Merger, Consolidation or Sale of Assets,” the indentures require us to do or cause to be done all things necessary to preserve and keep in full force and effect our existence, rights and franchises. However, the indentures do not require us to preserve any right or franchise if we determine that any right or franchise is no longer desirable in the conduct of our business.

Payment of Taxes and Other Claims

The indentures require us to pay, discharge or cause to be paid or discharged, before they become delinquent, (1) all taxes, assessments and governmental charges levied or imposed on us and (2) all lawful claims for labor, materials and supplies which, if unpaid, might by law become a lien upon our property. However, we will not be required to pay, discharge or cause to be paid or discharged any such tax, assessment, charge or claim whose amount, applicability or validity is being contested in good faith by appropriate proceedings.

Provision of Financial Information

The indentures require us to (1) within 15 days of each of the respective dates by which we are required to file our annual reports, quarterly reports and other documents with the SEC, file with the trustee copies of the annual report, quarterly report and other documents that we file with the SEC under Section 13 or 15(d) of the Exchange Act, (2) file with the trustee and the SEC any additional information, documents and reports regarding compliance by us with the conditions and covenants of the indentures, as required, (3) within 30 days after the filing with the trustee, mail to all holders of debt securities, as their names and addresses appear in the applicable register for such debt securities, without cost to such holders, summaries of any documents and reports required to be filed by us pursuant to (1) and (2) above, and (4) supply, promptly upon written request and payment of the reasonable cost of duplication and delivery, copies of such documents to any prospective holder of debt securities.

Additional Covenants

The applicable prospectus supplement and/or any related free writing prospectus will set forth any of our additional covenants relating to any series of debt securities.

Events of Default, Notice and Waiver

Unless the applicable prospectus supplement and/or any related free writing prospectus states otherwise, when we refer to “events of default” as defined in the indentures with respect to any series of debt securities, we mean:

- default in the payment of any installment of interest on such debt security continuing for 30 days;
- default in the payment of principal of, or any premium or make-whole amount on, such debt security at its stated maturity;
- default in making any sinking fund payment as required for such debt security;
- default in the performance or breach of any covenant or warranty in such debt security or in the indenture by us continuing for 60 days after written notice to us by the trustee or to us and the trustee by the holders of at least 25% in principal amount of the outstanding debt securities of that series as provided in the applicable indenture, but not of a covenant added to the indenture solely for the benefit of a series of debt securities issued thereunder other than such series;
- a default under any bond, debenture, note, mortgage, indenture or instrument under which there may be issued or by which there may be secured or evidenced any indebtedness for money borrowed by us (or by any subsidiary, the repayment of which we have guaranteed or for which we are directly responsible or liable as obligor or guarantor) having an aggregate principal amount of at least \$30,000,000, which default shall have resulted in such indebtedness becoming or being declared due and payable prior to the date on which it would otherwise have become due and payable, without such indebtedness having been discharged, or such acceleration having been rescinded or annulled, within 30 days after notice specifying such default. Such notice shall be given to us by the trustee, or to us and the trustee by the holders of at least 10% in principal amount of the outstanding debt securities of that series. The written notice shall specify such default and require us to cause such indebtedness to be discharged or cause such acceleration to be rescinded or annulled and shall state that such notice is a “Notice of Default” under such indenture;
- bankruptcy, insolvency or reorganization, or court appointment of a receiver, liquidator or trustee of us; and
- any other event of default provided with respect to a particular series of debt securities.

If an event of default occurs and is continuing with respect to debt securities of any series outstanding, then the applicable trustee or the holders of 25% or more in principal amount of the debt securities of that series will have the right to declare the principal amount of all the debt securities of that series to be due and payable. If the debt securities of that series are original issue discount securities or indexed securities, then the applicable trustee or the holders of 25% or more in principal amount of the debt securities of that series will have the right to declare the portion of the principal amount as may be specified in the terms thereof to be due and payable. However, at any time after such a declaration of acceleration has been made, but before a judgment or decree for payment of the money due has been obtained by the applicable trustee, the holders of at least a majority in principal amount of outstanding debt securities of such series or of all debt securities then outstanding under the applicable indenture may rescind and annul such declaration and its consequences if:

- we have deposited with the applicable trustee all required payments of the principal, any premium or make-whole amount, interest and, to the extent permitted by law, interest on overdue installment of interest, plus applicable fees, expenses, disbursements and advances of the applicable trustee; and
- all events of default, other than the non-payment of accelerated principal, or a specified portion thereof, and any premium or make-whole amount, have been cured or waived.

The indentures also provide that the holders of at least a majority in principal amount of the outstanding debt securities of any series or of all debt securities then outstanding under the applicable indenture may, on behalf of all holders, waive any past default with respect to such series and its consequences, except a default:

- in the payment of the principal, any premium or make-whole amount, or interest;

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- in respect of a covenant or provision contained in the applicable indenture that cannot be modified or amended without the consent of the holders of the outstanding debt security that is affected by the default; or
- in respect of a covenant or provision for the benefit or protection of the trustee, without its express written consent.

The indentures require each trustee to give notice to the holders of debt securities within 90 days of a default unless such default has been cured or waived. However, the trustee may withhold notice if specified persons of such trustee consider such withholding to be in the interest of the holders of debt securities. The trustee may not withhold notice of a default in the payment of principal, any premium or interest on any debt security of such series or in the payment of any sinking fund installment in respect of any debt security of such series.

The indentures provide that holders of debt securities of any series may not institute any proceedings, judicial or otherwise, with respect to such indenture or for any remedy under the indenture, unless the trustee fails to act for a period of 60 days after the trustee has received a written request to institute proceedings in respect of an event of default from the holders of 25% or more in principal amount of the outstanding debt securities of such series, as well as an offer of indemnity reasonably satisfactory to the trustee. However, this provision will not prevent any holder of debt securities from instituting suit for the enforcement of payment of the principal of, and any premium or make-whole amount, and interest on, such debt securities at the respective due dates thereof.

The indentures provide that, subject to provisions in each indenture relating to its duties in the case of a default, a trustee has no obligation to exercise any of its rights or powers at the request or direction of any holders of any series of debt securities then outstanding under the indenture, unless the holders have offered to the trustee reasonable security or indemnity. The holders of at least a majority in principal amount of the outstanding debt securities of any series or of all debt securities then outstanding under an indenture shall have the right to direct the time, method and place of conducting any proceeding for any remedy available to the applicable trustee, or of exercising any trust or power conferred upon such trustee. However, a trustee may refuse to follow any direction which:

- is in conflict with any law or the applicable indenture;
- may involve the trustee in personal liability; or
- may be unduly prejudicial to the holders of debt securities of the series not joining the proceeding.

Within 120 days after the close of each fiscal year, we will be required to deliver to each trustee a certificate, signed by one of our several specified officers, stating whether or not such officer has knowledge of any default under the applicable indenture. If the officer has knowledge of any default, the notice must specify the nature and status of the default.

Modification of the Indentures

The indentures provide that modifications and amendments may be made only with the consent of the affected holders of a majority in principal amount of all outstanding debt securities issued under that indenture. However, no such modification or amendment may, without the consent of the holders of the debt securities affected by the modification or amendment:

- change the stated maturity of the principal of, or any premium or make-whole amount on, or any installment of principal of or interest on, any such debt security;
- reduce the principal amount of, the rate or amount of interest on, or any premium or make-whole amount payable on redemption of, any such debt security;
- reduce the amount of principal of an original issue discount security that would be due and payable upon declaration of acceleration of the maturity thereof or would be provable in bankruptcy, or adversely affect any right of repayment of the holder of any such debt security;

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- change the place of payment or the coin or currency for payment of principal of, or any premium or make-whole amount, or interest on, any such debt security;
- impair the right to institute suit for the enforcement of any payment on or with respect to any such debt security on or after the stated maturity date or redemption date, if applicable;
- adversely affect the right to convert any such debt security, if convertible;
- reduce the percentage in principal amount of any outstanding debt securities necessary to modify or amend the applicable indenture with respect to any such debt security, to waive compliance with particular provisions thereof or defaults and consequences thereunder or to reduce the quorum or voting requirements set forth in the applicable indenture; and
- modify any of the foregoing provisions or any of the provisions relating to the waiver of particular past defaults or covenants, except to increase the required percentage to effect such action or to provide that some of the other provisions may not be modified or waived without the consent of the holder of any such debt security.

The holders of a majority in aggregate principal amount of the outstanding debt securities of each series may, on behalf of all holders of debt securities of that series, waive, insofar as that series is concerned, our compliance with material restrictive covenants of the applicable indenture.

We and the respective trustee may make modifications and amendments of an indenture without the consent of any holder of debt securities for any of the following purposes:

- to evidence the succession of another person to us as obligor under such indenture as permitted under an indenture;
- to add to our covenants for the benefit of the holders of all or any series of debt securities or to surrender any right or power conferred upon us in such indenture;
- to add events of default for the benefit of the holders of all or any series of debt securities;
- to add or change any provisions of an indenture (1) to change or eliminate restrictions on the payment of principal of, or premium or make-whole amount, or interest on, debt securities in bearer form or (2) to permit or facilitate the issuance of debt securities in uncertificated form, provided that such action shall not adversely affect the interests of the holders of the debt securities of any series in any material respect;
- to change or eliminate any provisions of an indenture, provided that any such change or elimination shall become effective only when there are no debt securities outstanding of any series created prior thereto that are entitled to the benefit of such provision;
- to secure the debt securities;
- to establish the form or terms of debt securities of any series;
- to provide for the acceptance of appointment by a successor trustee or facilitate the administration of the trusts under an indenture by more than one trustee;
- to cure any ambiguity, defect or inconsistency in an indenture, provided that such action shall not adversely affect the interests of holders of debt securities of any series issued under such indenture;
- to supplement any of the provisions of an indenture to the extent necessary to permit or facilitate defeasance and discharge of any series of such debt securities, provided that any such action shall not adversely affect the interests of the holders of the outstanding debt securities of any series; and
- to make provisions with respect to a holder's rights of conversion with respect to any series of debt securities that is convertible pursuant an indenture.

Voting

The indentures provide that in determining whether the holders of the requisite principal amount of outstanding debt securities of a series have given any request, demand, authorization, direction, notice, consent or waiver under the indentures or whether a quorum is present at a meeting of holders of debt securities:

- the principal amount of an original issue discount security that shall be deemed to be outstanding shall be the amount of the principal thereof that would be due and payable as of the date of such determination upon declaration of acceleration of the maturity thereof;
- the principal amount of any debt security denominated in a foreign currency that shall be deemed outstanding shall be the U.S. dollar equivalent, determined on the issue date for such debt security, of the principal amount or, in the case of an original issue discount security, the U.S. dollar equivalent on the issue date of such debt security of the amount determined as provided in the preceding bullet point;
- the principal amount of an indexed security that shall be deemed outstanding shall be the principal face amount of such indexed security at original issuance, unless otherwise provided for such indexed security under such indenture; and
- debt securities owned by us or any other obligor upon the debt securities or by any affiliate of ours or of such other obligor shall be disregarded.

The indentures contain provisions for convening meetings of the holders of debt securities of a series. A meeting will be permitted to be called at any time by the applicable trustee, and also, upon request, by us or the holders of at least 25% in principal amount of the outstanding debt securities of such series, in any such case upon notice given as provided in such indenture. Except for any consent that must be given by the holder of each debt security affected by the modifications and amendments of an indenture described above, any resolution presented at a meeting or adjourned meeting duly reconvened at which a quorum is present may be adopted by the affirmative vote of the holders of a majority of the aggregate principal amount of the outstanding debt securities of that series represented at such meeting.

Notwithstanding the preceding paragraph, except as referred to above, any resolution relating to a request, demand, authorization, direction, notice, consent, waiver or other action that may be made, given or taken by the holders of a specified percentage, which is less than a majority of the aggregate principal amount of the outstanding debt securities of a series, may be adopted at a meeting or adjourned meeting duly reconvened at which a quorum is present by the affirmative vote of such specified percentage.

Any resolution passed or decision taken at any properly held meeting of holders of debt securities of any series will be binding on all holders of such series. The quorum at any meeting called to adopt a resolution, and at any reconvened meeting, will be persons holding or representing a majority in principal amount of the outstanding debt securities of a series. However, if any action is to be taken relating to a consent or waiver that may be given by the holders of at least a specified percentage in principal amount of the outstanding debt securities of a series, the persons holding such percentage will constitute a quorum.

Notwithstanding the foregoing provisions, the indentures provide that if any action is to be taken at a meeting with respect to any request, demand, authorization, direction, notice, consent, waiver or other action that such indenture expressly provides may be made, given or taken by the holders of a specified percentage in principal amount of all outstanding debt securities affected by such action, or of the holders of such series and one or more additional series:

- there shall be no minimum quorum requirement for such meeting; and
- the principal amount of the outstanding debt securities of such series that vote in favor of such request, demand, authorization, direction, notice, consent, waiver or other action shall be taken account in determining whether such request, demand, authorization, direction, notice, consent, waiver or other action has been made, given or taken under such indenture.

Subordination

Unless otherwise provided in the applicable prospectus supplement and/or related free writing prospectus, subordinated debt securities will be subject to the following subordination provisions.

Upon any distribution to our creditors in a liquidation, dissolution or reorganization, the payment of the principal of and interest on any subordinated debt securities will be subordinated to the extent provided in the applicable indenture in right of payment to the prior payment in full of all senior debt. However, our obligation to make payments of the principal of and interest on such subordinated debt securities otherwise will not be affected. No payment of principal or interest will be permitted to be made on subordinated debt securities at any time if a default on senior debt exists that permits the holders of such senior debt to accelerate its maturity and the default is the subject of judicial proceedings or we receive notice of the default. After all senior debt is paid in full and until the subordinated debt securities are paid in full, holders of subordinated debt securities will be subrogated to the rights of holders of senior debt to the extent that distributions otherwise payable to holders of subordinated debt securities have been applied to the payment of senior debt. The subordinated indenture will not restrict the amount of senior debt or other indebtedness of ours. As a result of these subordination provisions, in the event of a distribution of assets upon insolvency, holders of subordinated debt securities may recover less, ratably, than our general creditors.

The term “senior debt” will be defined in the applicable indenture as the principal of and interest on, or substantially similar payments to be made by us in respect of, other outstanding indebtedness, whether outstanding at the date of execution of the applicable indenture or subsequently incurred, created or assumed. The prospectus supplement and/or related free writing prospectus may include a description of additional terms implementing the subordination feature.

No restrictions will be included in any indenture relating to subordinated debt securities upon the creation of additional senior debt.

If this prospectus is being delivered in connection with the offering of a series of subordinated debt securities, the accompanying prospectus supplement and/or any related free writing prospectus or the information incorporated herein by reference will set forth the approximate amount of senior debt outstanding as of the end of our most recent fiscal quarter.

Discharge, Defeasance and Covenant Defeasance

Unless otherwise indicated in the applicable prospectus supplement and/or any related free writing prospectus, the indentures allow us to discharge our obligations to holders of any series of debt securities issued under any indenture when:

- either (1) all securities of such series have already been delivered to the applicable trustee for cancellation; or (2) all securities of such series have not already been delivered to the applicable trustee for cancellation but (a) have become due and payable, (b) will become due and payable within one year or (c) if redeemable at our option, are to be redeemed within one year, and we have irrevocably deposited with the applicable trustee, in trust, funds in such currency or currencies, currency unit or units or composite currency or currencies in which such debt securities are payable, an amount sufficient to pay the entire indebtedness on such debt securities in respect of principal and any premium or make-whole amount, and interest to the date of such deposit if such debt securities have become due and payable or, if they have not, to the stated maturity or redemption date;
- we have paid or caused to be paid all other sums payable; and
- an officers’ certificate and an opinion of counsel stating the conditions to discharging the debt securities have been satisfied have been delivered to the trustee.

Unless otherwise indicated in the applicable prospectus supplement and/or related free writing prospectus, the indentures provide that, upon our irrevocable deposit with the applicable trustee, in trust, of an amount, in such currency or currencies, currency unit or units or composite currency or currencies in which such debt

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securities are payable at stated maturity, or government obligations, or both, applicable to such debt securities, which through the scheduled payment of principal and interest in accordance with their terms will provide money in an amount sufficient to pay the principal of, and any premium or make-whole amount, and interest on, such debt securities, and any mandatory sinking fund or analogous payments thereon, on the scheduled due dates therefor, the issuing company may elect either:

- to defease and be discharged from any and all obligations with respect to such debt securities; or
- to be released from its obligations with respect to such debt securities under the applicable indenture or, if provided in the applicable prospectus supplement and/or any related free writing prospectus, its obligations with respect to any other covenant, and any omission to comply with such obligations shall not constitute an event of default with respect to such debt securities.

Notwithstanding the above, we may not elect to defease and be discharged from the obligation to pay any additional amounts upon the occurrence of particular events of tax, assessment or governmental charge with respect to payments on such debt securities and the obligations to register the transfer or exchange of such debt securities, to replace temporary or mutilated, destroyed, lost or stolen debt securities, to maintain an office or agency in respect of such debt securities, or to hold monies for payment in trust.

The indentures only permit us to establish the trust described in the paragraph above if, among other things, we have delivered to the applicable trustee an opinion of counsel to the effect that the holders of such debt securities will not recognize income, gain or loss for United States federal income tax purposes as a result of such defeasance or covenant defeasance and will be subject to U.S. federal income tax on the same amounts, in the same manner and at the same times as would have been the case if such defeasance or covenant defeasance had not occurred. Such opinion of counsel, in the case of defeasance, will be required to refer to and be based upon a ruling received from or published by the Internal Revenue Service or a change in applicable U.S. federal income tax law occurring after the date of the indenture. In the event of such defeasance, the holders of such debt securities would be able to look only to such trust fund for payment of principal, any premium or make-whole amount, and interest.

When we use the term “government obligations,” we mean securities that are:

- direct obligations of the United States or the government that issued the foreign currency in which the debt securities of a particular series are payable, for the payment of which its full faith and credit is pledged; or
- obligations of a person controlled or supervised by and acting as an agency or instrumentality of the United States or other government that issued the foreign currency in which the debt securities of such series are payable, the payment of which is unconditionally guaranteed as a full faith and credit obligation by the United States or such other government, that are not callable or redeemable at the option of the issuer thereof and shall also include a depository receipt issued by a bank or trust company as custodian with respect to any such government obligation or a specific payment of interest on or principal of any such government obligation held by such custodian for the account of the holder of a depository receipt. However, except as required by law, such custodian is not authorized to make any deduction from the amount payable to the holder of such depository receipt from any amount received by the custodian in respect of the government obligation or the specific payment of interest on or principal of the government obligation evidenced by such depository receipt.

Unless otherwise provided in the applicable prospectus supplement and/or any related free writing prospectus, if after we have deposited funds and/or government obligations to effect defeasance or covenant defeasance with respect to debt securities of any series, (1) the holder of a debt security of such series is entitled to, and does, elect under the terms of the applicable indenture or the terms of such debt security to receive payment in a currency, currency unit or composite currency other than that in which such deposit has been made in respect of such debt security or (2) a conversion event occurs in respect of the currency, currency unit or composite currency in which such deposit has been made, the indebtedness represented by such debt security will be deemed to have been, and will be, fully discharged and satisfied through the payment of the principal of, and

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premium or make-whole amount, and interest on, such debt security as they become due out of the proceeds yielded by converting the amount so deposited in respect of such debt security into the currency, currency unit or composite currency in which such debt security becomes payable as a result of such election or such cessation of usage based on the applicable market exchange rate.

When we use the term “conversion event,” we mean the cessation of use of:

- a currency, currency unit or composite currency both by the government of the country that issued such currency and for the settlement of transactions by a central bank or other public institutions of or within the international banking community;
- the European Currency Unit both within the European Monetary System and for the settlement of transactions by public institutions of or within the European Communities; or
- any currency unit or composite currency other than the European Currency Unit for the purposes for which it was established.

Unless otherwise provided in the applicable prospectus supplement and/or related free writing prospectus, all payments of principal of, and any premium or make-whole amount, and interest on, any debt security that is payable in a foreign currency that ceases to be used by its government of issuance shall be made in U.S. dollars.

In the event that (1) we effect covenant defeasance with respect to any debt securities and (2) those debt securities are declared due and payable because of the occurrence of any event of default, the amount in the currency, currency unit or composite currency in which such debt securities are payable, and government obligations on deposit with the applicable trustee, will be sufficient to pay amounts due on such debt securities at the time of their stated maturity but may not be sufficient to pay amounts due on such debt securities at the time of the acceleration resulting from such event of default. However, the issuing company would remain liable to make payments of any amounts due at the time of acceleration.

The applicable prospectus supplement and/or any related free writing prospectus may further describe the provisions, if any, permitting such defeasance or covenant defeasance, including any modifications to the provisions described above, with respect to the debt securities of or within a particular series.

Conversion Rights

The terms and conditions, if any, upon which the debt securities are convertible into common stock or other securities of ours will be set forth in the applicable prospectus supplement and/or related free writing prospectus. The terms will include whether the debt securities are convertible into shares of common stock or other securities of ours, the conversion price, or manner of calculation thereof, the conversion period, provisions as to whether conversion will be at the issuing company’s option or the option of the holders, the events requiring an adjustment of the conversion price and provisions affecting conversion in the event of the redemption of the debt securities and any restrictions on conversion.

Global Securities

The debt securities of a series may be issued in whole or in part in the form of one or more global securities that will be deposited with, or on behalf of, a depository identified in the applicable prospectus supplement and/or any related free writing prospectus relating to such series. Global securities, if any, issued in the United States are expected to be deposited with DTC as depository. We may issue global securities in either registered or bearer form and in either temporary or permanent form. We will describe the specific terms of the depository arrangement with respect to a series of debt securities in the applicable prospectus supplement and/or any related free writing prospectus relating to such series. We expect that unless the applicable prospectus supplement and/or related free writing prospectus provides otherwise, the following provisions will apply to depository arrangements.

Once a global security is issued, the depository for such global security or its nominee will credit on its book-entry registration and transfer system the respective principal amounts of the individual debt securities represented by such global security to the accounts of participants that have accounts with such depository. Such

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accounts shall be designated by the underwriters, dealers or agents with respect to such debt securities or by us if we offer such debt securities directly. Ownership of beneficial interests in such global security will be limited to participants with the depository or persons that may hold interests through those participants.

We expect that, under procedures established by DTC, ownership of beneficial interests in any global security for which DTC is the depository will be shown on, and the transfer of that ownership will be effected only through, records maintained by DTC or its nominee, with respect to beneficial interests of participants with the depository, and records of participants, with respect to beneficial interests of persons who hold through participants with the depository. Neither we nor the trustee will have any responsibility or liability for any aspect of the records of DTC or for maintaining, supervising or reviewing any records of DTC or any of its participants relating to beneficial ownership interests in the debt securities. The laws of some states require that certain purchasers of securities take physical delivery of such securities in definitive form. Such limits and laws may impair the ability to own, pledge or transfer beneficial interest in a global security.

So long as the depository for a global security or its nominee is the registered owner of such global security, such depository or such nominee, as the case may be, will be considered the sole owner or holder of the debt securities represented by the global security for all purposes under the applicable indenture. Except as described below or in the applicable prospectus supplement and/or any related free writing prospectus, owners of beneficial interest in a global security will not be entitled to have any of the individual debt securities represented by such global security registered in their names, will not receive or be entitled to receive physical delivery of any such debt securities in definitive form and will not be considered the owners or holders thereof under the applicable indenture. Beneficial owners of debt securities evidenced by a global security will not be considered the owners or holders thereof under the applicable indenture for any purpose, including with respect to the giving of any direction, instructions or approvals to the trustee under the indenture. Accordingly, each person owning a beneficial interest in a global security with respect to which DTC is the depository must rely on the procedures of DTC and, if such person is not a participant with the depository, on the procedures of the participant through which such person owns its interests, to exercise any rights of a holder under the applicable indenture. We understand that, under existing industry practice, if DTC requests any action of holders or if an owner of a beneficial interest in a global security desires to give or take any action which a holder is entitled to give or take under the applicable indenture, DTC would authorize the participants holding the relevant beneficial interest to give or take such action, and such participants would authorize beneficial owners through such participants to give or take such actions or would otherwise act upon the instructions of beneficial owners holding through them.

Payments of principal of, and any premium or make-whole amount, and interest on, individual debt securities represented by a global security registered in the name of a depository or its nominee will be made to or at the direction of the depository or its nominee, as the case may be, as the registered owner of the global security under the applicable indenture. Under the terms of the applicable indenture, we and the trustee may treat the persons in whose name debt securities, including a global security, are registered as the owners thereof for the purpose of receiving such payments. Consequently, neither we nor the trustee have or will have any responsibility or liability for the payment of such amounts to beneficial owners of debt securities including principal, any premium or make-whole amount, or interest. We believe, however, that it is currently the policy of DTC to immediately credit the accounts of relevant participants with such payments, in amounts proportionate to their respective holdings of beneficial interests in the relevant global security as shown on the records of DTC or its nominee. We also expect that payments by participants to owners of beneficial interests in such global security held through such participants will be governed by standing instructions and customary practices, as is the case with securities held for the account of customers in bearer form or registered in street name, and will be the responsibility of such participants. Redemption notices with respect to any debt securities represented by a global security will be sent to the depository or its nominee. If less than all of the debt securities of any series are to be redeemed, we expect the depository to determine the amount of the interest of each participant in such debt securities to be redeemed to be determined by lot. Neither we, the trustee, any paying agent nor the security registrar for such debt securities will have any responsibility or liability for any aspect of the records relating to or payments made on account of beneficial ownership interests in the global security for such debt securities or for maintaining any records with respect thereto.

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Neither we nor the trustee will be liable for any delay by the holders of a global security or the depository in identifying the beneficial owners of debt securities, and we and the trustee may conclusively rely on, and will be protected in relying on, instructions from the holder of a global security or the depository for all purposes. The rules applicable to DTC and its participants are on file with the SEC.

If a depository for any debt securities is at any time unwilling, unable or ineligible to continue as depository and we do not appoint a successor depository within 90 days, we will issue individual debt securities in exchange for the global security representing such debt securities. In addition, we may at any time and at our sole discretion, subject to any limitations described in the applicable prospectus supplement and/or any related free writing prospectus relating to such debt securities, determine not to have any of such debt securities represented by one or more global securities and in such event will issue individual debt securities in exchange for the global security or securities representing such debt securities. Individual debt securities so issued will be issued in denominations of \$1,000 and integral multiples of \$1,000.

The debt securities of a series may also be issued in whole or in part in the form of one or more bearer global securities that will be deposited with a depository, or with a nominee for such depository, identified in the applicable prospectus supplement and/or any related free writing prospectus. Any such bearer global securities may be issued in temporary or permanent form. The specific terms and procedures, including the specific terms of the depository arrangement, with respect to any portion of a series of debt securities to be represented by one or more bearer global securities will be described in the applicable prospectus supplement and/or related free writing prospectus.

No Recourse

There is no recourse under any obligation, covenant or agreement in the applicable indenture or with respect to any security against any of our or our successor's past, present or future stockholders, employees, officers or directors.

DESCRIPTION OF WARRANTS

The following description, together with the additional information we may include in any applicable prospectus supplements and/or any related free writing prospectus, summarizes the material terms and provisions of the warrants that we may offer under this prospectus and the related warrant agreements and warrant certificates. While the terms summarized below will apply generally to any warrants that we may offer, we will describe the particular terms of any series of warrants in more detail in a prospectus supplement and/or any related free writing prospectus. If we indicate in the prospectus supplement and/or any related free writing prospectus, the terms of any warrants offered under that prospectus supplement and/or any related free writing prospectus may differ from the terms described below. Specific warrant agreements will contain additional important terms and provisions and will be incorporated by reference as an exhibit to the registration statement of which this prospectus forms a part.

General

We may issue warrants for the purchase of common stock, preferred stock and/or debt securities in one or more series. We may issue warrants independently or together with common stock, preferred stock and/or debt securities, and the warrants may be attached to or separate from these securities.

We will evidence each series of warrants by warrant certificates that we will issue under a separate warrant agreement. We will enter into the warrant agreement with a warrant agent. We will indicate the name and address of the warrant agent in the applicable prospectus supplement and/or any related free writing prospectus relating to a particular series of warrants.

We will describe in the applicable prospectus supplement and/or any related free writing prospectus the terms of the series of warrants, which may include:

- the offering price and aggregate number of warrants offered;
- the currency for which the warrants may be purchased;
- if applicable, the designation and terms of the securities with which the warrants are issued and the number of warrants issued with each such security or each principal amount of such security;
- if applicable, the date on and after which the warrants and the related securities will be separately transferable;
- in the case of warrants to purchase debt securities, the principal amount of debt securities purchasable upon exercise of one warrant and the price at, and currency in which, this principal amount of debt securities may be purchased upon such exercise;
- in the case of warrants to purchase common stock or preferred stock, the number of shares of common stock or preferred stock, as the case may be, purchasable upon the exercise of one warrant and the price at which these shares may be purchased upon such exercise;
- the effect of any merger, consolidation, sale or other disposition of our business on the warrant agreement and the warrants;
- the terms of any rights to redeem or call the warrants;
- any provisions for changes to or adjustments in the exercise price or number of securities issuable upon exercise of the warrants;
- the periods during which, and places at which, the warrants are exercisable;
- the manner of exercise;
- the dates on which the right to exercise the warrants will commence and expire;
- the manner in which the warrant agreement and warrants may be modified;

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- the applicable U.S. federal income tax consequences of holding or exercising the warrants;
- the terms of the securities issuable upon exercise of the warrants; and
- any other specific terms, preferences, rights or limitations of or restrictions on the warrants.

DESCRIPTION OF UNITS

We may issue units comprised of shares of common stock, shares of preferred stock, debt securities and warrants in any combination. We may issue units in such amounts and in as many distinct series as we wish. This section outlines certain provisions of the units that we may issue. If we issue units, they will be issued under one or more unit agreements to be entered into between us and a bank or other financial institution, as unit agent. The information described in this section may not be complete in all respects and is qualified entirely by reference to the unit agreement with respect to the units of any particular series. The specific terms of any series of units offered will be described in a prospectus supplement and/or any related free writing prospectus. If so described in a prospectus supplement and/or any related free writing prospectus, the specific terms of any series of units may differ from the general description of terms presented below. We urge you to read any prospectus supplement and/or any related free writing prospectus related to any series of units we may offer, as well as the complete unit agreement and unit certificate that contain the terms of the units. If we issue units, forms of unit agreements and unit certificates relating to such units will be incorporated by reference as exhibits to the registration statement of which this prospectus forms a part.

Each unit that we may issue will be issued so that the holder of the unit is also the holder of each security included in the unit. Thus, the holder of a unit will have the rights and obligations of a holder of each included security. The unit agreement under which a unit is issued may provide that the securities included in the unit may not be held or transferred separately, at any time or at any time before a specified date. The applicable prospectus supplement and/or any related free writing prospectus may describe:

- the designation and terms of the units and of the securities comprising the units, including whether and under what circumstances those securities may be held or transferred separately;
- any provisions of the governing unit agreement;
- the price or prices at which such units will be issued;
- the applicable U.S. federal income tax considerations relating to the units;
- any provisions for the issuance, payment, settlement, transfer or exchange of the units or of the securities comprising the units; and
- any other terms of the units and of the securities comprising the units.

The provisions described in this section, as well as those described under “Description of Capital Stock,” “Description of Debt Securities” and “Description of Warrants” will apply to the securities included in each unit, to the extent relevant and as may be updated in any prospectus supplements and/or any related free writing prospectus.

Issuance in Series

We may issue units in such amounts and in any number of distinct series. This section summarizes terms of the units that apply generally to all series. Most of the financial and other specific terms of a particular series of units will be described in the applicable prospectus supplement and/or any related free writing prospectus.

Unit Agreements

We will issue the units under one or more unit agreements to be entered into between us and a bank or other financial institution, as unit agent. We may add, replace or terminate unit agents from time to time. We will identify the unit agreement under which each series of units will be issued and the unit agent under that agreement in the applicable prospectus supplement and/or any related free writing prospectus.

The following provisions will generally apply to all unit agreements unless otherwise stated in the applicable prospectus supplement and/or any related free writing prospectus:

Modification without Consent

We and the applicable unit agent may amend any unit or unit agreement without the consent of any holder:

- to cure any ambiguity, including modifying any provisions of the governing unit agreement that differ from those described below;
- to correct or supplement any defective or inconsistent provision; or
- to make any other change that we believe is necessary or desirable and will not adversely affect the interests of the affected holders in any material respect.

We do not need any approval to make changes that affect only units to be issued after the changes take effect. We may also make changes that do not adversely affect a particular unit in any material respect, even if they adversely affect other units in a material respect. In those cases, we do not need to obtain the approval of the holder of the unaffected unit; we need only obtain any required approvals from the holders of the affected units.

Modification with Consent

We may not amend any particular unit or a unit agreement with respect to any particular unit unless we obtain the consent of the holder of that unit, if the amendment would:

- impair any right of the holder to exercise or enforce any right under a security included in the unit if the terms of that security require the consent of the holder to any changes that would impair the exercise or enforcement of that right; or
- reduce the percentage of outstanding units or any series or class the consent of whose holders is required to amend that series or class, or the applicable unit agreement with respect to that series or class, as described below.

Any other change to a particular unit agreement and the units issued under that agreement would require the following approval:

- If the change affects only the units of a particular series issued under that agreement, the change must be approved by the holders of a majority of the outstanding units of that series; or
- If the change affects the units of more than one series issued under that agreement, it must be approved by the holders of a majority of all outstanding units of all series affected by the change, with the units of all the affected series voting together as one class for this purpose.

These provisions regarding changes with majority approval also apply to changes affecting any securities issued under a unit agreement, as the governing document.

In each case, the required approval must be given by written consent.

Unit Agreements Will Not Be Qualified under Trust Indenture Act

No unit agreement will be qualified as an indenture, and no unit agent will be required to qualify as a trustee, under the Trust Indenture Act. Therefore, holders of units issued under unit agreements will not have the protections of the Trust Indenture Act with respect to their units.

Mergers and Similar Transactions Permitted; No Restrictive Covenants or Events of Default

The unit agreements will not restrict our ability to merge or consolidate with, or sell our assets to, another corporation or other entity or to engage in any other transactions. If at any time we merge or consolidate with, or sell our assets substantially as an entirety to, another corporation or other entity, the successor entity will succeed to and assume our obligations under the unit agreements. We will then be relieved of any further obligation under these agreements.

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The unit agreements will not include any restrictions on our ability to put liens on our assets, nor will they restrict our ability to sell our assets. The unit agreements also will not provide for any events of default or remedies upon the occurrence of any events of default.

Governing Law

The unit agreements and the units will be governed by Delaware law.

Form, Exchange and Transfer

Unless the accompanying prospectus supplement and/or any related free writing prospectus states otherwise, we will issue each unit in global form (i.e., book-entry) only. Units in book-entry form will be represented by a global security registered in the name of a depository, which will be the holder of all the units represented by the global security. Those who own beneficial interests in a unit will do so through participants in the depository's system, and the rights of these indirect owners will be governed solely by the applicable procedures of the depository and its participants. We will describe book-entry securities, and other terms regarding the issuance and registration of the units in the applicable prospectus supplement and/or any related free writing prospectus.

Unless the accompanying prospectus supplement and/or any related free writing prospectus states otherwise, each unit and all securities comprising the unit will be issued in the same form.

If we issue any units in registered, non-global form, the following will apply to them.

The units will be issued in the denominations stated in the applicable prospectus supplement and/or any related free writing prospectus. Holders may exchange their units for units of smaller denominations or combined into fewer units of larger denominations, as long as the total amount is not changed.

- Holders may exchange or transfer their units at the office of the unit agent. Holders may also replace lost, stolen, destroyed or mutilated units at that office. We may appoint another entity to perform these functions or perform them ourselves.
- Holders will not be required to pay a service charge to transfer or exchange their units, but they may be required to pay for any tax or other governmental charge associated with the transfer or exchange. The transfer or exchange, and any replacement, will be made only if our transfer agent is satisfied with the holder's proof of legal ownership. The transfer agent may also require an indemnity before replacing any units.
- If we have the right to redeem, accelerate or settle any units before their maturity, and we exercise our right as to less than all those units or other securities, we may block the exchange or transfer of those units during the period beginning 15 days before the day we mail the notice of exercise and ending on the day of that mailing, in order to freeze the list of holders to prepare the mailing. We may also refuse to register transfers of or exchange any unit selected for early settlement, except that we will continue to permit transfers and exchanges of the unsettled portion of any unit being partially settled. We may also block the transfer or exchange of any unit in this manner if the unit includes securities that are or may be selected for early settlement.

Only the depository will be entitled to transfer or exchange a unit in global form, since it will be the sole holder of the unit.

Payments and Notices

In making payments and giving notices with respect to our units, we will follow the procedures as described in the applicable prospectus supplement and/or any related free writing prospectus.

PLAN OF DISTRIBUTION

We may sell securities:

- through underwriters;
- through dealers;
- through agents;
- directly to purchasers; or
- through a combination of any of these methods or any other method permitted by law.

In addition, we may issue the securities as a dividend or distribution or in a subscription rights offering to our existing securityholders.

We may directly solicit offers to purchase securities, or agents may be designated to solicit such offers. In the prospectus supplement and/or any related free writing prospectus relating to an offering, we will name any agent that could be viewed as an underwriter under the Securities Act and describe any commissions that we must pay to any such agent. Any such agent will be acting on a best efforts basis for the period of its appointment or, if indicated in the applicable prospectus supplement and/or any related free writing prospectus, on a firm commitment basis. This prospectus may be used in connection with any offering of our securities through any of these methods or other methods described in the applicable prospectus supplement and/or any related free writing prospectus.

The distribution of the securities may be effected from time to time in one or more transactions:

- at a fixed price, or prices, which may be changed from time to time;
- at market prices prevailing at the time of sale;
- at prices related to such prevailing market prices; or
- at negotiated prices.

Each prospectus supplement and/or any related free writing prospectus will describe the method of distribution of the securities and any applicable restrictions.

The prospectus supplement and/or any related free writing prospectus with respect to the securities of a particular series will describe the terms of the offering of the securities, including the following:

- the name of the agent or any underwriters;
- the public offering or purchase price;
- any discounts and commissions to be allowed or paid to the agent or underwriters;
- all other items constituting underwriting compensation;
- any discounts and commissions to be allowed or paid to dealers; and
- any exchanges on which the securities will be listed.

If any underwriters or agents are used in the sale of the securities in respect of which this prospectus is delivered, we will enter into an underwriting agreement, sales agreement or other agreement with them at the time of sale to them, and we will set forth in the prospectus supplement and/or any related free writing prospectus relating to such offering the names of the underwriters or agents and the terms of the related agreement with them.

In connection with the offering of securities, we may grant to the underwriters an option to purchase additional securities with an additional underwriting commission, as may be set forth in the accompanying prospectus supplement and/or any related free writing prospectus. If we grant any such option, the terms of such option will be set forth in the prospectus supplement and/or any related free writing prospectus for such securities.

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If a dealer is used in the sale of the securities in respect of which the prospectus is delivered, we will sell such securities to the dealer, as principal. The dealer, who may be deemed to be an “underwriter” as that term is defined in the Securities Act, may then resell such securities to the public at varying prices to be determined by such dealer at the time of resale.

If we offer securities in a subscription rights offering to our existing securityholders, we may enter into a standby underwriting agreement with dealers, acting as standby underwriters. We may pay the standby underwriters a commitment fee for the securities they commit to purchase on a standby basis. If we do not enter into a standby underwriting arrangement, we may retain a dealer-manager to manage a subscription rights offering for us.

Agents, underwriters, dealers and other persons may be entitled under agreements that they may enter into with us to indemnification by us against certain civil liabilities, including liabilities under the Securities Act, and may be customers of, engage in transactions with or perform services for us in the ordinary course of business.

If so indicated in the applicable prospectus supplement and/or any related free writing prospectus, we will authorize underwriters or other persons acting as our agents to solicit offers by certain institutions to purchase securities from us pursuant to delayed delivery contracts providing for payment and delivery on the date stated in the prospectus supplement and/or any related free writing prospectus. Each contract will be for an amount not less than, and the aggregate amount of securities sold pursuant to such contracts shall not be less nor more than, the respective amounts stated in the prospectus supplement and/or any related free writing prospectus. Institutions with whom the contracts, when authorized, may be made include commercial and savings banks, insurance companies, pension funds, investment companies, educational and charitable institutions and other institutions, but shall in all cases be subject to our approval. Delayed delivery contracts will not be subject to any conditions except that:

- the purchase by an institution of the securities covered under that contract shall not at the time of delivery be prohibited under the laws of the jurisdiction to which that institution is subject; and
- if the securities are also being sold to underwriters acting as principals for their own account, the underwriters shall have purchased such securities not sold for delayed delivery. The underwriters and other persons acting as our agents will not have any responsibility in respect of the validity or performance of delayed delivery contracts.

Offered securities may also be offered and sold, if so indicated in the prospectus supplement and/or any related free writing prospectus, in connection with a remarketing upon their purchase, in accordance with a redemption or repayment pursuant to their terms, or otherwise, by one or more remarketing firms, acting as principals for their own accounts or as agents for us. Any remarketing firm will be identified and the terms of its agreement, if any, with us and its compensation will be described in the applicable prospectus supplement and/or any related free writing prospectus. Remarketing firms may be deemed to be underwriters in connection with their remarketing of offered securities.

Certain agents, underwriters and dealers, and their associates and affiliates, may be customers of, have borrowing relationships with, engage in other transactions with, or perform services, including investment banking services, for us or one or more of our respective affiliates in the ordinary course of business.

In order to facilitate the offering of the securities, any underwriters may engage in transactions that stabilize, maintain or otherwise affect the price of the securities or any other securities the prices of which may be used to determine payments on such securities. Specifically, any underwriters may overallocate in connection with the offering, creating a short position for their own accounts. In addition, to cover overallocations or to stabilize the price of the securities or of any such other securities, the underwriters may bid for, and purchase, the securities or any such other securities in the open market. Finally, in any offering of the securities through a syndicate of underwriters, the underwriting syndicate may reclaim selling concessions allowed to an underwriter or a dealer for distributing the securities in the offering if the syndicate repurchases previously distributed securities in transactions to cover syndicate short positions, in stabilization transactions or otherwise. Any of these activities may stabilize or maintain the market price of the securities above independent market levels. Any such underwriters are not required to engage in these activities and may end any of these activities at any time.

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We may engage in at-the-market offerings into an existing trading market in accordance with Rule 415(a)(4) under the Securities Act. In addition, we may enter into derivative transactions with third parties, or sell securities not covered by this prospectus to third parties in privately negotiated transactions. If the applicable prospectus supplement and/or any related free writing prospectus so indicates, in connection with those derivatives, the third parties may sell securities covered by this prospectus and the applicable prospectus supplement and/or any related free writing prospectus, including in short sale transactions. If so, the third party may use securities pledged by us or borrowed from us or others to settle those sales or to close out any related open borrowings of stock, and may use securities received from us in settlement of those derivatives to close out any related open borrowings of stock. The third party in such sale transactions will be an underwriter and, if not identified in this prospectus, will be named in the applicable prospectus supplement (or a post-effective amendment) and/or any related free writing prospectus. In addition, we may otherwise loan or pledge securities to a financial institution or other third party that in turn may sell the securities short using this prospectus and an applicable prospectus supplement and/or any related free writing prospectus. Such financial institution or other third party may transfer its economic short position to investors in our securities or in connection with a concurrent offering of other securities.

Under Rule 15c6-1 of the Exchange Act, trades in the secondary market generally are required to settle in two business days, unless the parties to any such trade expressly agree otherwise. The applicable prospectus supplement and/or any related free writing prospectus may provide that the original issue date for your securities may be more than two scheduled business days after the trade date for your securities. Accordingly, in such a case, if you wish to trade securities on any date prior to the second business day before the original issue date for your securities, you will be required, by virtue of the fact that your securities initially are expected to settle in more than two scheduled business days after the trade date for your securities, to make alternative settlement arrangements to prevent a failed settlement.

All securities we may offer, other than common stock, will be new issues of securities and may have no established trading market. The securities may or may not be listed on a national securities exchange. We can make no assurance as to the liquidity of or the existence of trading markets for any of the securities.

In compliance with the guidelines of the Financial Industry Regulatory Authority, Inc. (FINRA), the aggregate maximum discount, commission or agency fees or other items constituting underwriting compensation to be received by any FINRA member or independent broker-dealer will not exceed 8% of the proceeds from any offering pursuant to this prospectus and any applicable prospectus supplement and/or any related free writing prospectus.

The specific terms of any lock-up provisions in respect of any given offering will be described in the applicable prospectus supplement and/or any related free writing prospectus.

Any underwriters, dealers and agents may engage in transactions with us, or perform services for us, in the ordinary course of business for which they receive compensation.

The anticipated date of delivery of offered securities will be set forth in the applicable prospectus supplement and/or any related free writing prospectus relating to each offer.

LEGAL MATTERS

Unless otherwise indicated in the applicable prospectus supplement and/or any related free writing prospectus, certain legal matters in connection with this offering, including the validity of the securities offered by this prospectus and any supplement thereto, will be passed upon for us by Skadden, Arps, Slate Meagher & Flom LLP, Los Angeles, California.

EXPERTS

Ernst & Young LLP, independent registered public accounting firm, has audited our consolidated financial statements and related notes included in our Annual Report on Form 10-K for the year ended December 31, 2019, and the effectiveness of our internal control over financial reporting as of December 31, 2019, as set forth in their reports, which are incorporated by reference in this prospectus and elsewhere in the registration statement. Our consolidated financial statements and related notes are incorporated by reference in reliance on Ernst & Young LLP's reports, given on their authority as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We are subject to the information requirements of the Exchange Act and, in accordance therewith, file annual, quarterly and current reports, proxy statements and other information with the SEC. These documents may be accessed through the SEC's electronic data gathering, analysis and retrieval system (EDGAR) via electronic means, including the SEC's home page on the Internet (www.sec.gov).

Our website is located at www.assemblybio.com. Information contained on, or that can be accessed from, our website is not incorporated by reference in this prospectus or any applicable prospectus supplement and, therefore, is not part of this prospectus or any applicable prospectus supplement.

INCORPORATION BY REFERENCE

The SEC allows us to incorporate by reference the information and reports we file with it, which means that we can disclose important information to you by referring you to these documents. The information incorporated by reference is an important part of this prospectus and any applicable prospectus supplement, and information that we file later with the SEC will automatically update and supersede the information already incorporated by reference. We are incorporating by reference the documents listed below, which we have already filed with the SEC, and any future filings we make with the SEC under Section 13(a), 13(c), 14 or 15(d) of the Exchange Act, including all filings made after the date of the filing and the date of the effectiveness of the registration statement of which this prospectus forms a part, until the termination of the offering, except as to any portion of any future annual or quarterly report to stockholders or document or current report furnished under current Item 2.02 or 7.01 or any related Item 9.01 of Form 8-K that is not deemed filed under such provisions:

- Our Annual Report on [Form 10-K](#) for the year ended December 31, 2019, filed with the SEC on March 4, 2020;
- The information specifically incorporated by reference in Part III of our Annual Report on Form 10-K for the year ended December 31, 2019 from our [definitive proxy statement](#) on Schedule 14A, filed with the SEC on April 27, 2020;
- Our Quarterly Reports on Form 10-Q for the quarters ended March 31, 2020 and June 30, 2020, filed with the SEC on [May 7, 2020](#) and [August 5, 2020](#), respectively;
- Our Current Reports on Form 8-K, filed with the SEC on [January 3, 2020](#), [February 11, 2020](#), [June 16, 2020](#), [June 18, 2020](#), [July 20, 2020](#) and [August 27, 2020](#); and
- The description of our common stock in our Registration Statement on [Form 8-A](#) (File No. 001-35005) filed with the SEC on December 10, 2010, including any amendment or report filed by us for the purpose of updating such description, including Exhibit 4.3 to our Annual Report on [Form 10-K](#) for the year ended December 31, 2019, filed with the SEC on March 4, 2020.

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Any statement contained in a document that is incorporated by reference will be modified or superseded for all purposes to the extent that a statement contained in this prospectus, any applicable prospectus supplement or any related free writing prospectus, or in any other document that is subsequently filed with the SEC and incorporated by reference into this prospectus, any applicable prospectus supplement or any free writing prospectus, modifies or is contrary to that previous statement. Any statement so modified or superseded will not be deemed a part of this prospectus, any applicable prospectus supplement or any related free writing prospectus, except as so modified or superseded. Since information that we later file with the SEC will update and supersede previously incorporated information, you should look at all of the SEC filings that we incorporate by reference to determine if any of the statements in this prospectus, any applicable prospectus supplement or in any documents previously incorporated by reference have been modified or superseded.

Upon request, we will provide, without charge, to each person, including any beneficial owner, to whom a copy of this prospectus is delivered, a copy of the documents incorporated by reference into this prospectus, or any applicable prospectus supplement, but not delivered with the prospectus. You may request a copy of these documents at no cost by writing or telephoning us at the following address:

Assembly Biosciences, Inc.
331 Oyster Point Blvd., Fourth Floor
South San Francisco, California 94080
Attention: Corporate Secretary
(833) 509-4583

This prospectus, any applicable prospectus supplement or information incorporated by reference herein or therein contains summaries of certain agreements that we have filed as exhibits to various SEC filings, as well as certain agreements that we may enter into in connection with the offering of securities covered by this prospectus. The descriptions of these agreements contained in this prospectus, any applicable prospectus supplement or information incorporated by reference herein or therein do not purport to be complete and are subject to, and qualified in their entirety by reference to, the definitive agreements. Copies of the definitive agreements will be made available without charge to you by making a written or oral request to us at the address set forth above.

You may also access these documents, free of charge on the SEC's website at <http://www.sec.gov> or on our website at www.assemblybio.com. Information contained on, or accessible from, our website is not incorporated by reference in this prospectus or any applicable prospectus supplement and, therefore, is not part of this prospectus or any applicable prospectus supplement.

This prospectus is part of a registration statement we filed with the SEC. We have incorporated exhibits into that registration statement. You should read the exhibits carefully for provisions that may be important to you.

\$300,000,000



Common Stock
Preferred Stock
Debt Securities
Warrants
Units

PROSPECTUS

, 2020

We have not authorized any dealer, salesperson or other person to give any information or represent anything not contained in this prospectus. You must not rely on any unauthorized information. If anyone provides you with different or inconsistent information, you should not rely on it. This prospectus does not offer to sell any securities in any jurisdiction where it is unlawful. Neither the delivery of this prospectus, nor any sale made hereunder, shall create any implication that the information in this prospectus is correct after the date hereof or as of an earlier date for such information referenced herein.

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

**SUBJECT TO COMPLETION
DATED AUGUST 28, 2020**

PROSPECTUS SUPPLEMENT

Up to \$100,000,000 of Shares



Common Stock

We have entered into an Open Market Sale AgreementSM (the Sales Agreement) with Jefferies LLC (Jefferies) relating to shares of our common stock, par value \$0.001 per share, offered by this prospectus supplement. In accordance with the terms of the Sales Agreement, we may offer and sell shares of our common stock having an aggregate offering price of up to \$100,000,000 from time to time through Jefferies, acting as sales agent.

Our common stock is listed on The Nasdaq Global Select Market under the symbol "ASMB." On August 26, 2020, the last reported sale price of our common stock on The Nasdaq Global Select Market was \$21.04 per share.

Sales of our common stock, if any, under this prospectus supplement may be made in sales deemed to be an "at the market offering" as defined in Rule 415(a)(4) promulgated under the Securities Act of 1933, as amended (the Securities Act), in ordinary brokers' transactions, to or through a market maker, on or through The Nasdaq Global Select Market or any other market venue where the securities may be traded, in the over-the-counter market, in privately negotiated transactions or through a combination of any such methods of sale. Jefferies will act as sales agent on a best efforts basis and use commercially reasonable efforts to sell on our behalf all of the shares of common stock requested to be sold by us, consistent with their normal trading and sales practices, on mutually agreed terms between us and Jefferies. The securities may be sold at market prices prevailing at the time of sale, at prices related to such prevailing market prices or at negotiated prices. There is no arrangement for funds to be received in any escrow, trust or similar arrangement.

Jefferies will be entitled to compensation at a fixed commission rate of up to 3% of the gross sales price per share sold. In connection with the sale of our common stock on our behalf, Jefferies will be deemed to be an "underwriter" within the meaning of the Securities Act, and the compensation of Jefferies will be deemed to be underwriting commissions or discounts.

Investing in our common stock involves a high degree of risk. See the information contained under the heading "[Risk Factors](#)" beginning on page S-3 of this prospectus supplement and under similar headings in the accompanying prospectus and in the other documents that are incorporated by reference herein and therein, including specifically under "Item 1A: Risk Factors" and elsewhere in our Annual Report on Form 10-K for the year ended December 31, 2019 and in our Quarterly Report on Form 10-Q for the period ended June 30, 2020.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if this prospectus supplement or the accompanying prospectus is truthful or complete. Any representation to the contrary is a criminal offense.

Jefferies

The date of this prospectus supplement is _____, 2020.

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ABOUT THIS PROSPECTUS SUPPLEMENT

This document contains two parts.

- The first part is this prospectus supplement, which describes the specific terms of this offering and also supplements and updates information contained in the accompanying prospectus and the documents incorporated by reference herein and therein.
- The second part is the accompanying prospectus filed with the Securities and Exchange Commission (the SEC) as part of a registration statement on Form S-3 initially filed on August 28, 2020, which provides more general information, some of which may not apply to this offering.

If the information contained in this prospectus supplement differs or varies from the information contained in the accompanying prospectus or in any document incorporated by reference herein or therein that was filed with the SEC before the date of this prospectus supplement, you should rely on the information set forth in this prospectus supplement. This prospectus supplement is deemed a prospectus supplement to the accompanying prospectus contained in the registration statement of which such prospectus forms a part solely for the purpose of this offering. If any statement in one of these documents is inconsistent with a statement in another document having a later date (for example, a subsequently filed document deemed incorporated by reference in the accompanying prospectus), the statement in the document having the later date modifies or supersedes the earlier statement. Any statement so modified or superseded will not be deemed, except as so modified or superseded, to constitute a part of this prospectus supplement.

You should rely only on the information contained or incorporated by reference in this prospectus supplement and the accompanying prospectus, along with the information in any related free writing prospectus filed by us with the SEC. We have not, and the sales agent has not, authorized anyone to provide you with different information that is in addition to or different from that contained or incorporated by reference in this prospectus supplement, the accompanying prospectus or any related free writing prospectus. We and the sales agent take no responsibility for, and can provide no assurance as to the reliability of, any other information that others may provide.

We are offering to sell, and seeking offers to buy, shares of our common stock only in jurisdictions where such offers and sales are permitted. The information contained in this prospectus supplement, the accompanying prospectus, any related free writing prospectus and the documents incorporated by reference herein and therein is accurate only as of their respective dates (or any such earlier date as of which information is given), regardless of the time of delivery of any such document or the time of any sale of our common stock. Our business, financial condition, results of operations and prospects may have changed materially since those dates. It is important for you to read and consider all information contained or incorporated by reference in this prospectus supplement and the accompanying prospectus in making your investment decision. You should read both this prospectus supplement and the accompanying prospectus, as well as the documents incorporated by reference herein and therein, the additional information described under the section titled “Where You Can Find More Information” in this prospectus supplement and in the accompanying prospectus and any free writing prospectus that we have authorized for use in connection with this offering, before investing in our common stock.

We further note that the representations, warranties and covenants made by us in any agreement that is filed as an exhibit to any document that is incorporated by reference in the accompanying prospectus were made solely for the benefit of the parties to such agreement, including, in some cases, for the purpose of allocating risk among the parties to such agreements, and should not be deemed to be a representation, warranty or covenant to you. Moreover, such representations, warranties or covenants were accurate only as of the date when made. Accordingly, such representations, warranties and covenants should not be relied on as accurately representing the current state of our affairs.

Unless otherwise specified or the context otherwise requires, references in this prospectus supplement, the accompanying prospectus and any free writing prospectus to “Assembly,” “we,” “our,” “us” and “the Company” refer, collectively, to Assembly Biosciences, Inc., a Delaware corporation, and its consolidated subsidiaries.

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We own various U.S. federal and foreign trademark applications, and unregistered trademarks, including our corporate name and our corporate logo. GEMICEL® is our trademark. All other trademarks or trade names referred to in this prospectus supplement are the property of their respective owners. Solely for convenience, the trademarks and trade names in this prospectus supplement may be 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.

This prospectus supplement, the accompanying prospectus and the documents incorporated by reference herein and therein contain estimates, projections and other information concerning our industry, our business, and the markets for certain diseases, including data regarding the estimated size of those markets, and the incidence and prevalence of certain medical conditions. Information that is based on estimates, forecasts, projections, market research or similar methodologies is inherently subject to uncertainties and actual events or circumstances may differ materially from events and circumstances reflected in this information. Unless otherwise expressly stated, we obtained this industry, business, market and other data from reports, research surveys, studies and similar data prepared by market research firms and other third parties, industry, medical and general publications, government data and similar sources. Additionally, while such information has been obtained from sources believed to be reliable, there can be no assurance as to the accuracy or completeness of the included information. The Company has not independently verified any of the data from third-party sources, nor has the Company ascertained the underlying economic assumptions relied upon therein. While such information is believed to be reliable for the purposes used herein, none of the Company, its affiliates, nor their respective directors, officers, employees, members, partners, stockholders or agents make any representation or warranty with respect to the accuracy of such information.

PROSPECTUS SUPPLEMENT SUMMARY

This summary highlights selected information about us and this offering and does not contain all of the information that you should consider before investing in our securities. Before investing in our common stock, you should carefully read the information contained and incorporated by reference in this prospectus supplement, the accompanying prospectus, any related free-writing prospectus and the documents incorporated by reference herein or therein, including the sections titled “Risk Factors,” “Cautionary Statement Regarding Forward-Looking Statements” and the financial statements and accompanying notes.

Our Company

We are a clinical-stage biotechnology company developing innovative therapeutics targeting chronic hepatitis B virus (HBV) infection and disorders associated with the microbiome. Our HBV Cure program is focused on advancing a new class of potent, oral core inhibitors that have the potential to increase cure rates for chronically infected patients. Our Microbiome program is developing novel oral live microbial biotherapeutic candidates with our fully integrated platform, including a robust process for strain identification and selection, current Good Manufacturing Practice (cGMP) manufacturing expertise and targeted delivery to the lower gastrointestinal tract with the GEMICEL[®] technology.

Over 250 million people worldwide are chronically infected with HBV. Our HBV Cure program is pursuing multiple drug candidates that inhibit the HBV lifecycle and block the generation of covalently closed circular DNA, with the aim of increasing the current low cure rate for patients with HBV. We have discovered several novel core inhibitors, which are small molecules that directly target and allosterically modulate the HBV core protein.

In recent years, there has been increasing scientific evidence suggesting the therapeutic potential of the human microbiome—the billions of microbes living in and on people—to impact health and disease. Our Microbiome program builds upon experience reported in the literature of successfully treating various disease indications with fecal microbiota transplants and seeks to provide a pharmacologically relevant therapy using a “drug like” approach that delivers targeted and specific microbiome therapies in an oral capsule.

Our Microbiome program consists of a fully integrated platform that includes a biological-function-based strain isolation, identification, characterization and selection process, methods for strain purification and growth under conditions compliant with cGMP requirements, and a licensed patented delivery system that we call GEMICEL[®], which is designed to allow for targeted oral delivery of live biologic and conventional therapies to the lower gastrointestinal tract.

We currently have corporate and administrative offices and research laboratory space in South San Francisco, California and research, development and small-scale manufacturing activities in Groton, Connecticut. We also currently have an administrative office and research laboratory space in Shanghai, China and a regulatory office in Beijing, China.

Corporate Information

Assembly Biosciences, Inc., formerly known as Ventrus BioSciences, Inc., was incorporated under the laws of the State of Delaware on October 7, 2005, originally under the name South Island Biosciences, Inc. On July 11, 2014, we acquired Assembly Pharmaceuticals, Inc., a private company (the Merger). In connection with the Merger, we changed our name from Ventrus Biosciences, Inc. to Assembly Biosciences, Inc. Our principal executive office is located at 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080, and our telephone number is (833) 409-4583. Our corporate website address is www.assemblybio.com. We do not incorporate the information contained on, or accessible through, our website into this prospectus supplement or the accompanying prospectus, and you should not consider it part of this prospectus supplement or the accompanying prospectus.

THE OFFERING

Common stock offered by us	Shares of our common stock having an aggregate offering price of up to \$100,000,000.
Manner of offering	“At the market offering” that may be made from time to time through our sales agent, Jefferies. See “Plan of Distribution” on page S-11 of this prospectus supplement.
Use of Proceeds	Our management will retain broad discretion regarding the allocation and use of the net proceeds. We currently intend to use the net proceeds from this offering to fund clinical trials, nonclinical studies, research and development and for general corporate purposes. See “Use of Proceeds.”
Risk Factors	Investing in our common stock involves a high degree of risk. See the information contained under the heading “Risk Factors” beginning on page S-3 of this prospectus supplement and under similar headings in the accompanying prospectus and in the other documents that are incorporated by reference herein and therein, including specifically under “Item 1A: Risk Factors” and elsewhere in our Annual Report on Form 10-K for the year ended December 31, 2019 and in our Quarterly Report on Form 10-Q for the period ended June 30, 2020.
Nasdaq Global Select Market symbol	“ASMB”

RISK FACTORS

Investing in our securities involves a high degree of risk. Before making an investment decision, you should carefully consider the risks described below and in our Annual Report on Form 10-K for the year ended December 31, 2019 and our Quarterly Report on Form 10-Q for the period ended June 30, 2020 incorporated by reference into this prospectus supplement and the accompanying prospectus, any amendment or update thereto reflected in our subsequent filings with the SEC, any related free writing prospectus and all of the other information contained in this prospectus supplement, the accompanying prospectus, any related free writing prospectus and the documents incorporated by reference herein or therein, including our financial statements and related notes. If any of these risks is realized, our business, financial condition, results of operations and prospects could be materially and adversely affected. In that event, the trading price of our common stock could decline, and you could lose part or all of your investment. Additional risks and uncertainties that are not yet identified or that we currently believe to be immaterial may also materially harm our business, operating results and financial condition and could result in a complete loss of your investment.

Risks Related to This Offering and Our Common Stock

We have broad discretion in the use of the net proceeds from this offering and our existing cash and may not use them effectively.

Our management will have broad discretion in the application of the net proceeds from this offering, including for any of the purposes described in the section titled “Use of Proceeds,” as well as our existing cash, and you will be relying on the judgment of our management regarding such application. You will not have the opportunity, as part of your investment decision, to assess whether the proceeds are being used appropriately. Our management might not apply the net proceeds or our existing cash in ways that ultimately increase the value of your investment. If we do not invest or apply the net proceeds from this offering or our existing cash in ways that enhance stockholder value, we may fail to achieve expected results, which could cause our stock price to decline. Pending their use, we may invest the net proceeds from this offering in short-term U.S. Treasury securities or other similar investments or cash equivalents with insignificant rates of return. These investments may not yield a favorable return to our stockholders.

If you purchase our common stock in this offering, you will incur immediate and substantial dilution in the book value of your shares.

The offering price per share in this offering may exceed the net tangible book value per share of our common stock outstanding prior to this offering. Assuming that an aggregate of 4,752,852 shares of our common stock are sold at a price of \$21.04 per share, the last reported sale price of our common stock on The Nasdaq Global Select Market on August 26, 2020, for aggregate gross proceeds of \$100.0 million, and after deducting commissions and estimated offering expenses payable by us, you will experience immediate dilution of \$12.46 per share, representing the difference between our as adjusted net tangible book value per share as of June 30, 2020 after giving effect to this offering at the assumed offering price. The exercise of outstanding stock options and warrants will result in further dilution of your investment.

This dilution is due to the substantially lower price paid by some of our investors who purchased shares prior to this offering as compared to the price offered to the public in this offering and the exercise of stock options and vesting of RSUs granted to our employees, directors and consultants. In addition, we have a significant number of stock options, warrants and RSUs outstanding. The exercise of any of these outstanding options and warrants and the vesting and settlement of any of these RSUs would result in additional dilution. As a result of the dilution to investors purchasing shares in this offering, investors may receive significantly less than the purchase price paid in this offering, if anything, in the event of our liquidation. Further, because we expect we will need to raise additional capital to fund our future activities, we may in the future sell substantial amounts of common stock or securities convertible into or exchangeable for common stock.

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Future issuances of common stock or common stock-related securities, together with the exercise of outstanding options and warrants and the vesting and settlement of outstanding RSUs, if any, may result in further dilution. For a further description of the dilution that you will experience immediately after this offering, see the section titled “Dilution.”

Sales of a substantial number of shares of our common stock in the public market could cause our stock price to fall.

Sales of a substantial number of shares of our common stock in the public market 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. We are unable to predict the effect that sales may have on the prevailing market price of our common stock. In addition, the sale of substantial amounts of our common stock could adversely impact its price. As of June 30, 2020, we had outstanding 32,807,519 shares of our common stock, options to purchase 6,652,076 shares of our common stock, 1,136,379 shares of our common stock underlying RSUs, 276,881 shares of common stock subject to purchase under our Employee Stock Purchase Plan, warrants to purchase 15,296 shares of our common stock and pre-funded warrants to purchase 2,424,242 shares of our common stock. The sale or the availability for sale of a large number of shares of our common stock in the public market could cause the price of our common stock to decline.

Because we have no current plans to pay cash dividends on our common stock for the foreseeable future, you may not receive any return on investment unless you sell your common stock for a price greater than that which you paid for it.

We intend to retain future earnings, if any, for future operations and expansion of our business and have no current plans to pay any cash dividends for the foreseeable future. The declaration, amount and payment of any future dividends on shares of common stock will be at the sole discretion of our Board of Directors. Our Board of Directors may take into account general and economic conditions, our financial condition and results of operations, our available cash and current and anticipated cash needs, capital requirements, contractual, legal, tax and regulatory restrictions, implications on the payment of dividends by us to our stockholders or by our subsidiaries to us and such other factors as our Board of Directors may deem relevant. In addition, our ability to pay dividends may be limited by covenants in connection with any indebtedness we or our subsidiaries incur. As a result, you may not receive any return on an investment in our common stock unless you sell our common stock for a price greater than that which you paid for it.

Our ability to use our net operating loss and credit carryforwards to offset future taxable income may be subject to certain limitations, including as a result of changes in stock ownership resulting from this offering.

At December 31, 2019, we had potentially utilizable gross Federal net operating loss carryforwards of \$297.6 million with \$182.9 million of net operating losses that carry forward indefinitely and \$114.7 million of net operating losses which begin to expire in 2027. There are State net operating loss carryforwards of \$309.3 million with \$1.0 million carrying forward indefinitely and \$308.3 million beginning to expire in 2031. In addition, we have Federal research and development credit carryforwards of \$9.0 million, which begin to expire in 2028 if not utilized, and California research and development credit carryforwards of \$5.3 million, which will carryforward indefinitely. Our ability to utilize our net operating loss and credit carryforwards is dependent upon our ability to generate taxable income in future periods and may be limited due to restrictions imposed on utilization of net operating loss and credit carryforwards under federal and state laws upon a change in ownership.

Under Sections 382 and 383 of the Internal Revenue Code of 1986, as amended, a corporation that undergoes an “ownership change,” is subject to annual limitations on its ability to use its pre-change net operating loss carryforwards (NOLs) and other pre-change tax attributes (such as research tax credits) to offset its post-change income or taxes. For these purposes, an ownership change generally occurs where the equity ownership of one or

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more stockholders or groups of stockholders who owns at least 5% of a corporation's stock increases its ownership by more than 50 percentage points over its lowest ownership percentage within a three-year period (calculated on a rolling basis). We have determined that an ownership change occurred in each of December 2010, January 2013 and October 2014. The result of these ownership changes is that \$39.8 million of our \$337.4 million of Federal net operating losses will not be available to us to offset future taxable income leaving potentially utilizable gross Federal net operating loss carryforwards of \$297.6 million. In addition, we may experience ownership changes in the future, some of which are outside our control. Accordingly, we may not be able to utilize a material portion of our net operating losses or credits. Limitations on our ability to utilize our net operating losses to offset U.S. federal taxable income could potentially result in increased future tax liability to us. In addition, at the state level, there may be periods during which the use of net operating losses is suspended or otherwise limited, which could accelerate or permanently increase state taxes owed.

Because U.S. federal net operating losses incurred in taxable periods beginning before January 1, 2018 generally may be carried forward for up to 20 years, the annual limitation may effectively provide a cap on the cumulative amount of pre-ownership change losses, including certain recognized built-in losses that may be utilized. Such pre-ownership change losses in excess of the cap may be lost. In addition, if an ownership change were to occur, it is possible that the limitations imposed on our ability to use pre-ownership change losses and certain recognized built-in losses could cause a net increase in our U.S. federal income tax liability and require U.S. federal income taxes to be paid earlier than otherwise would be paid if such limitations were not in effect. Further, if for financial reporting purposes the amount or value of these deferred tax assets is reduced, such reduction would have a negative impact on the book value of our common stock.

In addition, under the Tax Cuts and Jobs Act (the Tax Act), the amount of U.S. federal net operating losses generated in taxable periods beginning after December 31, 2017 that we are permitted to deduct in any taxable year is limited to 80% of our taxable income in such year, where taxable income is determined without regard to the NOL deduction itself. The Tax Act generally eliminates the ability to carry back any post-2017 NOL to prior taxable years, while allowing unused post-2017 NOLs to be carried forward indefinitely. The Coronavirus Aid, Relief, and Economic Security Act (CARES Act) was signed into law by President Trump in March 2020. The CARES Act allows NOLs in tax periods beginning after December 31, 2017 and beginning before January 1, 2021 to be carried back five years, carried forward indefinitely, and permits us to deduct 100% of our taxable income for tax periods beginning before January 1, 2021. In tax periods beginning after December 31, 2020, the 80% taxable income limit discussed above will apply to all U.S. NOLs generated in taxable periods beginning after December 31, 2017.

There is a risk that due to ownership changes, including changes in stock ownership resulting from this offering, changes in law or other unforeseen reasons, our existing NOLs could expire or otherwise be unavailable to offset future income tax liabilities.

CAUTIONARY STATEMENT REGARDING FORWARD-LOOKING STATEMENTS

This prospectus supplement, the accompanying prospectus, any related free writing prospectus and the documents that we incorporate by reference herein and therein, contain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended (the Securities Act), and Section 21E of the Securities Exchange Act of 1934, as amended (the Exchange Act). All statements other than statements of historical facts contained in this prospectus supplement, the accompanying prospectus, any related free writing prospectus and any documents incorporated by reference, including statements regarding our strategy, future operations, future financial position, future revenues, projected costs, prospects, plans and objectives of management, are forward-looking statements. These statements are often, but are not always, made through the use of words or phrases such as “anticipate,” “believe,” “contemplate,” “continue,” “could,” “estimate,” “expect,” “intend,” “may,” “plan,” “potential,” “predict,” “project,” “seek,” “should,” “target,” “will,” “would” and similar expressions, or the negative of these terms, or similar expressions. Accordingly, these statements involve estimates, assumptions and uncertainties that could cause actual results to differ materially from those expressed in them. Any forward-looking statements are qualified in their entirety by reference to the factors discussed throughout this prospectus supplement, the accompanying prospectus, any related free writing prospectus and the information and documents incorporated by reference herein, and in particular those factors referenced in the section “Risk Factors.”

Forward-looking statements include, but are not limited to, statements about:

- the initiation, timing, progress and results of clinical trials and nonclinical studies, and our research and development programs;
- the potential impact of the ongoing COVID-19 pandemic on the timing and progress of our ongoing clinical trials, our business, results of operations, liquidity and operations and our ability to mitigate those potential impacts;
- the clinical and therapeutic potential of our product candidates;
- our unproven approach to therapeutic intervention;
- our plans to develop and commercialize our product candidates;
- the potential benefits of our existing collaborations and our ability to establish and maintain collaborations;
- our ability to obtain additional funding;
- the timing or likelihood of regulatory filings and approvals for our product candidates;
- the implementation of our business model, strategic plans for our business, product candidates and technology;
- our commercialization, marketing and manufacturing capabilities and strategy;
- the rate and degree of market acceptance and clinical utility of our products;
- our ability to retain and recruit key personnel;
- our ability to manage growth;
- our competitive position;
- our intellectual property position;
- developments and projections relating to our competitors and our industry; and
- our estimates regarding expenses, future revenue, capital requirements and needs for additional financing.

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The forward-looking statements are based on our management's beliefs and assumptions and on information currently available to our management. These statements involve known and unknown risks, uncertainties and other factors that may cause our actual results or events to be materially different from the plans, intentions and expectations expressed or implied by these forward-looking statements, including, without limitation the risk factors and cautionary statements described in other documents that we file from time to time with the SEC, specifically under "Item 1A: Risk Factors" and elsewhere in our Annual Report on Form 10-K for the year ended December 31, 2019 and in our Quarterly Report on Form 10-Q for the period ended June 30, 2020 and the section of this prospectus supplement and the accompanying prospectus titled "Risk Factors."

The forward-looking statements in this prospectus supplement, the accompanying prospectus, any related free writing prospectus and the documents incorporated by reference represent our views as of their respective dates. We anticipate that subsequent events and developments will cause our views to change. However, while we may elect to update these forward-looking statements at some point in the future, we assume no obligation to update or revise any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by law. You should, therefore, not rely on these forward-looking statements as representing our views as of any date subsequent to the dates on which they were made.

USE OF PROCEEDS

We may issue and sell shares of our common stock having aggregate sales proceeds of up to \$100.0 million from time to time. Because there is no minimum offering amount required as a condition to close this offering, the actual total public offering amount, commissions and proceeds to us, if any, are not determinable at this time. There can be no assurance that we will sell any shares under or fully utilize our Sales Agreement with Jefferies.

We currently intend to use the net proceeds of this offering to fund clinical trials, nonclinical studies, research and development and for general corporate purposes. The expected use of the net proceeds from this offering represents our intentions based upon our current plans and business conditions, which could change in the future as our plans and business conditions evolve. The amounts and timing of our actual expenditures depend on numerous factors, including the progress of our nonclinical development efforts, the ongoing status of and results from our clinical trials and other studies and any unforeseen cash needs. As a result, our management will have broad discretion in applying the net proceeds from this offering. Although we may use a portion of the net proceeds from this offering for the licensing or acquisition of, or the development of, additional product candidates, technologies, compounds, other assets or complementary businesses, we have no current understandings, agreements or commitments to do so. Pending application of the net proceeds as described above, we intend to invest the net proceeds in short-term U.S. Treasury securities with insignificant rates of return.

DILUTION

If you invest in our common stock in this offering, your ownership interest will be diluted to the extent of the difference between the public offering price per share of our common stock in this offering and the as adjusted net tangible book value per share of our common stock immediately after this offering.

As of June 30, 2020, we had net tangible book value of approximately \$225.5 million, or \$6.87 per share of our common stock, based upon 32,807,519 shares of our common stock outstanding as of that date. Historical net tangible book value per share is equal to our total tangible assets, less total liabilities, divided by the number of outstanding shares of our common stock. Dilution in net tangible book value per share represents the difference between the amount per share paid by purchasers of shares of common stock in this offering and the net tangible book value per share of our common stock immediately after this offering.

After giving effect to the sale of 4,752,852 shares of common stock in this offering at an assumed public offering price of \$21.04 per share, the last reported sale price of our common stock on The Nasdaq Global Select Market on August 26, 2020, our as adjusted net tangible book value as of June 30, 2020 would have been approximately \$322.2 million, or approximately \$8.58 per share of common stock. This represents an immediate increase in as adjusted net tangible book value of \$1.71 per share to our existing stockholders and an immediate dilution of \$12.46 per share to investors participating in this offering at the public offering price.

Dilution per share to new investors is determined by subtracting net tangible book value per share after this offering from the public offering price per share paid by new investors. The following table illustrates this per share dilution to new investors:

Assumed public offering price per share		<u>\$21.04</u>
Historical net tangible book value per share as of June 30, 2020	\$6.87	
Increase in net tangible book value per share attributable to new investors	<u>1.71</u>	
As adjusted net tangible book value per share after giving effect to this offering		<u>8.58</u>
Dilution per share to investors in this offering		<u>\$12.46</u>

The table above assumes for illustrative purposes that an aggregate of \$100.0 million in shares of our common stock are sold at a price of \$21.04 per share, the last reported sale price of our common stock on The Nasdaq Global Select Market on August 26, 2020. The shares sold in this offering, if any, will be sold from time to time at various prices. An increase of \$1.00 per share in the price at which the shares are sold from the assumed offering price of \$21.04 per share shown in the table above, assuming all of our common stock in the aggregate amount of \$100.0 million is sold at that price, would increase our as adjusted net tangible book value per share after the offering to \$8.63 per share and would increase the dilution in net tangible book value per share to investors participating in this offering to \$13.41 per share. A decrease of \$1.00 per share in the price at which the shares are sold from the assumed offering price of \$21.04 per share shown in the table above, assuming all of our common stock in the aggregate amount of \$100.0 million is sold at that price, would decrease our net tangible book value per share after the offering to \$8.53 per share and would decrease the dilution in net tangible book value per share to investors participating in this offering to \$11.51 per share.

The information discussed above is illustrative only and will adjust based on the actual public offering price and other terms of this offering determined at pricing.

All information in this prospectus supplement relating to the number of shares of our common stock to be outstanding immediately after this offering is based on 32,807,519 shares of common stock outstanding as of June 30, 2020 and excludes:

- 6,652,076 shares of our common stock issuable upon exercise of stock options outstanding as of June 30, 2020 with a weighted-average exercise price of \$15.81 per share, of which 6,185,836 were

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granted under our equity incentive plans and 466,238 are outstanding under standalone nonqualified stock option agreements;

- 1,136,379 shares of common stock issuable upon the vesting and settlement of restricted stock units (RSUs) as of June 30, 2020;
- 15,296 shares of common stock underlying warrants outstanding as of June 30, 2020, at an exercise price of \$30.00 per share;
- 2,424,242 shares of common stock underlying pre-funded warrants outstanding as of June 30, 2020, each with an exercise price of \$0.001 per share;
- 276,881 shares of common stock subject to purchase under our Employee Stock Purchase Plan as of June 30, 2020; and
- 2,217,221 shares of common stock available for future issuance under equity incentive plans as of June 30, 2020.

To the extent that any options or warrants are exercised, including the prefunded warrants, any RSUs vest and are settled, new equity awards are issued under our equity incentive plans, or we otherwise issue additional shares of common stock in the future (including shares issued in connection with strategic and other transactions), there will be further dilution to new investors.

In addition, we may choose to raise additional capital due to market conditions or strategic considerations, even if we believe we have sufficient funds for our current or future operating plans. To the extent that additional capital is raised through the sale of equity or convertible debt securities, the issuance of these securities could result in further dilution to our stockholders.

PLAN OF DISTRIBUTION

We have entered into an Open Market Sale AgreementSM with Jefferies, dated as of August 28, 2020 (the Sales Agreement), under which we may offer and sell up to \$100.0 million of our shares of common stock from time to time through Jefferies acting as agent. Sales of our shares of common stock, if any, under this prospectus supplement and the accompanying prospectus will be made by any method that is deemed to be an “at the market offering” as defined in Rule 415(a)(4) under the Securities Act.

Each time we wish to issue and sell our shares of common stock under the Sales Agreement, we will notify Jefferies of the number of shares to be issued, the dates on which such sales are anticipated to be made, any limitation on the number of shares to be sold in any one day and any minimum price below which sales may not be made. Once we have so instructed Jefferies, unless Jefferies declines to accept the terms of such notice, Jefferies has agreed to use its commercially reasonable efforts consistent with its normal trading and sales practices to sell such shares up to the amount specified on such terms. The obligations of Jefferies under the Sales Agreement to sell our shares of common stock are subject to a number of conditions that we must meet.

The settlement of sales of shares between us and Jefferies is generally anticipated to occur on the second trading day following the date on which the sale was made. Sales of our shares of common stock as contemplated in this prospectus supplement will be settled through the facilities of The Depository Trust Company or by such other means as we and Jefferies may agree upon. There is no arrangement for funds to be received in an escrow, trust or similar arrangement.

We will pay Jefferies a commission of up to 3% of the gross sales price per share sold. Because there is no minimum offering amount required as a condition to close this offering, the actual total public offering amount, commissions and proceeds to us, if any, are not determinable at this time. In addition, we have agreed to reimburse Jefferies for the fees and disbursements of its counsel, payable upon execution of the Sales Agreement, in an amount not to exceed \$50,000. We estimate that the total expenses for the offering, excluding any commissions or expense reimbursement payable to Jefferies under the terms of the Sales Agreement, will be approximately \$200,000. The remaining sale proceeds, after deducting any other transaction fees, will equal our net proceeds from the sale of such shares.

Jefferies will provide written confirmation to us before the open on The Nasdaq Global Select Market on the day following each day on which our shares of common stock are sold under the Sales Agreement. Each confirmation will include the number of shares sold on that day, the aggregate gross proceeds of such sales and the proceeds to us.

In connection with the sale of our shares of common stock on our behalf, Jefferies will be deemed to be an “underwriter” within the meaning of the Securities Act, and the compensation of Jefferies will be deemed to be underwriting commissions or discounts. We have agreed to indemnify Jefferies against certain civil liabilities, including liabilities under the Securities Act. We have also agreed to contribute to payments Jefferies may be required to make in respect of such liabilities.

The offering of our shares of common stock pursuant to the Sales Agreement will terminate upon the earlier of (i) the sale of all shares of common stock subject to the Sales Agreement and (ii) the termination of the Sales Agreement as permitted therein. We and Jefferies may each terminate the Sales Agreement at any time upon ten days’ prior notice.

This summary of the material provisions of the Sales Agreement does not purport to be a complete statement of its terms and conditions. A copy of the Sales Agreement is filed as an exhibit to the registration statement of which this prospectus supplement forms a part.

Jefferies and its affiliates may in the future provide various investment banking, commercial banking, financial advisory and other financial services for us and our affiliates, for which services they may in the future receive

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customary fees. In the course of its business, Jefferies may actively trade our securities for its own account or for the accounts of customers, and, accordingly, Jefferies may at any time hold long or short positions in such securities.

This prospectus supplement and the accompanying prospectus in electronic format may be made available on a website maintained by Jefferies, and Jefferies may distribute this prospectus supplement and the accompanying prospectus electronically.

LEGAL MATTERS

Certain legal matters in connection with the offering and the validity of the securities offered by this prospectus supplement will be passed upon for us by Skadden, Arps, Slate, Meagher & Flom LLP, Los Angeles, California. Certain legal matters will be passed upon for the sales agent by Latham & Watkins LLP, Chicago, Illinois.

EXPERTS

Ernst & Young LLP, independent registered public accounting firm, has audited our consolidated financial statements and related notes included in our Annual Report on Form 10-K for the year ended December 31, 2019, and the effectiveness of our internal control over financial reporting as of December 31, 2019, as set forth in their reports, which are incorporated by reference in this prospectus supplement and elsewhere in the registration statement. Our consolidated financial statements and related notes are incorporated by reference in reliance on Ernst & Young LLP's reports, given on their authority as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We are subject to the information requirements of the Exchange Act and, in accordance therewith, file annual, quarterly and current reports, proxy statements and other information with the SEC. These documents may be accessed through the SEC's electronic data gathering, analysis and retrieval system (EDGAR) via electronic means, including the SEC's home page on the Internet (www.sec.gov).

Our website is located at www.assemblybio.com. Information contained on, or that can be accessed from, our website is not incorporated by reference in this prospectus supplement or the accompanying prospectus and, therefore, is not part of this prospectus supplement or the accompanying prospectus.

INCORPORATION BY REFERENCE

The SEC allows us to incorporate by reference the information and reports we file with it, which means that we can disclose important information to you by referring you to these documents. The information incorporated by reference is an important part of this prospectus supplement and the accompanying prospectus, and information that we file later with the SEC will automatically update and supersede the information already incorporated by reference. We are incorporating by reference the documents listed below, which we have already filed with the SEC, and any future filings we make with the SEC under Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act, including all filings made after the date of this prospectus supplement and prior to the termination of this offering, except as to any portion of any future annual or quarterly report to stockholders or document or current report furnished under current Item 2.02 or 7.01 or any related Item 9.01 of Form 8-K that is not deemed filed under such provisions:

- Our Annual Report on [Form 10-K](#) for the year ended December 31, 2019, filed with the SEC on March 4, 2020;
- The information specifically incorporated by reference into Part III of our Annual Report on Form 10-K for the year ended December 31, 2019 from our [definitive proxy statement](#) on Schedule 14A, filed with the SEC on April 27, 2020;
- Our Quarterly Reports on Form 10-Q for the quarters ended March 31, 2020 and June 30, 2020, filed with the SEC on [May 7, 2020](#) and [August 5, 2020](#), respectively;
- Our Current Reports on Form 8-K, filed with the SEC on [January 3, 2020](#), [February 11, 2020](#), [June 16, 2020](#), [June 18, 2020](#), [July 20, 2020](#) and [August 27, 2020](#); and
- The description of the Company's common stock in the Company's Registration Statement on [Form 8-A](#) (File No. 001-35005) filed with the Commission on December 10, 2010, including any amendment or report filed by the Company for the purpose of updating such description, including Exhibit 4.3 to the Company's Annual Report on [Form 10-K](#) for the year ended December 31, 2019, filed with the Commission on March 4, 2020.

Any statement contained in a document that is incorporated by reference will be modified or superseded for all purposes to the extent that a statement contained in this prospectus supplement, the accompanying prospectus or any related free writing prospectus, or in any other document that is subsequently filed with the SEC and incorporated by reference into this prospectus supplement, the accompanying prospectus or any free writing prospectus, modifies or is contrary to that previous statement. Any statement so modified or superseded will not be deemed a part of this prospectus supplement, the accompanying prospectus or the related free writing prospectus, except as so modified or superseded. Since information that we later file with the SEC will update and supersede previously incorporated information, you should look at all of the SEC filings that we incorporate by reference to determine if any of the statements in this prospectus supplement, the accompanying prospectus or in any documents previously incorporated by reference have been modified or superseded.

Upon request, we will provide, without charge, to each person, including any beneficial owner, to whom a copy of this prospectus supplement is delivered, a copy of the documents incorporated by reference into this prospectus supplement, or the accompanying prospectus, but not delivered with the prospectus supplement. You may request a copy of these documents at no cost by writing or telephoning us at the following address:

Assembly Biosciences, Inc.
331 Oyster Point Blvd., Fourth Floor
South San Francisco, California 94080
Attention: Corporate Secretary
(833) 509-4583

This prospectus supplement, the accompanying prospectus or information incorporated by reference herein or therein contains summaries of certain agreements that we have filed as exhibits to various SEC filings, as well as

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certain agreements that we may enter into in connection with the offering of securities covered by this prospectus supplement. The descriptions of these agreements contained in this prospectus supplement, the accompanying prospectus or information incorporated by reference herein or therein do not purport to be complete and are subject to, and qualified in their entirety by reference to, the definitive agreements. Copies of the definitive agreements will be made available without charge to you by making a written or oral request to us at the address set forth above.

You may also access these documents, free of charge on the SEC's website at <http://www.sec.gov> or on our website at www.assemblybio.com. Information contained on, or accessible from, our website is not incorporated by reference in this prospectus supplement or the accompanying prospectus and, therefore, is not part of this prospectus supplement or the accompanying prospectus.

This prospectus supplement is part of a registration statement we filed with the SEC. We have incorporated exhibits into that registration statement. You should read the exhibits carefully for provisions that may be important to you.

Up to \$100,000,000



Common Stock

PROSPECTUS SUPPLEMENT

Jefferies

Part II—INFORMATION NOT REQUIRED IN PROSPECTUS**Item 14. Other Expenses of Issuance and Distribution**

The expenses payable by Assembly Biosciences, Inc. (the Registrant or the Company) in connection with the issuance and distribution of the securities being registered (other than underwriting discounts and commissions, if any) are set forth below. Each item listed is estimated, except for the Securities and Exchange Commission (the SEC) registration fee.

Securities and Exchange Commission registration fee	\$38,940
FINRA filing fee	*
Legal fees and expenses	*
Accounting fees and expenses	*
Printing fees and expenses	*
Transfer agent and trustee fees	*
Miscellaneous	*
Total	\$38,940

* Estimated expenses not presently known

Item 15. Indemnification of Directors and Officers

The Company is incorporated under the laws of the State of Delaware. Section 145 of the Delaware General Corporation Law (the DGCL) provides that a Delaware corporation may indemnify any persons who are, or are threatened to be made, parties to any threatened, pending, or completed action, suit, or proceeding, whether civil, criminal, administrative, or investigative (other than an action by or in the right of such corporation), by reason of the fact that such person was an officer, director, employee, or agent of such corporation, or is or was serving at the request of such person as an officer, director, employee, or agent of another corporation or enterprise. The indemnity may include expenses (including attorneys' fees), judgments, fines, and amounts paid in settlement actually and reasonably incurred by such person in connection with such action, suit, or proceeding, provided that such person acted in good faith and in a manner he or she reasonably believed to be in or not opposed to the corporation's best interests and, with respect to any criminal action or proceeding, had no reasonable cause to believe that his or her conduct was illegal.

Section 145 of the DGCL also gives a corporation the power to indemnify any person who was or is a party or is threatened to be made a party to any threatened, pending or completed action or suit by or in the right of the corporation to procure a judgment in its favor by reason of the fact that the person is or was a director, officer, employee or agent of the corporation, or is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise against expenses (including attorneys' fees) actually and reasonably incurred by the person in connection with the defense or settlement of such action or suit if the person acted in good faith and in a manner the person reasonably believed to be in or not opposed to the best interests of the corporation and except that no indemnification shall be made in respect of any claim, issue or matter as to which such person shall have been adjudged to be liable to the corporation unless and only to the extent that the Court of Chancery or the court in which such action or suit was brought shall determine upon application that, despite the adjudication of liability but in view of all the circumstances of the case, such person is fairly and reasonably entitled to indemnity for such expenses which the Court of Chancery or such other court shall deem proper. Section 145 of the DGCL further provides that, to the extent that a present or former director or officer of a corporation has been successful on the merits or otherwise in defense of any such action, suit or proceeding, or in defense of any claim, issue or matter therein, such person shall be indemnified against expenses (including attorneys' fees) actually and reasonably incurred by such person in connection therewith.

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The Company's Amended and Restated Bylaws provide that:

- the Company shall indemnify its directors, officers and, in the discretion of its board of directors, certain employees and agents to the fullest extent permitted by the DGCL, as it now exists or may in the future be amended; and
- the Company shall advance reasonable expenses, including attorneys' fees, to its directors and officers in connection with legal proceedings relating to their service for or on behalf of the Company, subject to limited exceptions.

Section 145 of the DGCL also authorizes a corporation to purchase and maintain insurance on behalf of any person who is or was a director, officer, employee or agent of the corporation, or is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise, against any liability asserted against him and incurred by him in any such capacity, arising out of his status as such, whether or not the corporation would otherwise have the power to indemnify him under Section 145 of the DGCL. The Company maintains general liability insurance which covers certain liabilities of its directors and officers arising out of claims based on acts or omissions in their capacities as directors or officers, including liabilities under the Securities Act of 1933, as amended (the Securities Act).

The Company has adopted provisions in the Company's certificate of incorporation that limit or eliminate the personal liability of the Company's directors to the fullest extent permitted by the DGCL, as it now exists or may in the future be amended. Consequently, a director will not be personally liable to the Company or its stockholders for monetary damages for breach of fiduciary duty as a director, except for liability for:

- any breach of the director's duty of loyalty to the Company or its stockholders;
- acts or omissions not in good faith or that involve intentional misconduct or a knowing violation of law;
- unlawful payments of dividends or unlawful stock purchases or redemptions under Section 174 of the DGCL; or
- any transaction from which the director derived an improper personal benefit.

These limitations of liability do not alter director liability under the federal securities laws and do not affect the availability of equitable remedies such as an injunction or rescission.

The Company has obtained liability insurance for each director and officer for certain losses arising from claims or charges made against them while acting in their capacities as directors or officers of our company.

Any underwriting agreement(s) that we may enter into may provide for indemnification by any underwriters of us, our directors, our officers who sign the registration statement and our controlling persons for some liabilities, including liabilities arising under the Securities Act.

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Item 16. Exhibits

The following exhibits are filed as a part of this registration statement:

<u>Exhibit No.</u>	<u>Description</u>
1.1*	Form of Underwriting Agreement
1.2	Open Market Sale Agreement, dated August 24, 2020, by and between the Registrant and Jefferies LLC.
3.1	Fifth Amended and Restated Certificate of Incorporation of the Registrant (incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed on June 16, 2020).
3.2	Amended and Restated Bylaws of the Registrant (incorporated by reference to Exhibit 3.2 of the Registrant's Current Report on Form 8-K filed on June 16, 2020).
4.1	Specimen Common Stock Certificate (incorporated by reference to Exhibit 4.1 of the Registrant's Registration Statement on Form S-3 (File No. 333-208806) filed on December 30, 2015).
4.2	Form of indenture for senior debt securities and the related form of senior debt security (incorporated by reference to Exhibit 4.2 of the Registrant's Registration Statement on Form S-3 (File No. 333-222366) filed on December 29, 2017).
4.3	Form of indenture for subordinated debt securities and the related form of subordinated debt security (incorporated by reference to Exhibit 4.3 of the Registrant's Registration Statement on Form S-3 (File No. 333-222366) filed on December 29, 2017).
4.4*	Form of Certificate of Designations
4.5*	Form of Warrant Agreements
4.6*	Form of Unit Certificate
4.7*	Form of Preferred Stock Certificate
5.1	Opinion of Skadden, Arps, Slate, Meagher & Flom LLP.
12.1*	Computation of Ratio of Earnings to Fixed Charges
23.1	Consent of Independent Registered Public Accounting Firm
23.2	Consent of Skadden, Arps, Slate, Meagher & Flom LLP (included in Exhibit 5.1 hereto)
24.1	Power of Attorney (included on the signature pages hereto)
25.1**	Form T-1 Statement of Eligibility of Trustee for Senior Indenture under the Trust Indenture Act of 1939
25.2**	Form T-1 Statement of Eligibility of Trustee for Subordinated Indenture under the Trust Indenture Act of 1939

* To be filed, if necessary, by amendment or as an exhibit to a document to be incorporated or deemed to be incorporated by reference in this registration statement, including a Current Report on Form 8-K.

** To be filed by amendment pursuant to Section 305(b)(2) of the Trust Indenture Act of 1939.

Item 17. Undertakings

(a) the undersigned registrant hereby undertakes:

(1) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:

(i) To include any prospectus required by Section 10(a)(3) of the Securities Act of 1933;

(ii) To reflect in the prospectus any facts or events arising after the effective date of the registration statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information set forth in the registration statement. Notwithstanding the foregoing, any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the Securities and Exchange Commission (the Commission) pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than 20% change in the maximum aggregate offering price set forth in the "Calculation of Registration Fee" table in the effective registration statement; and

(iii) To include any material information with respect to the plan of distribution not previously disclosed in the registration statement or any material change to such information in the registration statement;

provided, however, that paragraphs (a)(1)(i), (a)(1)(ii) and (a)(1)(iii) of this section do not apply if the information required to be included in a post-effective amendment by those paragraphs is contained in reports filed with or furnished to the Commission by the registrant pursuant to Section 13 or Section 15(d) of the Securities Exchange Act of 1934 that are incorporated by reference in the registration statement, or is contained in a form of prospectus filed pursuant to Rule 424(b) that is part of the registration statement;

(2) That, for the purpose of determining any liability under the Securities Act of 1933, each such post-effective amendment 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;

(3) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering;

(4) That, for the purpose of determining liability under the Securities Act of 1933 to any purchaser:

(i) Each prospectus filed by the registrant pursuant to Rule 424(b)(3) shall be deemed to be part of the registration statement as of the date the filed prospectus was deemed part of and included in the registration statement; and

(ii) Each prospectus required to be filed pursuant to Rule 424(b)(2), (b)(5), or (b)(7) as part of a registration statement in reliance on Rule 430B relating to an offering made pursuant to Rule 415(a)(1)(i), (vii), or (x) for the purpose of providing the information required by Section 10(a) of the Securities Act of 1933 shall be deemed to be part of and included in the registration statement as of the earlier of the date such form of prospectus is first used after effectiveness or the date of the first contract of sale of securities in the offering described in the prospectus. As provided in Rule 430B, for liability purposes of the issuer and any person that is at that date an underwriter, such date shall be deemed to be a new effective date of the registration statement relating to the securities in the registration statement to which that prospectus relates, and the offering of such securities at that time shall be deemed to be the initial *bona fide* offering thereof. Provided, however, that no statement made in a registration statement or prospectus that is part of the registration statement or made in a document incorporated or deemed incorporated by reference into the registration statement or prospectus that is part of the registration statement will, as to a purchaser with a time of contract of sale prior to such effective date, supersede or modify any statement that was made in the registration statement or

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prospectus that was part of the registration statement or made in any such document immediately prior to such effective date;

(5) That, for the purpose of determining liability of the registrant under the Securities Act of 1933 to any purchaser in the initial distribution of the securities:

The undersigned registrant undertakes that in a primary offering of securities of the undersigned registrant pursuant to this registration statement, regardless of the underwriting method used to sell the securities to the purchaser, if the securities are offered or sold to such purchaser by means of any of the following communications, the undersigned registrant will be a seller to the purchaser and will be considered to offer or sell such securities to such purchaser:

(i) Any preliminary prospectus or prospectus of the undersigned registrant relating to the offering required to be filed pursuant to Rule 424;

(ii) Any free writing prospectus relating to the offering prepared by or on behalf of the undersigned registrant or used or referred to by the undersigned registrant;

(iii) The portion of any other free writing prospectus relating to the offering containing material information about the undersigned registrant or its securities provided by or on behalf of the undersigned registrant; and

(iv) Any other communication that is an offer in the offering made by the undersigned registrant to the purchaser;

(6) That, for purposes of determining any liability under the Securities Act of 1933, each filing of the registrant's annual report pursuant to Section 13(a) or Section 15(d) of the Securities Exchange Act of 1934 (and, where applicable, each filing of an employee benefit plan's annual report pursuant to section 15(d) of the Securities Exchange Act of 1934) that is incorporated by reference in the registration statement 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;

(7) 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 Securities Act of 1933 and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Securities Act of 1933 and will be governed by the final adjudication of such issue;

(8) That, 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 of 1933 shall be deemed to be part of this registration statement as of the time it was declared effective;

(9) That, 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; and

(10) To file an application for the purpose of determining the eligibility of the trustee to act under subsection (a) of Section 310 of the Trust Indenture Act of 1939 in accordance with the rules and regulations prescribed by the Commission under Section 305(b)(2) of the Trust Indenture Act of 1939.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-3 and has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of South San Francisco, State of California, on this August 28, 2020.

Assembly Biosciences, Inc.

By: /s/ John G. McHutchison, A.O., M.D.
John G. McHutchison, A.O., M.D.
Chief Executive Officer and President

We the undersigned officers and directors of Assembly Biosciences, Inc. severally constitute and appoint each of John G. McHutchison, A.O., M.D., Thomas J. Russo and Jason A. Okazaki, and each of them singly (with full power to each of them to act alone, as our true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for such person and in such person's name, place and stead, in any and all capacities, to sign any or all amendments (including, without limitation, post-effective amendments) to this registration statement (or any registration statement for the same offering that is to be effective upon filing pursuant to Rule 462(b) under the Securities Act of 1933), and to file the same, with all exhibits thereto, and all documents in connection therewith, with the Securities and Exchange Commission, granting unto each said attorney-in-fact and agent full power and authority to do and perform each and every act and thing requisite and necessary to be done in and about the premises, as fully to all intents and purposes as such person might or could do in person, hereby ratifying and confirming all that any said attorney-in-fact and agent, or any substitute or substitutes of any of them, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, this registration statement has been signed by the following persons on August 28, 2020 in the capacities indicated.

<u>Signature</u>	<u>Title</u>
<u>/s/ John G. McHutchison, A.O., M.D.</u> John G. McHutchison, A.O., M.D.	Director, Chief Executive Officer and President (Principal Executive Officer)
<u>/s/ Thomas J. Russo</u> Thomas J. Russo	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)
<u>/s/ William R. Ringo, Jr.</u> William R. Ringo, Jr.	Chairman of the Board
<u>/s/ Anthony E. Altig</u> Anthony E. Altig	Director
<u>/s/ Richard D. DiMarchi, Ph.D.</u> Richard D. DiMarchi, Ph.D.	Director
<u>/s/ Myron Z. Holubiak</u> Myron Z. Holubiak	Director
<u>/s/ Helen S. Kim</u> Helen S. Kim	Director
<u>/s/ Alan J. Lewis, Ph.D.</u> Alan J. Lewis, Ph.D.	Director
<u>/s/ Susan Mahony, Ph.D.</u> Susan Mahony, Ph.D.	Director

OPEN MARKET SALE AGREEMENTSM

August 28, 2020

JEFFERIES LLC
520 Madison Avenue
New York, New York 10022

Ladies and Gentlemen:

Assembly Biosciences, Inc., a Delaware corporation (the “**Company**”), proposes, subject to the terms and conditions stated herein, to issue and sell from time to time through Jefferies LLC, as sales agent and/or principal (the “**Agent**”), shares of the Company’s common stock, par value \$0.001 per share (the “**Common Shares**”), having an aggregate offering price of up to \$100,000,000 on the terms set forth in this agreement (this “**Agreement**”).

Section 1. DEFINITIONS

(a) Certain Definitions. For purposes of this Agreement, capitalized terms used herein and not otherwise defined shall have the following respective meanings:

“**Affiliate**” of a Person means another Person that directly or indirectly, through one or more intermediaries, controls, is controlled by, or is under common control with, such first- mentioned Person. The term “control” (including the terms “controlling,” “controlled by” and “under common control with”) means the possession, direct or indirect, of the power to direct or cause the direction of the management and policies of a Person, whether through the ownership of voting securities, by contract or otherwise.

“**Agency Period**” means the period commencing on the date of this Agreement and expiring on the earliest to occur of (x) the date on which the Agent shall have placed the Maximum Program Amount pursuant to this Agreement and (y) the date this Agreement is terminated pursuant to Section 7.

“**Commission**” means the U.S. Securities and Exchange Commission.

“**Exchange Act**” means the Securities Exchange Act of 1934, as amended, and the rules and regulations of the Commission thereunder.

“**Floor Price**” means the minimum price set by the Company in the Issuance Notice below which the Agent shall not sell Shares during the applicable Selling Period, which may be adjusted by the Company at any time during the Selling Period by delivering written notice of such change to the Agent and which in no event shall be less than \$1.00 without the prior written consent of the Agent, which may be withheld in the Agent’s sole discretion.

SM “Open Market Sale Agreement” is a service mark of Jefferies LLC

“Issuance Amount” means the aggregate Sales Price of the Shares to be sold by the Agent pursuant to any Issuance Notice.

“Issuance Notice” means a written notice delivered to the Agent by the Company in accordance with this Agreement in the form attached hereto as Exhibit A that is executed by its Chief Executive Officer, President, Chief Financial Officer, Chief Legal and Business Officer or any other person from the Company named on Schedule A hereto (as such schedule may be amended from time to time, including by way of email).

“Issuance Notice Date” means any Trading Day during the Agency Period that an Issuance Notice is delivered pursuant to Section 3(b)(i).

“Issuance Price” means the Sales Price less the Selling Commission.

“Maximum Program Amount” means Common Shares with an aggregate Sales Price of the lesser of (a) the number or dollar amount of Common Shares registered under the effective Registration Statement (defined below) pursuant to which the offering is being made, (b) the number of authorized but unissued Common Shares (less Common Shares issuable upon exercise, conversion or exchange of any outstanding securities of the Company or otherwise reserved from the Company’s authorized capital stock), (c) the number or aggregate dollar amount of Common Shares permitted to be sold under Form S-3 (including General Instruction I.B.6 thereof, if applicable), or (d) the aggregate dollar amount of Common Shares for which the Company has filed a Prospectus (defined below).

“Person” means an individual or a corporation, partnership, limited liability company, trust, incorporated or unincorporated association, joint venture, joint stock company, governmental authority or other entity of any kind.

“Principal Market” means the Nasdaq Global Select Market or such other national securities exchange on which the Common Shares, including any Shares, are then listed.

“Sales Price” means the actual sale execution price of each Share placed by the Agent pursuant to this Agreement.

“Securities Act” means the Securities Act of 1933, as amended, and the rules and regulations of the Commission thereunder.

“Selling Commission” means up to three percent (3.0%) of the gross proceeds of Shares sold pursuant to this Agreement, or as otherwise agreed between the Company and the Agent with respect to any Shares sold pursuant to this Agreement.

“Selling Period” means the period set forth in the Issuance Notice.

“Settlement Date” means the second business day following each Trading Day during the Selling Period on which Shares are sold pursuant to this Agreement, when the Company shall deliver to the Agent the amount of Shares sold on such Trading Day and the Agent shall deliver to the Company the Issuance Price received on such sales.

“Shares” shall mean the Common Shares issued or issuable pursuant to this Agreement.

“Trading Day” means any day on which the Principal Market is open for trading.

Section 2. REPRESENTATIONS AND WARRANTIES OF THE COMPANY

The Company represents and warrants to, and agrees with, the Agent that, unless such representation, warranty or agreement specifies otherwise, as of (1) the date of this Agreement, (2) each Issuance Notice Date, (3) each Settlement Date, (4) each Triggering Event Date and (5) as of each Time of Sale (each of the times referenced above is referred to herein as a “**Representation Date**”), except as may be disclosed in the Prospectus (including any documents incorporated by reference therein and any supplements thereto) on or before a Representation Date:

(a) **Registration Statement.** The Company has prepared and has filed or will file with the Commission a shelf registration statement on Form S-3, including a base prospectus relating to certain securities, including the Shares to be issued from time to time by the Company, and a sales agreement prospectus (the “**Sales Agreement Prospectus**”) specifically relating to the Shares. Such registration statement registers the issuance and sale by the Company of the Shares under the Securities Act. The Company may file one or more additional registration statements from time to time that will contain a base prospectus and related prospectus or prospectus supplement, if applicable, with respect to the Shares. Except where the context otherwise requires, such registration statement(s), including any information deemed to be a part thereof pursuant to Rule 430B under the Securities Act, including all financial statements, exhibits and schedules thereto and all documents incorporated or deemed to be incorporated therein by reference pursuant to Item 12 of Form S-3 under the Securities Act as from time to time amended or supplemented, is herein referred to as the “**Registration Statement**,” and the Sales Agreement Prospectus, together with any prospectus supplement filed with the Commission pursuant to Rule 424(b) under the Securities Act relating to a particular issuance of the Shares, including all documents incorporated or deemed to be incorporated therein by reference pursuant to Item 12 of Form S-3 under the Securities Act, in each case, as from time to time amended or supplemented, is referred to herein as the “**Prospectus**,” except that if any revised prospectus is provided to the Agent by the Company for use in connection with the offering of the Shares that is not required to be filed by the Company pursuant to Rule 424(b) under the Securities Act, the term “**Prospectus**” shall refer to such revised prospectus from and after the time it is first provided to the Agent for such use. The Registration Statement at the time it originally became effective is herein called the “**Original Registration Statement**.” As used in this Agreement, the terms “**amendment**” or “**supplement**” when applied to the Registration Statement or the Prospectus shall be deemed to include the filing by the Company with the Commission of any document under the Exchange Act after the date hereof that is or is deemed to be incorporated therein by reference.

All references in this Agreement to financial statements and schedules and other information which is “contained,” “included” or “stated” in the Registration Statement or the Prospectus (and all other references of like import) shall be deemed to mean and include all such financial statements and schedules and other information which is or is deemed to be incorporated by reference in or otherwise deemed under the Securities Act to be a part of or included in the Registration Statement or the Prospectus, as the case may be, as of any specified date; and all

references in this Agreement to amendments or supplements to the Registration Statement or the Prospectus shall be deemed to mean and include, without limitation, the filing of any document under the Exchange Act which is or is deemed to be incorporated by reference in or otherwise deemed under the Securities Act to be a part of or included in the Registration Statement or the Prospectus, as the case may be, as of any specified date. The Company's obligations under this Agreement to furnish, provide, deliver or make available (and all other references of like import) copies of any report or statement shall be deemed satisfied if the same is filed with the Commission through its Electronic Data Gathering, Analysis, and Retrieval system ("EDGAR").

At the time the Registration Statement was or will be originally declared effective and at the time the Company's most recent annual report on Form 10-K was filed with the Commission, if later, the Company met the then-applicable requirements for use of Form S-3 under the Securities Act. At the time the Company filed its most recent annual report on Form 10-K, the Company met the then-applicable requirements for use of Form S-3 under the Securities Act.

(b) Issuer Free Writing Prospectus. Neither the Company nor the Agent has prepared, used, referred to or distributed, or will prepare, use, refer to or distribute, without the other party's prior written consent, any "written communication" that constitutes a "free writing prospectus" as such terms are defined in Rule 405 under the Securities Act with respect to the offering contemplated by this Agreement (any such free writing prospectus being referred to herein as a "**Free Writing Prospectus**"). Any Free Writing Prospectus that the Company is required to file pursuant to Rule 433(d) under the Securities Act has been, or will be, filed with the Commission in accordance with the requirements of the Securities Act. Each Free Writing Prospectus that the Company has filed, or is required to file, pursuant to Rule 433(d) under the Securities Act or that was prepared by or on behalf of or used or referred to by the Company complies or will comply in all material respects with the requirements of Rule 433 under the Securities Act including timely filing with the Commission or retention where required and legending, and each such Free Writing Prospectus, as of its issue date and at all subsequent times through the completion of the issuance and sale of the Shares did not, does not and will not include any information that conflicted, conflicts with or will conflict with the information contained in the Registration Statement or the Prospectus, including any document incorporated by reference therein. Except for the Free Writing Prospectuses, if any, and electronic road shows, if any, furnished to the Agent before first use, the Company has not prepared, used or referred to, and will not, without the Agent's prior consent, prepare, use or refer to, any Free Writing Prospectus.

(c) Registration Statement and Prospectus. The Registration Statement and any registration statement filed under Rule 462(b) under the Securities Act Rule (a "**462(b) Registration Statement**") has been declared effective by the Commission and has been filed with the Commission not earlier than three years prior to the date hereof; and no notice of objection of the Commission to the use of such registration statement or any post-effective amendment thereto pursuant to Rule 401(g)(2) under the Securities Act has been received by the Company. No order suspending the effectiveness of the Registration Statement or any Rule 462(b) 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 threatened by the Commission; as of the applicable effective date of the Registration Statement, any Rule 462(b) Registration Statement and any post-effective amendment

thereto, the Registration Statement, any Rule 462(b) Registration Statement and any such post-effective amendment complied and will comply in all material respects with 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 any Settlement Date, 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 required to be stated therein or 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 the Agent furnished to the Company in writing by the Agent expressly for use in the Registration Statement, any Rule 462(b) Registration Statement and the Prospectus and any amendment or supplement thereto, it being understood and agreed that the only such information furnished by the Agent consists of the information described as such in Section 7 hereof.

(d) Incorporated Documents. The documents incorporated by reference in the Registration Statement and the Prospectus when they were filed with the Commission conformed in all material respects to the requirements of 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.

(e) 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 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 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 the information required to be stated therein; and the other financial information included or incorporated by reference in the Registration Statement and the Prospectus has been derived from the accounting records of the Company and its consolidated subsidiaries and presents fairly the information shown thereby.

(f) 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 and the Prospectus, (i) there has not been any change in the capital stock (other than (x) the issuance of shares of Shares upon exercise of stock options and warrants or vesting of restricted stock units described as outstanding in, and the grant of options and awards under existing equity incentive plans and (y) the issuance of shares of Shares upon purchase under the Company’s employee stock purchase plan, each described in, the Registration Statement 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 involving a prospective material adverse change, in or affecting the business, properties, management, financial position, stockholders' equity or results of operations 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 and the Prospectus.

(g) Organization and Good Standing. The Company has been duly organized and is validly existing and in good standing under the laws of its jurisdiction of organization, is duly qualified to do business and is in good standing in each jurisdiction in which its ownership or lease of property or the conduct of its business requires such qualification, and has all power and authority necessary to own or hold its properties and to conduct the businesses in which it is 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, have a material adverse effect on the condition (financial or otherwise), results of operations, business, properties 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 the most recent Exhibit 21 filed with the Commission or as otherwise disclosed to the Agent.

(h) Capitalization. The Company has an authorized capitalization as set forth in the Registration Statement and the Prospectus under the heading "Description of Capital Stock" (for the avoidance of doubt, as such capitalization may be updated from time to time pursuant to the Company's filings with the Commission); 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 Prospectus, there are no outstanding rights (including, without limitation, pre-emptive rights), 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 (including the Shares) conforms in all material respects to the description thereof contained in the Registration Statement 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.

(i) 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 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 and, to the extent applicable, the Exchange Act and the rules of the Principal Market and any other exchange on which Company securities are traded and (iv) each such grant was properly accounted for in accordance with GAAP in the financial statements (including the related notes) of the Company. Each Company Stock Plan is accurately described in all material respects in the Registration Statement and the Prospectus.

(j) 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.

(k) Open Market Sale AgreementSM. This Agreement has been duly authorized, executed and delivered by the Company.

(l) 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 and the Prospectus; and the issuance of the Shares is not subject to any preemptive or similar rights.

(m) Listing. The Shares have been approved for listing on the Principal Market.

(n) No Violation or Default. Neither the Company nor any of its subsidiaries is (i) in violation of its charter or bylaws 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, have a Material Adverse Effect.

(o) No Conflicts. The execution, delivery and performance by the Company of this Agreement, the issuance and sale of the Shares and the consummation by the Company of the

transactions contemplated by this Agreement 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 bylaws 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, reasonably be expected to have a Material Adverse Effect.

(p) No Consents Required. No consent, filing, approval, authorization, order, 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 and the consummation of the transactions contemplated by this Agreement, except for the registration of the Shares under the Securities Act and such consents, approvals, authorizations, orders and registrations or qualifications as may be required by the Financial Industry Regulatory Authority, Inc. (“**FINRA**”) and under applicable state securities laws in connection with the purchase and distribution of the Shares by the Agent.

(q) Legal Proceedings. Except as described in the Registration Statement 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; no such Actions are threatened or, to the knowledge of the Company, 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 or the Prospectus that are not so described in the Registration Statement 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 or the Prospectus that are not so filed as exhibits to the Registration Statement or described in the Registration Statement and the Prospectus.

(r) Independent Accountants. Ernst & Young LLP, who has 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.

(s) Title to Real and Personal Property. The Company and its subsidiaries have good and marketable title in fee simple 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.

(t) Intellectual Property. (i) The Company and its subsidiaries own or have the right to use all patents, patent applications, trademarks, service marks, trade names, trademark registrations, service mark registrations, domain names and other source indicators, copyrights and copyrightable works, know-how, trade secrets, systems, procedures, proprietary or confidential information and all other worldwide intellectual property, industrial property and proprietary rights (collectively, “**Intellectual Property**”) used in the conduct of their respective businesses, except to the extent that the failure to own, or otherwise hold adequate rights to use such Intellectual Property would not, individually or in the aggregate, have a Material Adverse Effect, (ii) to the knowledge of the Company, the Company’s and its subsidiaries’ conduct of their respective businesses does not currently, and will not, upon the commercialization of any product candidates described or referred to in the Registration Statement or the Prospectus, infringe, misappropriate or otherwise violate any Intellectual Property of any person, (iii) the Company and its subsidiaries have not received any written notice of any claim relating to Intellectual Property and (iv) to the knowledge of the Company, the Intellectual Property of the Company and their subsidiaries is not being infringed, misappropriated or otherwise violated by any person. To the Company’s knowledge, there are no third parties who have rights to any Intellectual Property, except as disclosed in the Registration Statement and the Prospectus (“**Disclosure Documents**”). There is no pending or to the Company’s knowledge, threatened action, suit, proceeding or claim by others: (A) challenging the Company’s rights in or to any Intellectual Property, and the Company is unaware of any facts which would form a reasonable basis for any such action, suit, proceeding or claim, (B) challenging the validity, enforceability or scope of any Intellectual Property, and the Company is unaware of any facts which would form a reasonable basis for any such action, suit, proceeding or claim or (C) asserting that the Company or its subsidiaries infringe, misappropriate, or otherwise violate, or would, upon the commercialization of any product or service described in the Registration Statement or Prospectus as under development, infringe, misappropriate, or otherwise violate, any Intellectual Property rights of others, and the Company is unaware of any facts which would form a reasonable basis for any such action, suit, proceeding or claim. The Company and its subsidiaries have complied with the terms of each agreement pursuant to which Intellectual Property has been licensed to the Company or its subsidiaries, and all such agreements are in full force and effect. To the Company’s knowledge, there are no material defects in any of the patents or patent applications included in the Intellectual Property. The Company and its subsidiaries have taken all reasonable steps to protect, maintain and safeguard their Intellectual Property Rights, including the execution of appropriate nondisclosure, confidentiality agreements and invention assignment agreements and invention assignments with their employees, and to the Company’s knowledge, no employee of the Company is in or has 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 the basis of such violation relates to such employee’s employment with the Company. To the Company’s knowledge, the duty of candor and good faith

as required by the United States Patent and Trademark Office during the prosecution of the United States patents and patent applications included in the Company Intellectual Property have been complied with; and in all foreign offices having similar requirements, all such requirements have been complied with. The product candidates described in the Registration Statement and Prospectus as under development by the Company or its subsidiary fall within the scope of the claims of one or more patents or patent applications owned by, or exclusively licensed to, the Company or its subsidiary.

(u) Clinical Data and Regulatory Compliance. The nonclinical tests, clinical trials and other studies (collectively, “**studies**”) that are described in, or the results of which are referred to in, the Registration Statement or the Prospectus were and, if still pending, are being conducted in all material respects in accordance with the protocols, procedures and controls designed and approved for such studies and with standard medical and scientific research procedures; each description of the results of such studies is accurate and complete in all material respects and fairly presents the data derived from such studies, and the Company and its subsidiaries have no knowledge of any other studies the results of which are inconsistent with, or otherwise call into question, the results described or referred to in the Registration Statement or the Prospectus; the Company and its subsidiaries have made all such filings and obtained all such approvals as may be required by the Food and Drug Administration of the U.S. Department of Health and Human Services or from any other U.S. or foreign government or drug regulatory agency, or health care facility Institutional Review Board (collectively, the “**Regulatory Agencies**”); the Company and its subsidiaries have not received any notice of, or correspondence from, any Regulatory Agency requiring the termination or suspension of any clinical trials that are described or referred to in the Registration Statement or the Prospectus; and the Company and its subsidiaries have operated and currently are in compliance in all material respects with all applicable rules and regulations of the Regulatory Agencies.

(v) Compliance with Health Care Laws. The Company and its subsidiaries are, and at all times have been, in compliance in all material respects with all Health Care Laws. For purposes of this Agreement, “**Health Care Laws**” means: (i) the Federal Food, Drug, and Cosmetic Act and the regulations promulgated thereunder, (ii) all applicable federal, state, local and all applicable foreign health care related fraud and abuse laws, including, without limitation, the U.S. Anti-Kickback Statute (42 U.S.C. Section 1320a-7b(b)), the U.S. civil monetary penalties law (42 U.S.C. § 1320a-7a), the U.S. Civil False Claims Act (31 U.S.C. Section 3729 et seq.), the U.S. criminal false statements law (42 U.S.C. § 1320a-7b(a)), all applicable federal, state, local and all foreign criminal laws relating to health care fraud and abuse, including but not limited to 18 U.S.C. Sections 286 and 287, and the health care fraud criminal provisions under the U.S. Health Insurance Portability and Accountability Act of 1996 (“**HIPAA**”) (42 U.S.C. Section 1320d et seq.), the U.S. exclusion law (42 U.S.C. § 1320a-7), the statutes, regulations and directives of applicable government funded or sponsored healthcare programs, and the regulations promulgated pursuant to such statutes, (iii) the Standards for Privacy of Individually Identifiable Health Information, the Security Standards, and the Standards for Electronic Transactions and Code Sets promulgated under HIPAA, the Health Information Technology for Economic and Clinical Health Act (42 U.S.C. Section 17921 et seq.), and the regulations promulgated thereunder and any state or non-U.S. counterpart thereof or other law or regulation the purpose of which is to protect the privacy of individuals or prescribers, (iv) the U.S. Patient Protection and Affordable Care Act of

2010 (Public Law 111-148), as amended by the U.S. Health Care and Education Reconciliation Act of 2010 (Public Law 111-152), the regulations promulgated thereunder; (v) the U.S. Physician Payments Sunshine Act (42 U.S.C. § 1320a-7h), (vi) the U.S. Controlled Substances Act (21 U.S.C. Section 801 et seq.) and (vii) all other local, state, federal, national, supranational and foreign laws applicable to the Company and its subsidiaries. The Company and its subsidiaries have not received written notice of any claim, action, suit, proceeding, hearing, enforcement, investigation, arbitration or other action from any court or arbitrator or governmental or regulatory authority or third party alleging that any product operation or activity is in violation of any Health Care Laws nor is any such claim, action, suit, proceeding, hearing, enforcement, investigation, arbitration or other action threatened. The Company and its subsidiaries have filed, maintained or submitted all material reports, documents, forms, notices, applications, records, claims, submissions and supplements or amendments as required by any Health Care Laws, and all such reports, documents, forms, notices, applications, records, claims, submissions and supplements or amendments were complete and accurate on the date filed in all material respects (or were corrected or supplemented by a subsequent submission). The Company and its subsidiaries are not a party to any corporate integrity agreements, monitoring agreements, consent decrees, settlement orders, or similar agreements with or imposed by any governmental or regulatory authority. Additionally, neither the Company and its subsidiaries nor, to the best of its knowledge, any of their employees, officers or directors has been excluded, suspended or debarred from participation in any U.S. federal health care program or human clinical research or is subject to a governmental inquiry, investigation, proceeding, or other similar action that could reasonably be expected to result in debarment, suspension, or exclusion.

(w) 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.

(x) 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 as described in the Registration Statement and the Prospectus, will not be 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 (collectively, the “**Investment Company Act**”).

(y) 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 or have timely requested extension thereof, except where the failure to so file or pay would not have a Material Adverse Effect; and except as otherwise disclosed in each of the Registration Statement 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 which has had, or would have, individually or in the aggregate, a Material Adverse Effect.

(z) Licenses and Permits. The Company and its subsidiaries possess all licenses, sub-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 each of the Registration Statement and the Prospectus, except where the failure to possess or make the same would not, individually or in the aggregate, have a Material Adverse Effect; and except as described in each of the Registration Statement and the Prospectus, neither the Company nor any of its subsidiaries has received notice of any revocation or modification of any such license, sub-license, certificate, permit or authorization or has any reason to believe that any such license, sub-license, certificate, permit or authorization will not be renewed in the ordinary course.

(aa) 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 have a Material Adverse Effect.

(bb) 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 (including common law), rules, regulations, requirements, decisions, judgments, decrees, orders and other legally enforceable requirements 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, and have not violated any, 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 or obligation 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, (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 the Registration Statement 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.

(cc) Hazardous Materials. There has been no storage, generation, transportation, use, handling, treatment, Release or threat of Release of Hazardous Materials by, relating to or caused by the Company or any of its subsidiaries for whose acts or omissions the Company and its

subsidiaries are or could reasonably be expected to be liable) at, on, under or from any property or facility now or previously owned, operated or leased by the Company or its subsidiaries, or at, on, under or from any other property or facility, in violation of any Environmental Laws or in a manner or amount or to a location that could reasonably be expected to result in any liability under any Environmental Law, except for any violation or liability which would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect. **“Hazardous Materials”** means any material, chemical, substance, waste, pollutant, contaminant, compound, mixture, or constituent thereof, in any form or amount, including petroleum (including crude oil or any fraction thereof) and petroleum products, natural gas liquids, asbestos and asbestos containing materials, naturally occurring radioactive materials, brine, and drilling mud, regulated or which can give rise to liability under any Environmental Law. **“Release”** means any spilling, leaking, seepage, pumping, pouring, emitting, emptying, discharging, injecting, escaping, leaching, dumping, disposing, depositing, dispersing, or migrating in, into or through the environment, or in, into from or through any building or structure.

(dd) **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.

(ee) Disclosure Controls. The Company maintains an effective system of "disclosure controls and procedures" (as defined in Rule 13a-15(e) of the Exchange Act) that complies with the 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 has carried out evaluations of the effectiveness of its disclosure controls and procedures as required by Rule 13a-15 of the Exchange Act.

(ff) Accounting Controls. The Company maintains a system of "internal control over financial reporting" (as defined in Rule 13a-15(f) of the Exchange Act) that comply with the requirements of the Exchange Act and have been designed by, or under the supervision of, its 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 maintains 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 and the Prospectus fairly presents the information called for in all material respects and is prepared in accordance with the Commission's rules and guidelines applicable thereto. Based on the Company's most recent evaluation of its internal controls over financial reporting pursuant to Rule 13a-15(c) of the Exchange Act, except as disclosed in the Registration Statement 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.

(gg) 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.

(hh) Insurance. The Company has insurance covering its respective properties, operations, personnel and businesses, including business interruption insurance, which insurance is in amounts and insures against such losses and risks as are adequate to protect the Company and its respective businesses; and the Company has not (i) received 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.

(ii) 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 U.S. 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 has instituted, maintains and enforces, 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.

(jj) 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 or regulatory agency (collectively, the "**Anti-Money Laundering Laws**") and no action, suit or proceeding by or before any court or governmental or regulatory 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.

(kk) No Conflicts with Sanctions Laws. Neither the Company nor any of its subsidiaries, directors, officers, nor, to the knowledge of the Company, any employee, agent or affiliate of the Company or any of its subsidiaries is currently the subject or the target of any sanctions or designated on any prohibited party lists 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, designation on OFAC’s Specially Designated Nationals and Blocked Persons List or OFAC’s Foreign Sanctions Evaders List), the United Nations Security Council (“**UNSC**”), the European Union, Her Majesty’s Treasury (“**HMT**”) or other relevant sanctions authorities (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.

(ll) No Restrictions on Subsidiaries. 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 or similar ownership interest, 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.

(mm) 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 the Agent for a brokerage commission, finder’s fee or like payment in connection with the offering and sale of the Shares.

(nn) No Registration Rights. 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.

(oo) 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.

(pp) Margin Rules. Neither the issuance, sale and delivery of the Shares nor the application of the proceeds thereof by the Company as described in the Registration Statement and the Prospectus will 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.

(qq) 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 or the Prospectus has been made or reaffirmed without a reasonable basis or has been disclosed other than in good faith.

(rr) 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 each of the Registration Statement and the Prospectus is not based on or derived from sources that are reliable and accurate in all material respects.

(ss) 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**"), including Section 402 related to loans and Sections 302 and 906 related to certifications.

(tt) 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. The Company has paid the registration fee for this offering pursuant to Rule 456(b)(1) under the Securities Act or will pay such fee within the time period required by such rule (without giving effect to the proviso therein) and in any event prior to the Settlement Date.

(uu) No Ratings. There are (and prior to the Settlement 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.

(vv) Cybersecurity. The Company and its subsidiaries' information technology assets and equipment, computers, systems, networks, hardware, software, websites, applications, and databases (collectively, "**IT Systems**") are 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, 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 physical, technical and administrative controls, policies, procedures, and safeguards to maintain and protect their material confidential information and the integrity, continuous operation, redundancy and security of all IT Systems and data, including "Personal Data," used in connection with their businesses. "**Personal Data**" means (i) a natural person's name, street address, telephone number, e-mail address, photograph, social security number or tax identification number, driver's license number, passport number, credit card number, bank information, or customer or account number, (ii) any information which would

qualify as “personally identifying information” under the Federal Trade Commission Act, as amended, (iii) “personal data” as defined by the European Union General Data Protection Regulation (EU 2016/679) (“**GDPR**”), (iv) any information which would qualify as “protected health information” under HIPAA, as amended by the Health Information Technology for Economic and Clinical Health Act and (v) any other piece of information that allows the identification of such natural person, or his or her family, or permits the collection or analysis of any data related to an identified person’s health or sexual orientation. 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, nor any incidents under internal review or to the Company’s knowledge, 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.

(ww) Compliance with Data Privacy Laws. The Company and its subsidiaries are in material compliance with all applicable state and federal data privacy and security laws and regulations, including without limitation HIPAA, and, to the extent applicable, the Company and its subsidiaries have taken commercially reasonable actions to prepare to comply with, and since May 25, 2018, have been and currently are in compliance with in all material respects, the GDPR (EU 2016/679) (collectively, the “**Privacy Laws**”). To ensure compliance with the Privacy Laws, the Company and its subsidiaries have in place, comply with, and take appropriate steps reasonably designed to ensure compliance in all material respects with their policies and procedures relating to data privacy and security and the collection, storage, use, disclosure, handling, and analysis of Personal Data (the “**Policies**”). The Company and its subsidiaries have at all times made all disclosures to users or customers required by applicable laws and regulatory rules or requirements, and none of such disclosures made or contained in any Policy have, to the knowledge of the Company, been inaccurate or in violation of any applicable laws and regulatory rules or requirements in any material respect. The Company further represents that neither it nor any subsidiary: (i) has received notice of any actual or potential liability under or relating to, or actual or potential violation of, any of the Privacy Laws, and has no knowledge of any event or condition that would reasonably be expected to result in any such notice, (ii) is currently conducting or paying for, in whole or in part, any material investigation, remediation, or other corrective action pursuant to any Privacy Law or (iii) is a party to any order, decree, or agreement that imposes any obligation or liability under any Privacy Law.

(xx) Other Sales Agreements. The Company is not a party to any agreement with an agent or underwriter for any other “at the market” or continuous equity transaction, other than (i) that certain Controlled Equity OfferingSM Sales Agreement, dated December 29, 2017, between the Company and the Agent and (ii) that certain Controlled Equity OfferingSM Sales Agreement, dated December 29, 2017, between the Company and Cantor Fitzgerald & Co. (together, the “**Prior ATM Sales Agreements**”), for which, in each case, notices of termination have been sent by the Company.

Any certificate signed by any officer or representative of the Company or any of its subsidiaries and delivered to the Agent or counsel for the Agent in connection with an issuance of Shares shall be deemed a representation and warranty by the Company to the Agent as to the matters covered thereby on the date of such certificate.

The Company acknowledges that the Agent and, for purposes of the opinions to be delivered pursuant to Section 4(o) hereof, counsel to the Company and counsel to the Agent, will rely upon the accuracy and truthfulness of the foregoing representations and hereby consents to such reliance.

Section 3. ISSUANCE AND SALE OF COMMON SHARES

(a) Sale of Securities. On the basis of the representations, warranties and agreements herein contained, but subject to the terms and conditions herein set forth, the Company and the Agent agree that the Company may from time to time seek to sell Shares through the Agent, acting as sales agent, or directly to the Agent, acting as principal, as follows, with an aggregate Sales Price of up to the Maximum Program Amount, based on and in accordance with Issuance Notices as the Company may deliver, during the Agency Period.

(b) Mechanics of Issuances.

(i) Issuance Notice. Upon the terms and subject to the conditions set forth herein, on any Trading Day during the Agency Period on which the conditions set forth in Section 5(a) and Section 5(b) shall have been satisfied, the Company may exercise its right to request an issuance of Shares by delivering to the Agent an Issuance Notice; *provided, however*, that (A) in no event may the Company deliver an Issuance Notice to the extent that (I) the sum of (x) the aggregate Sales Price of the requested Issuance Amount, plus (y) the aggregate Sales Price of all Shares issued under all previous Issuance Notices effected pursuant to this Agreement, would exceed the Maximum Program Amount; and (B) prior to delivery of any Issuance Notice, the Selling Period for any previous Issuance Notice shall have expired or been terminated. An Issuance Notice shall be considered delivered on the Trading Day that the Company notifies the Agent by email to the persons at the Agent set forth in Schedule A hereto (or other method mutually agreed to in writing by the Company and the Agent), with the understanding that, with adequate prior written notice, the Agent may modify the list of such persons from time to time. Notwithstanding any other provision of this Agreement, no Issuance Notice may be delivered hereunder until the Prior ATM Sales Agreements have each been terminated.

(ii) Agent Efforts. Upon the terms and subject to the conditions set forth in this Agreement, upon the receipt of an Issuance Notice, the Agent will use its commercially reasonable efforts consistent with its normal sales and trading practices to place the Shares with respect to which the Agent has agreed to act as sales agent, subject to, and in accordance with the information specified in, the Issuance Notice, unless the sale of the Shares described therein has been suspended, cancelled or otherwise terminated in accordance with the terms of this Agreement. For the avoidance of doubt, the parties to this Agreement may modify an Issuance Notice at any time *provided* they both agree in writing to any such modification.

(iii) Method of Offer and Sale. The Shares may be offered and sold (A) in privately negotiated transactions with the consent of the Company or (B) by any other method permitted by law and deemed to be an “at the market offering” as defined in Rule 415(a)(4) under the Securities Act, including block transactions, sales made directly on the Principal Market or sales made to or into any other existing trading market of the Shares. Nothing in this Agreement shall be deemed to require either party to agree to the method of offer and sale specified in the preceding sentence, and (subject to clauses (A) and (B) above) the method of placement of any Shares by the Agent shall be at the Agent’s discretion.

(iv) Confirmation to the Company. The Agent will provide written confirmation to the Company no later than the opening of the Trading Day next following the Trading Day on which it has placed Shares hereunder setting forth the number of shares sold on such Trading Day, the corresponding Sales Price and the Issuance Price payable to the Company in respect thereof.

(v) Settlement. Each issuance of Shares will be settled on the applicable Settlement Date for such issuance of Shares and, subject to the provisions of Section 5, on or before each Settlement Date, the Company will, or will cause its transfer agent to, electronically transfer the Shares being sold by crediting the Agent or its designee’s account at The Depository Trust Company through its Deposit/Withdrawal At Custodian (DWAC) System, or by such other means of delivery as may be mutually agreed upon by the parties hereto and, upon receipt of such Shares, which in all cases shall be freely tradable, transferable, registered shares in good deliverable form, the Agent will deliver, by wire transfer of immediately available funds, the related Issuance Price in same day funds delivered to an account designated by the Company prior to the Settlement Date. The Company may sell Shares to the Agent as principal at a price agreed upon at each relevant time Shares are sold pursuant to this Agreement (each, a “**Time of Sale**”).

(vi) Suspension or Termination of Sales. Consistent with standard market settlement practices, the Company or the Agent may, upon notice to the other party hereto in writing (including by email) or by telephone (confirmed promptly by verifiable email), suspend any sale of Shares, and, upon such suspension, the Selling Period shall immediately terminate; *provided, however*, that (A) such suspension and termination shall not affect or impair either party’s obligations with respect to any Shares placed or sold hereunder prior to the receipt of such notice; (B) if the Company suspends or terminates any sale of Shares after the Agent confirms such sale to the Company, the Company shall still be obligated to comply with Section 3(b)(v) with respect to such Shares; and (C) if the Company defaults in its obligation to deliver Shares on a Settlement Date, the Company agrees that it will hold the Agent harmless against any loss, claim, damage or expense (including, without limitation, penalties, interest and reasonable and documented legal fees and expenses), as incurred, arising out of or in connection with such default by the Company. The parties hereto acknowledge and agree that, in performing its obligations under this Agreement, the Agent may borrow Common Shares from stock lenders in the event that the Company has not delivered Shares to settle sales as required by subsection (v) above, and may use the Shares to settle or close out such borrowings. The Company agrees that no such suspension notice shall be effective against the Agent unless it is made to the persons identified in writing by the Agent pursuant to Section 3(b)(i). While a suspension is in effect, any obligation under Sections 4(o), 4(p), 4(q) and 4(r) with respect to the delivery of certificates, opinions, or comfort letters to the Agent shall be deemed waived.

(vii) No Guarantee of Placement, Etc. The Company acknowledges and agrees that (A) there can be no assurance that the Agent will be successful in placing Shares; (B) the Agent will incur no liability or obligation to the Company or any other Person if it does not sell Shares; and (C) the Agent shall be under no obligation to purchase Shares on a principal basis pursuant to this Agreement, except as otherwise specifically agreed by the Agent and the Company.

(viii) Material Non-Public Information. Notwithstanding any other provision of this Agreement, the Company and the Agent agree that the Company shall not deliver any Issuance Notice to the Agent, and the Agent shall not be obligated to place any Shares, during any period in which the Company is in possession of material non-public information.

(c) Fees. As compensation for services rendered, the Company shall pay to the Agent, on the applicable Settlement Date, the Selling Commission for the applicable Issuance Amount (including with respect to any suspended or terminated sale pursuant to Section 3(b)(vi)) but only for Shares actually sold by the Agent) by the Agent deducting the Selling Commission from the applicable Issuance Amount.

(d) Expenses. The Company agrees to pay all costs, fees and expenses incurred in connection with the performance of its obligations hereunder and in connection with the transactions contemplated hereby, including without limitation (i) all expenses incident to the issuance and delivery of the Shares (including all printing and engraving costs); (ii) all fees and expenses of the registrar and transfer agent of the Shares; (iii) all necessary issue, transfer and other stamp taxes in connection with the issuance and sale of the Shares; (iv) all fees and expenses of the Company's counsel, independent public or certified public accountants and other advisors; (v) all costs and expenses incurred in connection with the preparation, printing, filing, shipping and distribution of the Registration Statement (including financial statements, exhibits, schedules, consents and certificates of experts), the Prospectus, any Free Writing Prospectus (as defined below) prepared by or on behalf of, used by, or referred to by the Company, and all amendments and supplements thereto, and this Agreement; (vi) all filing fees, attorneys' fees and expenses incurred by the Company or the Agent in connection with qualifying or registering (or obtaining exemptions from the qualification or registration of) all or any part of the Shares for offer and sale under the U.S. state securities or blue sky laws or the provincial securities laws of Canada, and, if requested by the Agent, preparing and printing a "Blue Sky Survey" or memorandum and a "Canadian wrapper", and any supplements thereto, advising the Agent of such qualifications, registrations, determinations and exemptions; (vii) the reasonable fees and disbursements of the Agent's counsel, including the reasonable fees and expenses of counsel for the Agent in connection with, FINRA review, if any, and approval of the Agent's participation in the offering and distribution of the Shares; (viii) the filing fees incident to FINRA review, if any; and (ix) the fees and expenses associated with listing the Shares on the Principal Market. The fees and disbursements of Agent's counsel pursuant to subsections (vi) and (vii) above shall not exceed \$50,000.

Section 4. ADDITIONAL COVENANTS

The Company covenants and agrees with the Agent as follows, in addition to any other covenants and agreements made elsewhere in this Agreement:

(a) Exchange Act Compliance. During the Agency Period, the Company shall (i) file, on a timely basis, with the Commission all reports and documents required to be filed under Section 13, 14 or 15 of the Exchange Act in the manner and within the time periods required by the Exchange Act; and (ii) either (A) include in its quarterly reports on Form 10-Q and its annual reports on Form 10-K, a summary detailing, for the relevant reporting period, (1) the number of Shares sold through the Agent pursuant to this Agreement and (2) the net proceeds received by the Company from such sales or (B) prepare a prospectus supplement containing, or include in such other filing permitted by the Securities Act or Exchange Act (each an “**Interim Prospectus Supplement**”), such summary information and, if the option in this clause (B) is elected by the Company, at least once a quarter and subject to this Section 4, file such Interim Prospectus Supplement pursuant to Rule 424(b) under the Securities Act (and within the time periods required by Rule 424(b) and Rule 430B under the Securities Act).

(b) Securities Act Compliance. After the date of this Agreement, the Company shall promptly advise the Agent in writing (i) of the receipt of any comments of, or requests for additional or supplemental information from, the Commission; (ii) of the time and date of any filing of any post-effective amendment to the Registration Statement, any Rule 462(b) Registration Statement or any amendment or supplement to the Prospectus or any Free Writing Prospectus; (iii) of the time and date that any post-effective amendment to the Registration Statement or any Rule 462(b) Registration Statement becomes effective; and (iv) of the issuance by the Commission of any stop order suspending the effectiveness of the Registration Statement or any post-effective amendment thereto, any Rule 462(b) Registration Statement or any amendment or supplement to the Prospectus or of any order preventing or suspending the use of any Free Writing Prospectus or the Prospectus, or of any proceedings to remove, suspend or terminate from listing or quotation the Common Shares from any securities exchange upon which they are listed for trading or included or designated for quotation, or, to the knowledge of the Company, of the threatening or initiation of any proceedings for any of such purposes. If the Commission shall enter any such stop order at any time, the Company will use reasonable efforts to obtain the lifting of such order. Additionally, the Company agrees that it shall comply with the provisions of Rule 424(b) and Rule 433, as applicable, under the Securities Act and will use its reasonable efforts to confirm that any filings made by the Company under such Rule 424(b) or Rule 433 were received in a timely manner by the Commission.

(c) Amendments and Supplements to the Prospectus and Other Securities Act Matters. During any period when the delivery of a prospectus relating to the Shares is required (including in circumstances where such requirement may be satisfied pursuant to Rule 172) to be delivered under the Securities Act, if any event shall occur or condition exist as a result of which it is necessary to amend or supplement the Prospectus so that the Prospectus does not include an 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 when the Prospectus is delivered to a purchaser, not misleading, or if in the opinion of counsel for the Agent it is otherwise necessary to amend or

supplement the Prospectus to comply with applicable law, including the Securities Act, the Company agrees (subject to Section 4(d) and 4(f)) to promptly prepare, file with the Commission and furnish at its own expense to the Agent, amendments or supplements to the Prospectus so that the statements in the Prospectus as so amended or supplemented will not include an 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 when the Prospectus is delivered to a purchaser, be misleading or so that the Prospectus, as amended or supplemented, will comply with applicable law including the Securities Act. Neither the Agent's consent to, or delivery of, any such amendment or supplement shall constitute a waiver of any of the Company's obligations under Sections 4(d) and 4(f). Notwithstanding the foregoing, in the alternative, the Company can suspend or terminate the Issuance Notice upon written notice to the Agent and delay the filing of any such amendment or supplement, if in the judgment of the Company, it is in the best interest of the Company.

(d) Agent's Review of Proposed Amendments and Supplements. Prior to amending or supplementing the Registration Statement (including any registration statement filed under Rule 462(b) under the Securities Act) or the Prospectus, excluding, in each case, any amendment or supplement through incorporation of any report filed under the Exchange Act, the Company shall furnish to the Agent for review, a reasonable amount of time prior to the proposed time of filing or use thereof, a copy of each such proposed amendment or supplement, and the Company shall not file or use any such proposed amendment or supplement without the Agent's prior consent, which shall not be unreasonably withheld, conditioned or delayed, and shall file with the Commission within the applicable period specified in Rule 424(b) under the Securities Act any prospectus required to be filed pursuant to such Rule.

(e) Use of Free Writing Prospectus. Neither the Company nor the Agent has prepared, used, referred to or distributed, or will prepare, use, refer to or distribute, without the other party's prior written consent, any "written communication" that constitutes a "free writing prospectus" as such terms are defined in Rule 405 under the Securities Act with respect to the offering contemplated by this Agreement (any such free writing prospectus being referred to herein as a "**Free Writing Prospectus**").

(f) Free Writing Prospectuses. The Company shall furnish to the Agent for review, a reasonable amount of time prior to the proposed time of filing or use thereof, a copy of each proposed free writing prospectus or any amendment or supplement thereto to be prepared by or on behalf of, used by, or referred to by the Company, and the Company shall not file, use or refer to any proposed free writing prospectus or any amendment or supplement thereto without the Agent's consent, which shall not be unreasonably withheld, conditioned or delayed. The Company shall furnish to the Agent, without charge, as many copies of any free writing prospectus prepared by or on behalf of, or used by the Company, as the Agent may reasonably request. If at any time when a prospectus is required by the Securities Act (including, without limitation, pursuant to Rule 173(d)) to be delivered in connection with sales of the Shares (but in any event if at any time through and including the date of this Agreement) there has occurred or occurs an event or development as a result of which any free writing prospectus prepared by or on behalf of, used by, or referred to by the Company conflicted or would conflict with the information contained in the Registration Statement or, taken together with the information in the Prospectus (and any

amendment or supplement thereto) included or would include an untrue statement of a material fact or omitted or would omit to state a material fact necessary in order to make the statements therein, in the light of the circumstances prevailing at that subsequent time, not misleading, the Company shall promptly amend or supplement such free writing prospectus to eliminate or correct such conflict or so that the statements in such free writing prospectus as so amended or supplemented will not include an 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 prevailing at such subsequent time, not misleading, as the case may be; *provided, however*, that prior to amending or supplementing any such free writing prospectus the Company shall furnish to the Agent for review, a reasonable amount of time prior to the proposed time of filing or use thereof, a copy of such proposed amended or supplemented free writing prospectus and the Company shall not file, use or refer to any such amended or supplemented free writing prospectus without the Agent's consent, which shall not be unreasonably withheld, conditioned or delayed.

(g) Filing of Agent Free Writing Prospectuses. The Company shall not to take any action that would result in the Agent or the Company being required to file with the Commission pursuant to Rule 433(d) under the Securities Act a free writing prospectus prepared by or on behalf of the Agent that the Agent otherwise would not have been required to file thereunder.

(h) Copies of Registration Statement and Prospectus. After the date of this Agreement through the last time that a prospectus is required by the Securities Act (including, without limitation, pursuant to Rule 173(d)) to be delivered in connection with sales of the Shares, the Company agrees to furnish the Agent with copies (which may be electronic copies) of the Registration Statement and each amendment thereto, and with copies of the Prospectus and each amendment or supplement thereto, excluding, in each case, any amendment or supplement through incorporation of any report filed under the Exchange Act, in the form in which it is filed with the Commission pursuant to the Securities Act or Rule 424(b) under the Securities Act, both in such quantities as the Agent may reasonably request from time to time; and, if the delivery of a prospectus is required under the Securities Act or under the blue sky or securities laws of any jurisdiction at any time on or prior to the applicable Settlement Date for any Selling Period in connection with the offering or sale of the Shares and if at such time any event has occurred as a result of which the Prospectus as then amended or supplemented would include an 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 under which they were made when such Prospectus is delivered, not misleading, or, if for any other reason it is necessary during such same period to amend or supplement the Prospectus or to file under the Exchange Act any document incorporated by reference in the Prospectus in order to comply with the Securities Act or the Exchange Act, to notify the Agent and to request that the Agent suspend offers to sell Shares (and, if so notified, the Agent shall cease such offers as soon as practicable); and if the Company decides to amend or supplement the Registration Statement or the Prospectus as then amended or supplemented, to advise the Agent promptly by telephone (with confirmation in writing) and to prepare and cause to be filed promptly with the Commission an amendment or supplement to the Registration Statement or the Prospectus as then amended or supplemented that will correct such misstatement or omission or effect such compliance (it being acknowledged that the Company may delay the filing of any amendment or supplement, if, in the judgment of the Company, it is in the best interest of the Company); *provided, however*, that if during such same period the Agent is required to deliver a prospectus in respect of transactions in the Shares, the Company shall promptly prepare and file with the Commission such an amendment or supplement.

(i) Blue Sky Compliance. The Company shall cooperate with the Agent and counsel for the Agent to qualify or register the Shares for sale under (or obtain exemptions from the application of) the U.S. state securities or blue sky laws or Canadian provincial securities laws of those jurisdictions designated by the Agent, shall comply with such laws and shall continue such qualifications, registrations and exemptions in effect so long as required for the distribution of the Shares. The Company shall not be required to qualify as a foreign corporation or to take any action that would subject it to general service of process in any such jurisdiction where it is not presently qualified or where it would be subject to taxation as a foreign corporation. The Company will advise the Agent promptly of the suspension of the qualification or registration of (or any such exemption relating to) the Shares for offering, sale or trading in any jurisdiction or any initiation or threat of any proceeding for any such purpose, and in the event of the issuance of any order suspending such qualification, registration or exemption, the Company shall use reasonable efforts to obtain the withdrawal thereof.

(j) Earnings Statement. As soon as practicable, the Company will make generally available to its security holders and to the Agent an earnings statement (which need not be audited) which shall satisfy the provisions of Section 11(a) of the Securities Act and Rule 158 under the Securities Act; *provided* that the Company will be deemed to have furnished such statement to its security holders and the Agent to the extent it is available on EDGAR or any successor system.

(k) Listing of Shares. (a) The Company will use its reasonable best efforts to cause the Shares to be listed on the Principal Market and (b) the Company will reserve and keep available at all times, free of preemptive rights, Shares for the purpose of enabling the Company to satisfy its obligations under this Agreement.

(l) Transfer Agent. The Company shall engage and maintain, at its expense, a registrar and transfer agent for the Shares.

(m) Due Diligence. During the term of this Agreement, the Company will reasonably cooperate with any reasonable due diligence review conducted by the Agent in connection with the transactions contemplated hereby, including, without limitation, providing information and, upon reasonable notice, making available documents and senior corporate officers, during normal business hours and at the Company's principal offices, as the Agent may reasonably request from time to time.

(n) Representations and Warranties. The Company acknowledges that each delivery of an Issuance Notice and each delivery of Shares on a Settlement Date shall be deemed to be (i) an affirmation to the Agent that the representations and warranties of the Company contained in or made pursuant to this Agreement are true and correct as of the date of such Issuance Notice or of such Settlement Date, as the case may be, as though made at and as of each such date, except as may be disclosed in the Prospectus (including any documents incorporated by reference therein and any supplements thereto); and (ii) an undertaking that the Company will advise the Agent if any of such representations and warranties will not be true and correct as of the Settlement Date

for the Shares relating to such Issuance Notice, as though made at and as of each such date (except that such representations and warranties shall be deemed to relate to the Registration Statement and the Prospectus as amended and supplemented relating to such Shares).

(o) Deliverables at Triggering Event Dates; Certificates. The Company agrees that on or prior to the date of the first Issuance Notice and, during the term of this Agreement after the date of the first Issuance Notice, upon:

(A) the filing of any amendment or supplement to the Registration Statement or Prospectus (other than a prospectus supplement relating solely to an offering of securities other than the Shares or a prospectus supplement filed in accordance with Section 4(a)(ii)(B)), by means of a post-effective amendment, sticker or supplement, but not by means of incorporation of documents by reference into the Registration Statement or Prospectus;

(B) the filing with the Commission of an annual report on Form 10-K or a quarterly report on Form 10-Q (including any Form 10-K/A or Form 10-Q/A containing amended financial information or a material amendment to the previously filed annual report on Form 10-K or quarterly report on Form 10-Q), in each case, of the Company; or

(C) the filing with the Commission of a current report on Form 8-K of the Company containing amended financial information (other than (i) an earnings release or other information “furnished” pursuant to Item 2.02 or 7.01 (or related Item 9.01) of Form 8-K or (ii) to provide disclosure pursuant to Item 8.01 of Form 8-K relating to reclassification of certain properties as discontinued operations in accordance with Statement of Financial Accounting Standards No. 144) that is material to the offering of securities of the Company in the Agent’s reasonable discretion (any such event, together with the events described in clauses (A) and (B) above, during the term of this Agreement after the date of the first Issuance Notice, a “**Triggering Event Date**”), the Company shall furnish the Agent (but in the case of clause (C) above only if the Agent reasonably determines that the information contained in such current report on Form 8-K of the Company is material) with a certificate as of the Triggering Event Date, in substantially the form set forth in Exhibit 4(o) hereto. The requirement to provide a certificate under this Section 4(o) shall be automatically waived for any Triggering Event Date occurring at a time when no Issuance Notice is pending or a suspension pursuant to Section 3(b)(vi) is in effect, which waiver in each case shall continue until the earlier to occur of (i) the date the Company delivers instructions for the sale of Shares hereunder (which for such calendar quarter shall be considered a Triggering Event Date) and (ii) the next occurring Triggering Event Date. Notwithstanding the foregoing, if the Company subsequently decides to deliver an Issuance Notice following a Triggering Event Date when a waiver was in effect and did not provide the Agent with a certificate under this Section 4(o), then before the Company delivers the Issuance Notice or the Agent sells any Shares pursuant to such Issuance Notice, the Company shall provide the Agent with a certificate in conformity with this Section 4(o) dated as of the date of the Issuance Notice.

(p) Legal Opinions. On or prior to the date of the first Issuance Notice and on or prior to each Triggering Event Date with respect to which the Company is obligated to deliver a certificate pursuant to Section 4(o)(A) or (B) for which no waiver is applicable, and excluding the date of this Agreement, the Company shall cause the delivery of:

- (i) a negative assurance letter and the written legal opinion of Skadden, Arps, Slate, Meagher & Flom LLP, counsel to the Company, in form and substance reasonably satisfactory to the Agent; and
- (ii) a written legal opinion with respect to intellectual property matters of the Company from the Company's outside intellectual property counsel, in form and substance reasonably satisfactory to the Agent;

in each case, modified, as necessary, to relate to the Registration Statement and the Prospectus as then amended or supplemented; *provided* that the Company shall not be required to furnish more than one opinion from each counsel per annual report on Form 10-K and quarterly report on Form 10-Q filed by the Company.

(q) Comfort Letter. On or prior to the date of the first Issuance Notice and on or prior to each Triggering Event Date with respect to which the Company is obligated to deliver a certificate pursuant to Section 4(o) (A) or (B) for which no waiver is applicable, and excluding the date of this Agreement, the Company shall cause Ernst & Young LLP (or such other accounting firm as applicable), the independent registered public accounting firm who has audited the financial statements of the Company included or incorporated by reference in the Registration Statement, to furnish the Agent a customary comfort letter, dated the date of delivery, in form and substance reasonably satisfactory to the Agent and its counsel; *provided, however*, that (i) the Agent has provided Ernst & Young LLP (or such other accounting firm as applicable) with a representation letter reasonably satisfactory to Ernst & Young LLP (or such other accounting firm as applicable) and (ii) any such comfort letter will only be required for the Triggering Event Date specified to the extent that it covers financial statements filed with the Commission under the Exchange Act and incorporated or deemed to be incorporated by reference into a Prospectus that have not previously been covered by a comfort letter delivered pursuant to this Section 4(q). If requested by the Agent, the Company shall also cause a comfort letter to be furnished to the Agent within ten (10) Trading Days of a Triggering Event Date referred to in Section 4(o)(C) relating to the occurrence of any material transaction or event requiring the filing of a current report on Form 8-K containing material amended financial information of the Company, including the restatement of the Company's financial statements. The Company shall not be required to furnish more than one comfort letter hereunder per annual report on Form 10-K and quarterly report on Form 10-Q filed by the Company or more than one comfort letter per calendar quarter for the same financial statements.

(r) Secretary's Certificate. On or prior to the date of the first Issuance Notice and on or prior to of each Triggering Event Date with respect to which the Company is obligated to deliver a certificate pursuant to Section 4(o) for which no waiver is applicable and excluding the date of this Agreement, the Company shall furnish the Agent a certificate executed by the Secretary of the Company, signing in such capacity, dated the date of delivery (i) certifying that attached thereto are true and complete copies of the resolutions duly adopted by the Board of Directors of the Company authorizing the execution and delivery of this Agreement and the consummation of the

transactions contemplated hereby (including, without limitation, the issuance of the Shares pursuant to this Agreement), which authorization shall be in full force and effect on and as of the date of such certificate, (ii) certifying and attesting to the office, incumbency, due authority and specimen signatures of each Person who executed this Agreement for or on behalf of the Company and (iii) containing any other certification that the Agent shall reasonably request.

(s) Own Account; Clients' Account. The Company consents to the Agent trading, in compliance with applicable law, in the Common Shares for the Agent's own account and for the account of its clients at the same time as sales of the Shares occur pursuant to this Agreement.

(t) Investment Limitation. The Company shall not invest, or otherwise use the proceeds received by the Company from its sale of the Shares in such a manner as would require the Company or any of its subsidiaries to register as an investment company under the Investment Company Act.

(u) Market Activities. The Company will not take, directly or indirectly, any action designed to or that might be reasonably expected to cause or result in stabilization or manipulation of the price of the Shares or any other reference security, whether to facilitate the sale or resale of the Shares or otherwise, and the Company will, and shall cause each of its affiliates to, comply with all applicable provisions of Regulation M. If the limitations of Rule 102 of Regulation M ("**Rule 102**") do not apply with respect to the Shares or any other reference security pursuant to any exception set forth in Section (d) of Rule 102, then promptly upon notice from the Agent (or, if later, at the time stated in the notice), the Company will, and shall cause each of its affiliates to, comply with Rule 102 as though such exception were not available but the other provisions of Rule 102 (as interpreted by the Commission) did apply. The Company shall promptly notify the Agent if it no longer meets the requirements set forth in Section (d) of Rule 102.

(v) Notice of Other Sale. Without the written consent of the Agent, the Company will not, directly or indirectly, offer to sell, sell, contract to sell, grant any option to sell or otherwise dispose of any Common Shares or securities convertible into or exchangeable for Common Shares (other than Shares hereunder), warrants or any rights to purchase or acquire Common Shares, during the period beginning on the third Trading Day immediately prior to the date on which any Issuance Notice is delivered to the Agent hereunder and ending on the third Trading Day immediately following the earlier of (x) the Settlement Date with respect to Shares sold pursuant to such Issuance Notice and (y) the termination or suspension by the Company of such Issuance Notice; and will not directly or indirectly enter into any other "at the market" or continuous equity transaction offer to sell, sell, contract to sell, grant any option to sell or otherwise dispose of any Common Shares (other than the Shares offered pursuant to this Agreement) or securities convertible into or exchangeable for Common Shares, warrants or any rights to purchase or acquire, Common Shares prior to the termination of this Agreement; *provided, however*, that such restrictions will not be required in connection with the Company's (i) issuance or sale of Common Shares, options to purchase Common Shares, restricted stock unit awards or other equity awards to acquire Common Stock, or Common Shares issuable upon the exercise of options or other equity awards, or the vesting of any of the foregoing, pursuant to any employee or director share option, incentive or benefit plan, share purchase or ownership plan, long-term incentive plan, dividend reinvestment plan, inducement award under Principal Market rules or other compensation plan of

the Company or its subsidiaries, whether now in effect or hereafter implemented, (ii) issuance or sale of Common Shares issuable upon exchange, conversion or redemption of securities or the exercise or vesting of warrants, options, rights or equity awards outstanding at the date of this Agreement or disclosed in filings by the Company available on EDGAR or otherwise in writing to the Agent, (iii) issuance or sale of Common Shares or securities convertible into or exchangeable for Common Shares as consideration for mergers, acquisitions, other business combinations or strategic alliances, joint ventures, marketing or distribution arrangements, collaboration agreements, co-promotion agreements, or intellectual property license agreements occurring after the date of this Agreement, which are not used for capital raising purposes and which aggregate number of Common Shares issued or sold under this subsection (iii), on an as-converted basis, if applicable, shall not exceed 7.5% of the number of Common Shares outstanding immediately prior to giving effect to such sale or issuance, and (iv) modification of any outstanding options, warrants of any rights to purchase or acquire Common Shares.

Section 5. CONDITIONS TO DELIVERY OF ISSUANCE NOTICES AND TO SETTLEMENT

(a) Conditions Precedent to the Right of the Company to Deliver an Issuance Notice and the Obligation of the Agent to Sell Shares During the Selling Period(s). The right of the Company to deliver an Issuance Notice hereunder is subject to the satisfaction, on the date of delivery of such Issuance Notice, and the obligation of the Agent to use its commercially reasonable efforts to place Shares during the applicable Selling Period is subject to the satisfaction, on each Trading Day during the applicable Selling Period, of each of the following conditions:

- (i) Accuracy of the Company's Representations and Warranties; Performance by the Company. The Company shall have delivered the certificate required to be delivered pursuant to Section 4(o) on or before the date on which delivery of such certificate is required pursuant to Section 4(o). The Company shall have performed, satisfied and complied with all covenants, agreements and conditions required by this Agreement to be performed, satisfied or complied with by the Company at or prior to such date, including, but not limited to, the covenants contained in Section 4(p), Section 4(q) and Section 4(r).
- (ii) No Injunction. No statute, rule, regulation, executive order, decree, ruling or injunction shall have been enacted, entered, promulgated or endorsed by any court or governmental authority of competent jurisdiction or any self-regulatory organization having authority over the matters contemplated hereby that prohibits or directly and materially adversely affects any of the transactions contemplated by this Agreement, and no proceeding shall have been commenced that may have the effect of prohibiting or materially adversely affecting any of the transactions contemplated by this Agreement.
- (iii) Material Adverse Changes. Except as disclosed in the Prospectus, (a) no event or condition of a type described in Section 2(f) hereof shall have occurred which in the judgment of the Agent makes it impracticable or inadvisable to proceed with the offering, sale or delivery of the Shares on the applicable Settlement Date, as the

case may be, on the terms and in the manner contemplated by this Agreement and the Prospectus; and (b) there shall not have occurred any downgrading, nor shall any notice have been given of any intended or potential downgrading or of any review for a possible change that does not indicate the direction of the possible change, in the rating accorded any securities of the Company or any of its subsidiaries by any “nationally recognized statistical rating organization” as such term is defined for purposes of Section 3(a)(62) of the Exchange Act.

- (iv) No Suspension of Trading in or Delisting of Common Shares; Other Events. There shall not have occurred (and be continuing in the case of occurrences under clauses (i) and (ii) below) any of the following: (i) trading or quotation in any of the Company’s securities shall have been suspended or limited by the Commission or by the Principal Market or trading in securities generally on either the Principal Market shall have been suspended or limited, the Shares shall have been delisted from the Principal Market, or minimum or maximum prices shall have been generally established on any of such stock exchanges by the Commission or the FINRA, (ii) a general banking moratorium shall have been declared by any of U.S. federal or New York State authorities; or (iii) there shall have occurred any outbreak or escalation of national or international hostilities or any crisis or calamity, or any change in the United States or international financial markets, or any substantial change or development involving a prospective substantial change in United States’ or international political, financial or economic conditions, as in the judgment of the Agent is material and adverse and makes it impracticable to market the Shares in the manner and on the terms described in the Prospectus or to enforce contracts for the sale of securities.
- (v) Documents Required to be Delivered on each Issuance Notice Date. The Agent’s obligation to use its commercially reasonable efforts to place Shares hereunder shall additionally be conditioned upon the delivery to the Agent on or before the applicable Issuance Notice Date, but excluding the date of the Agreement, of the following:
- (A) a certificate in form and substance reasonably satisfactory to the Agent, executed by the Chief Executive Officer, President, Chief Financial Officer or Chief Legal and Business Officer of the Company, to the effect that all conditions to the delivery of such Issuance Notice shall have been satisfied as at the date of such certificate (which certificate shall not be required if the foregoing representations shall be set forth in the Issuance Notice);
 - (B) a negative assurance letter and the written legal opinion of counsel to the Company, as and to the extent required to be delivered pursuant to Section 4(p);
 - (C) the written legal opinion of intellectual property counsel to the Company, as and to the extent required to be delivered pursuant to Section 4(p);
 - (D) a negative assurance letter of Latham & Watkins LLP, counsel to the Agent, such letter to be delivered on or before the date on which the delivery of the opinion by

counsel to the Company is required pursuant to Section 4(p) and the Company shall have furnished to such counsel such documents as they request for enabling them to pass upon such matters;

- (E) the comfort letter, as and to the extent required to be delivered pursuant to Section 4(q); and
- (F) the certificate of the Secretary of the Company, as and to the extent required to be delivered pursuant to Section 4(r).

(b) No Misstatement or Material Omission. The Agent shall not have advised the Company that the Registration Statement or the Prospectus, or any amendment or supplement thereto, contains an untrue statement of fact that in the Agent's reasonable opinion is material, or omits to state a fact that in the Agent's reasonable opinion is material and is required to be stated therein or is necessary to make the statements therein not misleading.

Section 6. INDEMNIFICATION AND CONTRIBUTION

(a) Indemnification of the Agent. The Company agrees to indemnify and hold harmless the Agent, its officers and employees, and each person, if any, who controls the Agent within the meaning of the Securities Act or the Exchange Act against any loss, claim, damage, liability or expense, as incurred, to which the Agent or such officer, employee or controlling person may become subject, under the Securities Act, the Exchange Act, other federal or state statutory law or regulation, or the laws or regulations of foreign jurisdictions where Shares have been offered or sold or at common law or otherwise (including in settlement of any litigation), insofar as such loss, claim, damage, liability or expense (or actions in respect thereof as contemplated below) arises out of or is based upon (i) any untrue statement or alleged untrue statement of a material fact contained in the Registration Statement, or any amendment thereto, including any information deemed to be a part thereof pursuant to Rule 430B under the Securities Act, or the omission or alleged omission therefrom of a material fact required to be stated therein or necessary to make the statements therein not misleading; or (ii) any untrue statement or alleged untrue statement of a material fact contained in any Free Writing Prospectus that the Company has used, referred to or filed, or is required to file, pursuant to Rule 433(d) of the Securities Act or the Prospectus (or any amendment or supplement thereto), or the omission or alleged omission therefrom of a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; and to reimburse the Agent and each such officer, employee and controlling person for any and all reasonable and documented expenses (including the reasonable and documented fees and disbursements of counsel chosen by the Agent) as such expenses are reasonably incurred by the Agent or such officer, employee or controlling person in connection with investigating, defending, settling, compromising or paying any such loss, claim, damage, liability, expense or action; *provided, however*, that the foregoing indemnity agreement shall not apply to any loss, claim, damage, liability or expense to the extent, but only to the extent, arising out of or based upon any untrue statement or alleged untrue statement or omission or alleged omission made in reliance upon and in conformity with written information furnished to the Company by the Agent expressly for use in the Registration Statement, any such Free Writing Prospectus or the Prospectus (or any amendment or supplement thereto), it being understood and

agreed that the only such information furnished by the Agent to the Company consists of the information set forth in the first sentence of the ninth paragraph under the caption "Plan of Distribution" in the Prospectus. The indemnity agreement set forth in this Section 6(a) shall be in addition to any liabilities that the Company may otherwise have.

(b) Indemnification of the Company, its Directors and Officers. The Agent agrees to indemnify and hold harmless the Company, each of its directors, each of its officers who signed the Registration Statement and each person, if any, who controls the Company within the meaning of the Securities Act or the Exchange Act against any loss, claim, damage, liability or expense, as incurred, to which the Company or any such director, officer or controlling person may become subject, under the Securities Act, the Exchange Act, or other federal or state statutory law or regulation, or the laws or regulations of foreign jurisdictions where Shares have been offered or sold or at common law or otherwise (including in settlement of any litigation), arises out of or is based upon (i) any untrue statement or alleged untrue statement of a material fact contained in the Registration Statement, or any amendment thereto, including any information deemed to be a part thereof pursuant to Rule 430B under the Securities Act, or the omission or alleged omission therefrom of a material fact required to be stated therein or necessary to make the statements therein not misleading; or (ii) any untrue statement or alleged untrue statement of a material fact contained in any Free Writing Prospectus that the Company has used, referred to or filed, or is required to file, pursuant to Rule 433(d) of the Securities Act or the Prospectus (or any amendment or supplement thereto), or the omission or alleged omission therefrom of a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; but, for each of (i) and (ii) above, only to the extent arising out of or based upon any untrue statement or alleged untrue statement or omission or alleged omission made in reliance upon and in conformity with written information furnished to the Company by the Agent expressly for use in the Registration Statement, any such Free Writing Prospectus or the Prospectus (or any amendment or supplement thereto), it being understood and agreed that the only such information furnished by the Agent to the Company consists of the information set forth in the first sentence of the ninth paragraph under the caption "Plan of Distribution" in the Prospectus, and to reimburse the Company and each such director, officer and controlling person for any and all reasonable and documented expenses (including the reasonable and documented fees and disbursements of counsel chosen by the Company) as such expenses are reasonably incurred by the Company or such officer, director or controlling person in connection with investigating, defending, settling, compromising or paying any such loss, claim, damage, liability, expense or action. The indemnity agreement set forth in this Section 6(b) shall be in addition to any liabilities that the Agent or the Company may otherwise have.

(c) Notifications and Other Indemnification Procedures. Promptly after receipt by an indemnified party under this Section 6 of notice of the commencement of any action, such indemnified party will, if a claim in respect thereof is to be made against an indemnifying party under this Section 6, notify the indemnifying party in writing of the commencement thereof, but the omission so to notify the indemnifying party will not relieve it from any liability which it may have to any indemnified party for contribution or otherwise than under the indemnity agreement contained in this Section 6 or to the extent it is not materially prejudiced as a proximate result of such failure. In case any such action is brought against any indemnified party and such indemnified party seeks or intends to seek indemnity from an indemnifying party, the indemnifying party will

be entitled to participate in, and, to the extent that it shall elect, jointly with all other indemnifying parties similarly notified, by written notice delivered to the indemnified party promptly after receiving the aforesaid notice from such indemnified party, to assume the defense thereof with one firm of counsel reasonably satisfactory to such indemnified party; *provided, however*, if the defendants in any such action include both the indemnified party and the indemnifying party and the indemnified party shall have reasonably concluded that a conflict may arise between the positions of the indemnifying party and the indemnified party in conducting the defense of any such action or that there may be legal defenses available to it and/or other indemnified parties which are different from or additional to those available to the indemnifying party, the indemnified party or parties shall have the right to select one firm of separate counsel to assume such legal defenses and to otherwise participate in the defense of such action on behalf of such indemnified party or parties. Upon receipt of notice from the indemnifying party to such indemnified party of such indemnifying party's election so to assume the defense of such action and approval by the indemnified party of counsel, the indemnifying party will not be liable to such indemnified party under this Section 6 for any legal or other expenses subsequently incurred by such indemnified party in connection with the defense thereof unless (i) the indemnified party shall have employed separate counsel in accordance with the proviso to the preceding sentence (it being understood, however, that the indemnifying party shall not be liable for the fees and expenses of more than one separate counsel (together with local counsel), representing the indemnified parties who are parties to such action), which counsel (together with any local counsel) for the indemnified parties shall be selected by the Agent (in the case of counsel for the indemnified parties referred to in Section 6(a) and Section 6(b) above), (ii) the indemnifying party shall not have employed counsel satisfactory to the indemnified party to represent the indemnified party within a reasonable time after notice of commencement of the action or (iii) the indemnifying party has authorized in writing the employment of counsel for the indemnified party at the expense of the indemnifying party, in each of which cases the fees and expenses of counsel shall be at the expense of the indemnifying party and shall be paid as they are incurred.

(d) Settlements. The indemnifying party under this Section 6 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 party agrees to indemnify the indemnified party against any loss, claim, damage, liability or expense by reason of such settlement or judgment. Notwithstanding the foregoing sentence, if at any time an indemnified party shall have requested an indemnifying party to reimburse the indemnified party for fees and expenses of counsel as contemplated by Section 6(b) hereof, the indemnifying party agrees that it shall be liable for any settlement of any proceeding effected without its written consent if (i) such settlement is entered into more than 45 days after receipt by such indemnifying party of the aforesaid request; (ii) such indemnifying party shall have received notice of the terms of such settlement at least 30 days prior to such settlement being entered into and (iii) such indemnifying party shall not have reimbursed the indemnified party in accordance with such request prior to the date of such settlement. No indemnifying party shall, without the prior written consent of the indemnified party, effect any settlement, compromise or consent to the entry of judgment in any pending or threatened action, suit or proceeding in respect of which any indemnified party is or could have been a party and indemnity was or could have been sought hereunder by such indemnified party, unless such settlement, compromise or consent includes an unconditional release of such indemnified party from all liability on claims that are the subject matter of such action, suit or proceeding.

(e) Contribution. If the indemnification provided for in this Section 6 is for any reason held to be unavailable to or otherwise insufficient to hold harmless an indemnified party in respect of any losses, claims, damages, liabilities or expenses referred to therein, then each indemnifying party shall contribute to the aggregate amount paid or payable by such indemnified party, as incurred, as a result of any losses, claims, damages, liabilities or expenses referred to therein (i) in such proportion as is appropriate to reflect the relative benefits received by the Company, on the one hand, and the Agent, on the other hand, from the offering of the Shares pursuant to this Agreement; or (ii) if the allocation provided by clause (i) above is not permitted by applicable law, in such proportion as is appropriate to reflect not only the relative benefits referred to in clause (i) above but also the relative fault of the Company, on the one hand, and the Agent, on the other hand, in connection with the statements or omissions which resulted in such losses, claims, damages, liabilities or expenses, as well as any other relevant equitable considerations. The relative benefits received by the Company, on the one hand, and the Agent, on the other hand, in connection with the offering of the Shares pursuant to this Agreement shall be deemed to be in the same respective proportions as the total gross proceeds from the offering of the Shares (before deducting expenses) received by the Company bear to the total commissions received by the Agent. The relative fault of the Company, on the one hand, and the Agent, on the other hand, shall be determined by reference to, among other things, whether any such untrue or alleged untrue statement of a material fact or omission or alleged omission to state a material fact relates to information supplied by the Company, on the one hand, or the Agent, on the other hand, and the parties' relative intent, knowledge, access to information and opportunity to correct or prevent such statement or omission.

The amount paid or payable by a party as a result of the losses, claims, damages, liabilities and expenses referred to above shall be deemed to include, subject to the limitations set forth in Section 6(c), any reasonable and documented legal or other fees or expenses reasonably incurred by such party in connection with investigating or defending any action or claim. The provisions set forth in Section 6(c) with respect to notice of commencement of any action shall apply if a claim for contribution is to be made under this Section 6(e); *provided, however*, that no additional notice shall be required with respect to any action for which notice has been given under Section 6(c) for purposes of indemnification.

The Company and the Agent agree that it would not be just and equitable if contribution pursuant to this Section 6(e) were determined by pro rata allocation or by any other method of allocation which does not take account of the equitable considerations referred to in this Section 6(e).

Notwithstanding the provisions of this Section 6(e), the Agent shall not be required to contribute any amount in excess of the agent fees received by the Agent in connection with the offering contemplated hereby. 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. For purposes of this Section 6(e), each officer and employee of the Agent and each person, if any, who controls the Agent within the

meaning of the Securities Act or the Exchange Act shall have the same rights to contribution as the Agent, and each director of the Company, each officer of the Company who signed the Registration Statement, and each person, if any, who controls the Company within the meaning of the Securities Act and the Exchange Act shall have the same rights to contribution as the Company.

Section 7. TERMINATION & SURVIVAL

(a) Term. Subject to the provisions of this Section 7, the term of this Agreement shall continue from the date of this Agreement until the end of the Agency Period, unless earlier terminated by the parties to this Agreement pursuant to this Section 7.

(b) Termination; Survival Following Termination.

- (i) Either party may terminate this Agreement prior to the end of the Agency Period, by giving written notice as required by this Agreement, upon ten (10) Trading Days' notice to the other party; *provided* that, (A) if the Company terminates this Agreement after the Agent confirms to the Company any sale of Shares, the Company shall remain obligated to comply with Section 3(b)(v) with respect to such Shares and (B) Section 2, Section 6, Section 7 and Section 8 shall survive termination of this Agreement. If termination shall occur prior to the Settlement Date for any sale of Shares, such sale shall nevertheless settle in accordance with the terms of this Agreement. Upon termination of this Agreement, the Company shall not have any liability to the Agent for any discount, commission or other compensation with respect to any Shares not otherwise sold by the Agent under this Agreement.
- (ii) In addition to the survival provision of Section 7(b)(i), the respective indemnities, agreements, representations, warranties and other statements of the Company, of its officers and of the Agent set forth in or made pursuant to this Agreement will remain in full force and effect, regardless of any investigation made by or on behalf of the Agent or the Company or any of its or their partners, officers or directors or any controlling person, as the case may be, and, anything herein to the contrary notwithstanding, will survive delivery of and payment for the Shares sold hereunder and any termination of this Agreement.

Section 8. MISCELLANEOUS

(a) Press Releases and Disclosure. The Company may issue a press release describing the material terms of the transactions contemplated hereby as soon as practicable following the date of this Agreement, and may file with the Commission a Current Report on Form 8-K, with this Agreement attached as an exhibit thereto, describing the material terms of the transactions contemplated hereby, and the Company shall consult with the Agent prior to making such disclosures, and the parties hereto shall use all commercially reasonable efforts, acting in good faith, to agree upon a text for such disclosures that is reasonably satisfactory to all parties hereto. No party hereto shall issue thereafter any press release or like public statement including, without limitation, any disclosure required in reports filed with the Commission pursuant to the Exchange

Act (other than disclosure related to periodic sales pursuant to this Agreement as required to be included in any reports filed with the Commission pursuant to the Securities Act or the Exchange Act) related to this Agreement or any of the transactions contemplated hereby without the prior written approval of the other party hereto, except as may be necessary or appropriate in the reasonable opinion of the party seeking to make disclosure to comply with the requirements of applicable law or stock exchange rules. If any such press release or like public statement is so required, the party making such disclosure shall consult with the other party prior to making such disclosure, and the parties shall use all commercially reasonable efforts, acting in good faith, to agree upon a text for such disclosure that is reasonably satisfactory to all parties hereto.

(b) No Advisory or Fiduciary Relationship. The Company acknowledges and agrees that (i) the transactions contemplated by this Agreement, including the determination of any fees, are arm's-length commercial transactions between the Company and the Agent, (ii) when acting as a principal under this Agreement, the Agent is and has been acting solely as a principal and is not the agent or fiduciary of the Company, or its stockholders, creditors, employees or any other party, (iii) the Agent has not assumed nor will assume an advisory or fiduciary responsibility in favor of the Company with respect to the transactions contemplated hereby or the process leading thereto (irrespective of whether the Agent has advised or is currently advising the Company on other matters) and the Agent does not have any obligation to the Company with respect to the transactions contemplated hereby except the obligations expressly set forth in this Agreement, (iv) the Agent and its affiliates may be engaged in a broad range of transactions that involve interests that differ from those of the Company, and (v) the Agent has not provided any legal, accounting, regulatory or tax advice with respect to the transactions contemplated hereby and the Company has consulted its own legal, accounting, regulatory and tax advisors to the extent it deemed appropriate.

(c) Research Analyst Independence. The Company acknowledges that the Agent's research analysts and research departments are required to and should be independent from their respective investment banking divisions and are subject to certain regulations and internal policies, and as such the Agent's research analysts may hold views and make statements or investment recommendations and/or publish research reports with respect to the Company or the offering that differ from the views of their respective investment banking divisions. The Company understands that the Agent is a full service securities firm and as such from time to time, subject to applicable securities laws, may effect transactions for its own account or the account of its customers and hold long or short positions in debt or equity securities of the companies that may be the subject of the transactions contemplated by this Agreement.

(d) Notices. All communications hereunder shall be in writing and shall be mailed, hand delivered or emailed or telecopied and confirmed to the parties hereto as follows:

If to the Agent:

Jefferies LLC
520 Madison Avenue
New York, NY 10022
Facsimile: (646) 619-4437
Attention: General Counsel

with a copy (which shall not constitute notice) to:

Latham & Watkins LLP
330 N. Wabash Ave,
Suite 2800
Chicago, IL 60611
Facsimile: (312) 993-9767
Attention: Christopher D. Lueking, Esq.
Email: Christopher.Lueking@lw.com

If to the Company:

Assembly Biosciences, Inc.
331 Oyster Point Blvd., Fourth Floor
South San Francisco, California 94080
Attention: Jason Okazaki
Email: jokazaki@assemblybio.com

with a copy (which shall not constitute notice) to:

Skadden, Arps, Slate, Meagher & Flom LLP
300 South Grand Avenue
Los Angeles, California 90071-3144
Facsimile: (213) 621-5122
Attention: P. Michelle Gasaway, Esq.
Email: michelle.gasaway@skadden.com

Any party hereto may change any address or number for receipt of communications by giving written notice to the others in accordance with this Section 8(d).

(e) Successors. This Agreement will inure to the benefit of and be binding upon the parties hereto, and to the benefit of the employees, officers and directors and controlling persons referred to in Section 6, and in each case their respective successors, and no other person will have any right or obligation hereunder. The term "successors" shall not include any purchaser of the Shares as such from the Agent merely by reason of such purchase.

(f) Partial Unenforceability. The invalidity or unenforceability of any Article, Section, paragraph or provision of this Agreement shall not affect the validity or enforceability of any other Article, Section, paragraph or provision hereof. If any Article, Section, paragraph or provision of this Agreement is for any reason determined to be invalid or unenforceable, there shall be deemed to be made such minor changes (and only such minor changes) as are necessary to make it valid and enforceable.

(g) Governing Law Provisions. This Agreement, and any claim, controversy or dispute of any kind or nature whatsoever arising out of or in any way relating to this Agreement, shall be governed by and construed in accordance with the internal laws of the State of New York applicable to agreements made and to be performed in such state. Any legal suit, action or proceeding arising out of or based upon this Agreement or the transactions contemplated hereby (“**Related Proceedings**”) may be instituted in the federal courts of the United States of America located in the Borough of Manhattan in the City of New York or the courts of the State of New York in each case located in the Borough of Manhattan in the City of New York (collectively, the “**Specified Courts**”), and each party irrevocably submits to the exclusive jurisdiction (except for proceedings instituted in regard to the enforcement of a judgment of any such court (a “**Related Judgment**”), as to which such jurisdiction is non-exclusive) of such courts in any such suit, action or proceeding. Service of any process, summons, notice or document by mail to such party’s address set forth above shall be effective service of process for any suit, action or other proceeding brought in any such court. The parties irrevocably and unconditionally waive any objection to the laying of venue of any suit, action or other proceeding in the Specified Courts and irrevocably and unconditionally waive and agree not to plead or claim in any such court that any such suit, action or other proceeding brought in any such court has been brought in an inconvenient forum.

(h) General Provisions. This Agreement constitutes the entire agreement of the parties to this Agreement and supersedes all prior written or oral and all contemporaneous oral agreements, understandings and negotiations with respect to the subject matter hereof. This Agreement may be executed in two or more counterparts, each one of which shall be an original, with the same effect as if the signatures thereto and hereto were upon the same instrument, and may be delivered by facsimile transmission or by electronic delivery of a portable document format (PDF) file (including any electronic signature covered by the U.S. federal ESIGN Act of 2000, Uniform Electronic Transactions Act, the Electronic Signatures and Records Act or other applicable law, e.g., www.docusign.com). This Agreement may not be amended or modified unless in writing by all of the parties hereto, and no condition herein (express or implied) may be waived unless waived in writing by each party whom the condition is meant to benefit. The Article and Section headings herein are for the convenience of the parties only and shall not affect the construction or interpretation of this Agreement.

[Signature Page Immediately Follows]

If the foregoing is in accordance with your understanding of our agreement, kindly sign and return to the Company the enclosed copies hereof, whereupon this instrument, along with all counterparts hereof, shall become a binding agreement in accordance with its terms

Very truly yours,

ASSEMBLY BIOSCIENCES, INC.

By: /s/ Jason Okazaki

Name: Jason Okazaki

Title: Chief Legal and Business Officer

[Signature Page to Sales Agreement]

The foregoing Agreement is hereby confirmed and accepted by the Agent in New York, New York as of the date first above written.

JEFFERIES LLC

By: /s/ Michael Magarro

Name: Michael Magarro

Title: Managing Director

[Signature Page to Sales Agreement]

EXHIBIT A

ISSUANCE NOTICE

[Date]

Jefferies LLC
520 Madison Avenue
New York, New York 10022

Attn: [_____]

Reference is made to the Open Market Sale Agreement between Assembly Biosciences, Inc. (the “**Company**”) and Jefferies LLC (the “**Agent**”) dated as of August 28, 2020. The Company confirms that all conditions to the delivery of this Issuance Notice are satisfied as of the date hereof.

Date of Delivery of Issuance Notice (determined pursuant to Section 3(b)(i)):

Issuance Amount (equal to the total Sales Price for such Shares):

\$ _____

Number of days in Selling Period: _____

First date of Selling Period: _____

Last date of Selling Period: _____

Settlement Date(s) if other than standard T+2 settlement:

Floor Price Limitation (in no event less than \$1.00 without the prior written consent of the Agent, which consent may be withheld in the Agent’s sole discretion): \$ ____ per share

Comments: _____

By: _____
Name:
Title:

Exhibit A

Schedule A

Notice Parties

The Company

Tom Russo (trusso@assemblybio.com)

Michael Samar (msamar@assemblybio.com)

Jason Okazaki (jokazaki@assemblybio.com)

John Gunderson (jgunderson@assemblybio.com)

The Agent

Michael Magarro (mmagarro@jefferies.com)

Donald C. Lynaugh (dlynaugh@jefferies.com)

Kevin Sheridan (ksheridan@jefferies.com)

Jack Fabbri (JFABBRI@Jefferies.com)

Schedule A

EXHIBIT 4(o)

Form of Triggering Event Date Certificate

The undersigned, the [●], of Assembly Biosciences, Inc., a Delaware corporation (the “**Company**”), does hereby certify in such capacity and on behalf of the Company, pursuant to Section 4(o) of the Sales Agreement, dated August 28, 2020 (the “**Sales Agreement**”), between the Company and Jefferies LLC, that to the knowledge of the undersigned:

(i) The representations and warranties of the Company in Section 2 of the Sales Agreement (A) to the extent such representations and warranties are subject to qualifications and exceptions contained therein relating to materiality or Material Adverse Effect, are true and correct on and as of the date hereof with the same force and effect as if expressly made on and as of the date hereof, except for those representations and warranties that speak solely as of a specific date and which were true and correct as of such date, and (B) to the extent such representations and warranties are not subject to qualifications or exceptions contained therein relating to materiality or Material Adverse Effect, are true and correct in all material respects as of the date hereof as if made on and as of the date hereof; *provided, however*, that such representations and warranties also shall be qualified by the disclosure included or incorporated by reference in the Registration Statement and Prospectus; and

(ii) The Company has complied with all agreements and satisfied all conditions on its part to be performed or satisfied pursuant to the Sales Agreement at or prior to the date hereof.

Capitalized terms used herein without definition shall have the meanings given to such terms in the Sales Agreement.

ASSEMBLY BIOSCIENCES, INC.

By: _____

Name: _____

Title: _____

Date: [●]

Exhibit 4(o)

SKADDEN, ARPS, SLATE, MEAGHER & FLOM LLP
 ONE MANHATTAN WEST
 NEW YORK, NY 10001

TEL: (212) 735-3000
 FAX: (212) 735-2000
 www.skadden.com

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 SEOUL
 SHANGHAI
 SINGAPORE
 TOKYO
 TORONTO

August 28, 2020

Assembly Biosciences, Inc.
 331 Oyster Point Blvd., Fourth Floor
 South San Francisco, California 94080

Re: Assembly Biosciences, Inc.
Registration Statement on Form S-3

Ladies and Gentlemen:

We have acted as special United States counsel to Assembly Biosciences, Inc., a Delaware corporation (the "Company"), in connection with the registration statement on Form S-3 (the "Registration Statement") to be filed on the date hereof by the Company with the Securities and Exchange Commission (the "Commission") under the Securities Act of 1933 (the "Securities Act"). The Registration Statement relates to the issuance and sale by the Company from time to time, pursuant to Rule 415 of the General Rules and Regulations of the Commission promulgated under the Securities Act (the "Rules and Regulations"), of (i) shares of common stock, par value \$0.001 per share, of the Company ("Common Stock"), (ii) shares of preferred stock, par value \$0.001 per share, of the Company ("Preferred Stock"), which may be issued in one or more series, (iii) debt securities of the Company ("Debt Securities"), which may be issued in one or more series under one or more indentures (the "Indentures") proposed to be entered into by the Company and the trustee to be named therein, the forms of which are filed as exhibits to the Registration Statement, (iv) warrants to purchase shares of Common Stock, shares of Preferred Stock or Debt Securities ("Warrants"), which may be issued pursuant to one or more warrant agreements (each, a "Warrant Agreement") proposed to be entered into by the Company and one or more warrant agents to be named therein, (v) units of the Company ("Units") comprised of shares of Common Stock, shares of Preferred Stock, Debt Securities or Warrants in any combination, and (vi) such indeterminate number of shares of Common Stock or Preferred Stock, such indeterminate amount of Debt Securities and such indeterminate number of Units as may be issued upon conversion, exchange or exercise, as applicable, of any Preferred Stock, Debt Securities or Warrants or settlement of any Units, including such shares of Common Stock or Preferred Stock as may be issued pursuant to anti-dilution adjustments determined at the time of offering (collectively, "Indeterminate Securities"). The Common Stock, Preferred Stock, Debt Securities, Warrants, Units and Indeterminate Securities offered pursuant to the Registration Statement are collectively referred to herein as the "Securities."

We have also acted as special United States counsel to the Company in connection with the Open Market Sale AgreementSM, dated the date hereof (the "Sales Agreement"), by and between the Company and Jefferies LLC ("Jefferies"), relating to the offer and sale by the Company from time to time of shares (the "ATM Shares") of Common Stock, having an aggregate gross sales price of up to \$100,000,000 to or through Jefferies as sales agent.

This opinion is being furnished in accordance with the requirements of Item 601(b)(5) of Regulation S-K under the Securities Act.

In rendering the opinions stated herein, we have examined and relied upon the following:

- (a) the Registration Statement;
- (b) the prospectus (the "Base Prospectus"), which forms a part of and is included in the Registration Statement;
- (c) the prospectus supplement (together with the Base Prospectus, the "Prospectus Supplement"), relating to the offering of the ATM Shares, which forms a part of and is included in the Registration Statement;
- (d) the forms of Indentures filed as exhibits to the Registration Statement;
- (e) an executed copy of the Sales Agreement;
- (f) an executed copy of a certificate of Jason Okazaki, Corporate Secretary of the Company, dated the date hereof (the "Secretary's Certificate");
- (g) a copy of the Company's Fifth Amended and Restated Certificate of Incorporation certified by the Secretary of State of the State of Delaware as of August 25, 2020, and certified pursuant to the Secretary's Certificate (the "Certificate of Incorporation");
- (h) a copy of the Company's Amended and Restated Bylaws in effect as of the date hereof and certified pursuant to the Secretary's Certificate (the "Bylaws"); and
- (i) a copy of certain resolutions of the Board of Directors of the Company, adopted on June 11, 2020, certified pursuant to the Secretary's Certificate.

We have also examined originals or copies, certified or otherwise identified to our satisfaction, of such records of the Company and such agreements, certificates and receipts of public officials, certificates of officers or other representatives of the Company and others, and such other documents as we have deemed necessary or appropriate as a basis for the opinions stated below.

In our examination, we have assumed the genuineness of all signatures, including electronic signatures, the legal capacity and competency of all natural persons, the authenticity of all documents submitted to us as originals, the conformity to original documents of all documents submitted to us as facsimile, electronic, certified or photocopied copies, and the authenticity of the originals of such copies. As to any facts relevant to the opinions stated herein that we did not independently establish or verify, we have relied upon statements and representations of officers and other representatives of the Company and others and of public officials, including those in the Secretary's Certificate and the factual representations and warranties contained in the Sales Agreement.

We do not express any opinion with respect to the laws of any jurisdiction other than (i) the laws of the State of New York and (ii) the General Corporation Law of the State of Delaware (the "DGCL") (all of the foregoing being referred to as "Opined-on-Law").

As used herein, "Transaction Documents" means the Indentures and any supplemental indentures and officer's certificates establishing the terms of the Debt Securities pursuant thereto, the Warrant Agreements, the Units and any applicable underwriting or purchase agreement.

The opinions stated in paragraphs 1 through 5 below presume that all of the following (collectively, the "general conditions") shall have occurred prior to the issuance of the Securities referred to therein: (i) the Registration Statement, as finally amended (including all necessary post-effective amendments), has become effective under the Securities Act; (ii) an appropriate prospectus supplement or term sheet with respect to such Securities has been prepared, delivered and filed in compliance with the Securities Act and the applicable Rules and Regulations; (iii) the applicable Transaction Documents shall have been duly authorized, executed and delivered by the Company and the other parties thereto, including, if such Securities are to be sold or otherwise distributed pursuant to a firm commitment underwritten offering, the underwriting agreement or purchase agreement with respect thereto; (iv) the Board of Directors of the Company, including any duly authorized committee thereof, shall have taken all necessary corporate action to approve the issuance and sale of such Securities and related matters and appropriate officers of the Company have taken all related action as directed by or under the direction of the Board of Directors of the Company; and (v) the terms of the applicable Transaction Documents and the issuance and sale of such Securities have been duly established in conformity with the certificate of incorporation of the Company so as not to violate any applicable law, the certificate of incorporation of the Company or the bylaws of the Company, or result in a default under or breach of any agreement or instrument binding upon the Company, and so as to comply with any requirement or restriction imposed by any court or governmental body having jurisdiction over the Company.

Based upon the foregoing and subject to the qualifications and assumptions stated herein, we are of the opinion that:

1. With respect to any shares of Common Stock (other than the ATM Shares, which are covered in paragraph 6 below) offered by the Company, including any Indeterminate Securities constituting Common Stock (the "Offered Common Stock"), when (a) the general conditions shall have been satisfied, (b) if the Offered Common Stock is to be certificated, certificates in the form required under the DGCL representing the shares of Offered Common Stock are duly executed and countersigned and (c) the shares of Offered Common Stock are registered in the Company's share registry and delivered upon payment of the agreed-upon consideration therefor, the shares of Offered Common Stock, when issued and sold or otherwise distributed in accordance with the provisions of the applicable Transaction Document, will be duly authorized by all requisite corporate action on the part of the Company under the DGCL and validly issued, fully paid and nonassessable; *provided* that the consideration therefor is not less than \$0.001 per share of Common Stock.

2. With respect to the shares of any series of Preferred Stock offered by the Company, including any Indeterminate Securities constituting Preferred Stock of such series (the "Offered Preferred Stock"), when (a) the general conditions shall have been satisfied, (b) the Board of Directors of the Company, or a duly authorized committee thereof, has duly adopted a Certificate of Designations for the Offered Preferred Stock in accordance with the DGCL (the "Certificate"), (c) the filing of the Certificate with the Secretary of State of the State of Delaware has duly occurred, (d) if the Offered Preferred Stock is to be certificated, certificates in the form required under the DGCL representing the shares of Offered Preferred Stock are duly executed and countersigned and (e) the shares of Offered Preferred Stock are registered in the Company's share registry and delivered upon payment of the agreed-upon consideration therefor, the shares of Offered Preferred Stock, when issued and sold or otherwise distributed in accordance with the provisions of the applicable Transaction Document, will be duly authorized by all requisite corporate action on the part of the Company under the DGCL and validly issued, fully paid and nonassessable; *provided* that the consideration therefor is not less than \$0.001 per share of Preferred Stock.

3. With respect to any series of Debt Securities offered by the Company, including any Indeterminate Securities constituting Debt Securities of such series (the "Offered Debt Securities"), when (a) the general conditions shall have been satisfied, (b) the Indenture has been qualified under the Trust Indenture Act of 1939 (the "TIA"); (c) the issuance, sale and terms of the Offered Debt Securities and related matters have been approved and established in conformity with the applicable Transaction Documents and (d) the certificates evidencing the Offered Debt Securities have been issued in a form that complies with the provisions of the applicable Transaction Documents and have been duly executed and authenticated in accordance with the provisions of the Indenture and any other applicable Transaction Documents and issued and sold or otherwise distributed in accordance with the provisions of the applicable Transaction Document upon payment of the agreed-upon consideration therefor, the Offered Debt Securities will constitute valid and binding obligations of the Company, enforceable against the Company in accordance with their respective terms under the laws of the State of New York.

4. With respect to any Warrants offered by the Company (the “Offered Warrants”), when (a) the general conditions shall have been satisfied, (b) the Common Stock, Preferred Stock and/or Debt Securities for which the Offered Warrants are exercisable have been duly authorized for issuance by the Company and (c) certificates evidencing the Offered Warrants have been duly executed, delivered and countersigned in accordance with the provisions of the applicable Warrant Agreement, the Offered Warrants, when issued and sold or otherwise distributed in accordance with the provisions of the applicable Transaction Document upon payment of the agreed-upon consideration therefor, will constitute valid and binding obligations of the Company, enforceable against the Company in accordance with their respective terms under the laws of the State of New York.

5. With respect to any Units offered by the Company, including any Indeterminate Securities constituting Units (the “Offered Units”), when (a) the general conditions shall have been satisfied, (b) the shares of Common Stock, shares of Preferred Stock, Debt Securities or Warrants, or any combination thereof, included in such Offered Units have been duly authorized for issuance by the Company and (c) certificates evidencing the Offered Units have been duly executed, delivered and countersigned, the Offered Units, when issued and sold or otherwise distributed in accordance with the provisions of the applicable Transaction Agreement upon payment of the agreed-upon consideration therefor, will constitute valid and binding obligations of the Company, enforceable against the Company in accordance with their respective terms under the laws of the State of New York.

6. When (a) the Registration Statement, as finally amended (including all necessary post-effective amendments), has become effective under the Securities Act, (b) if the ATM Shares are to be certificated, certificates in the form required under the DGCL representing the ATM Shares are duly executed and countersigned and (c) the ATM Shares are registered in the Company’s share registry and delivered upon payment of the agreed upon consideration therefor, the ATM Shares will be duly authorized by all requisite corporate action on the part of the Company under the DGCL and when issued and sold in accordance with the provisions of the Sales Agreement, will be validly issued, fully paid and nonassessable, provided that the consideration therefor is not less than \$0.001 per share of Common Stock.

The opinions stated herein are subject to the following qualifications:

(a) we do not express any opinion with respect to the effect on the opinions stated herein of any bankruptcy, insolvency, reorganization, moratorium, fraudulent transfer, preference and other similar laws affecting creditors’ rights generally, and the opinions stated herein are limited by such laws and by general principles of equity (regardless of whether enforcement is sought in equity or at law);

(b) we do not express any opinion with respect to any law, rule or regulation that is applicable to any party to any of the Transaction Documents or the transactions contemplated thereby solely because such law, rule or regulation is part of a regulatory regime applicable to any such party or any of its affiliates as a result of the specific assets or business operations of such party or such affiliates;

(c) except to the extent expressly stated in the opinions contained herein, we have assumed that each of the Transaction Documents constitutes the valid and binding obligation of each party to such Transaction Document, enforceable against such party in accordance with its terms;

(d) we do not express any opinion with respect to the enforceability of any provision contained in any Transaction Document relating to any indemnification, contribution, non-reliance, exculpation, release, limitation or exclusion of remedies, waiver or other provisions having similar effect that may be contrary to public policy or violative of federal or state securities laws, rules or regulations, or to the extent any such provision purports to, or has the effect of, waiving or altering any statute of limitations;

(e) we do not express any opinion with respect to the enforceability of any provision of any Transaction Document to the extent that such section purports to bind the Company to the exclusive jurisdiction of any particular federal court or courts;

(f) we call to your attention that irrespective of the agreement of the parties to any Transaction Document, a court may decline to hear a case on grounds of forum non conveniens or other doctrine limiting the availability of such court as a forum for resolution of disputes; in addition, we call to your attention that we do not express any opinion with respect to the subject matter jurisdiction of the federal courts of the United States of America in any action arising out of or relating to any Transaction Document;

(g) we have assumed that any agent of service will have accepted appointment as agent to receive service of process and call to your attention that we do not express any opinion if and to the extent such agent shall resign such appointment. Further, we do not express any opinion with respect to the irrevocability of the designation of such agent to receive service of process;

(h) we have assumed that the choice of New York law to govern the Indentures and any supplemental indenture thereto is a valid and legal provision;

(i) we have assumed that the laws of the State of New York will be chosen to govern any Warrant Agreements or Units and that such choice is and will be a valid and legal provision;

(j) we have assumed that the Indentures will be duly authorized, executed and delivered by the trustee in substantially the forms reviewed by us, and that any Debt Securities, Warrants and Units that may be issued will be manually authenticated, signed or countersigned, as the case may be, by duly authorized officers of any trustee, warrant agent and unit agent, as the case may be; and

(k) to the extent that any opinion relates to the enforceability of the choice of New York law and choice of New York forum provisions contained in any Transaction Document, the opinions stated herein are subject to the qualification that such enforceability may be subject to, in each case, (i) the exceptions and limitations in New York General Obligations Law sections 5-1401 and 5-1402 and (ii) principles of comity and constitutionality.

In addition, in rendering the foregoing opinions we have assumed that:

(a) neither the execution and delivery by the Company of the Transaction Documents nor the performance by the Company of its obligations thereunder, including the issuance and sale of the applicable Securities: (i) constitutes or will constitute a violation of, or a default under, any lease, indenture, agreement or other instrument to which the Company or its property is subject (except that, with respect to paragraph 6 above, we do not make this assumption with respect to the Certificate of Incorporation, the Bylaws or those agreements or instruments expressed to be governed by the laws of the State of New York which are listed in Part II of the Registration Statement or the Company's Annual Report on Form 10-K for the year ended December 31, 2019), (ii) contravenes or will contravene any order or decree of any governmental authority to which the Company or its property is subject, or (iii) violates or will violate any law, rule or regulation to which the Company or its property is subject (except that we do not make the assumption set forth in this clause (iii) with respect to the Opined-on Law); and

(b) neither the execution and delivery by the Company of the Transaction Documents nor the performance by the Company of its obligations thereunder, including the issuance and sale of the applicable Securities, requires or will require the consent, approval, licensing or authorization of, or any filing, recording or registration with, any governmental authority under any law, rule or regulation of any jurisdiction.

We hereby consent to the filing of this opinion with the Commission as an exhibit to the Registration Statement. We also hereby consent to the reference to our firm under the heading "Legal Matters" in the Base Prospectus and the Prospectus Supplement. In giving this consent, 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. This opinion is expressed as of the date hereof unless otherwise expressly stated, and we disclaim any undertaking to advise you of any subsequent changes in the facts stated or assumed herein or of any subsequent changes in applicable laws.

Very truly yours,

/s/ Skadden, Arps, Slate, Meagher & Flom LLP

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the reference to our firm under the caption “Experts” in this Registration Statement (Form S-3) and related Prospectuses of Assembly Biosciences, Inc. for the registration of common stock, preferred stock, debt securities, warrants, and units and to the incorporation by reference therein of our reports dated March 4, 2020, with respect to the consolidated financial statements of Assembly Biosciences, Inc. and the effectiveness of internal controls over financial reporting of Assembly Biosciences, Inc., included in its Annual Report (Form 10-K) for the year ended December 31, 2019, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP
Redwood City, California
August 28, 2020