
**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 Executive Officer and President
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)

Copy 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 the effective date of this registration statement.

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.

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. (Check one):

Large accelerated filer

Accelerated filer

Non-accelerated filer

Smaller reporting company

Emerging growth company

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

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.

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

Subject to Completion, dated March 22, 2023

Prospectus

\$150,000,000



**Common Stock
Preferred Stock
Debt Securities
Warrants
Subscription Rights
and
Units**

We may offer, issue and sell, together or separately, from time to time in one or more offerings: shares of our common stock; shares of our preferred stock, which may be issued in one or more series; debt securities, which may be issued in one or more series and which may be senior debt securities or subordinated debt securities; warrants to purchase shares of our common stock, shares of our preferred stock or our debt securities; subscription rights to purchase shares of our common stock, shares of our preferred stock or our debt securities; 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.

The aggregate offering price of all securities sold by us under this prospectus may not exceed \$150,000,000.

We will provide the specific prices and terms of these securities in one or more supplements to this prospectus at the time of offering. You should read this prospectus and the accompanying prospectus supplement carefully before you make your investment decision.

This prospectus may not be used to sell securities unless accompanied by a prospectus supplement.

Investing in our securities involves a number of risks. See “[Risk Factors](#)” on page 6 before you make your investment decision.

We may offer securities through underwriting syndicates managed or co-managed by one or more underwriters or dealers, through agents or directly to purchasers. If required, the prospectus supplement for each offering of securities will describe the plan of distribution for that offering. For general information about the distribution of securities offered, please see “Plan of Distribution” in this prospectus.

Our common stock is listed on The Nasdaq Global Select Market under the trading symbol “ASMB.” On March 21, 2023, the last reported sale price of our common stock as reported on The Nasdaq Global Select Market was \$1.20 per share. Each prospectus supplement will indicate whether the securities offered thereby will be listed on any securities exchange.

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

The date of this prospectus is _____, 2023.

TABLE OF CONTENTS

ABOUT THIS PROSPECTUS	1
WHERE YOU CAN FIND MORE INFORMATION	2
CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS	3
THE COMPANY	4
RISK FACTORS	6
USE OF PROCEEDS	7
DESCRIPTION OF SECURITIES	8
DESCRIPTION OF CAPITAL STOCK	8
DESCRIPTION OF DEBT SECURITIES	12
DESCRIPTION OF WARRANTS	27
DESCRIPTION OF SUBSCRIPTION RIGHTS	28
DESCRIPTION OF UNITS	29
PLAN OF DISTRIBUTION	33
LEGAL MATTERS	34
EXPERTS	35

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 offer and sell from time to time the securities described in this prospectus in one or more offerings for an aggregate offering price of up to \$150,000,000.

This prospectus only provides you with a general description of the securities that we may offer. Each time we sell securities, we will provide a supplement to this prospectus that contains specific information about the terms of that offering, including the specific amounts, prices and terms of the securities offered. The prospectus supplement may also add, update or change information contained in this prospectus. You should carefully read both this prospectus, any accompanying prospectus supplement and any free writing prospectus prepared by or on behalf of us, together with the additional information described under the heading “Where You Can Find More Information.”

We have not authorized anyone to provide you with any information other than that contained in or incorporated by reference into this prospectus, any accompanying prospectus supplement and any free writing prospectus prepared by or on behalf of us. We take no responsibility for, and can provide no assurance as to the reliability of, any other information that others may give you. We are not making offers to sell the securities in any jurisdiction in which an offer or solicitation is not authorized or in which the person making such offer or solicitation is not qualified to do so or to anyone to whom it is unlawful to make an offer or solicitation.

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. We have not independently verified any of the data from third-party sources, nor have we 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.

The information in this prospectus is accurate as of the date on the front cover. You should not assume that the information contained in this prospectus is accurate as of any other date.

When used in this prospectus, the terms “Assembly Bio,” “Assembly,” the “Company,” “we,” “our” and “us” refer to Assembly Biosciences, Inc. and its consolidated subsidiaries, unless otherwise specified or the context otherwise requires.

WHERE YOU CAN FIND MORE INFORMATION

We file annual, quarterly and current reports, proxy statements and other information with the SEC under the Securities Exchange Act of 1934, as amended (the “Exchange Act”). Our SEC filings are available to the public at the SEC’s website at www.sec.gov.

The SEC allows us to “incorporate by reference” information into this prospectus and any accompanying prospectus supplement, which means that we can disclose important information to you by referring you to another document filed separately with the SEC. The information incorporated by reference is deemed to be part of this prospectus and any accompanying prospectus supplement, except for any information superseded by information contained directly in this prospectus, any accompanying prospectus supplement, any subsequently filed document deemed incorporated by reference or any free writing prospectus prepared by or on behalf of us. This prospectus and any accompanying prospectus supplement incorporate by reference the documents set forth below that we have previously filed with the SEC (other than information deemed furnished and not filed in accordance with SEC rules, including Items 2.02 and 7.01 of Form 8-K).

- our Annual Report on [Form 10-K](#) for the fiscal year ended December 31, 2022, filed with the SEC on March 22, 2023;
- the information specifically incorporated by reference into our Annual Report on [Form 10-K](#) for the fiscal year ended December 31, 2021 from our definitive proxy statement on [Schedule 14A](#), filed with the SEC on April 12, 2022;
- our Current Report on Form 8-K, filed with the SEC on [February 15, 2023](#) and [March 22, 2023](#) (Item 8.01 only); and
- the description of our common stock contained in our Registration Statement on [Form 8-A](#) 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 4.2](#) to our Annual Report on Form 10-K for the year ended December 31, 2022, filed with the SEC on March 22, 2023.

All documents filed by us pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act after the date of this prospectus and before the termination of the offering also shall be deemed to be incorporated herein by reference. We are not, however, incorporating by reference any documents or portions thereof that are not deemed “filed” with the SEC, including any information furnished pursuant to Items 2.02 or 7.01 of Form 8-K.

If requested, we will provide to each person, including any beneficial owner, to whom a prospectus is delivered, a copy of any or all of the information that has been incorporated by reference in the prospectus but not delivered with the prospectus. Exhibits to the filings will not be sent, however, unless those exhibits have specifically been incorporated by reference into such documents. To obtain a copy of these filings at no cost, you may write or telephone us at the following address:

Assembly Biosciences, Inc.
331 Oyster Point Blvd., Fourth Floor
South San Francisco, California 94080
Attn: Corporate Secretary
(833) 509-4584

CAUTIONARY NOTE 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:

- our ability to maintain financial resources necessary to continue our research activities, clinical studies and other business operations;
- our ability to initiate and complete clinical studies involving our therapeutic product candidates, including studies contemplated by clinical collaboration agreements, in the anticipated timeframes;
- safety and efficacy data from clinical or nonclinical studies may not warrant further development of our product candidates;
- clinical and nonclinical data presented at conferences may not differentiate our product candidates from other companies’ candidates;
- results of nonclinical studies may not be representative of disease behavior in a clinical setting and may not be predictive of the outcomes of clinical studies; and
- continued development and commercialization of ABI-H3733, if successful, in the China territory will be dependent on, and subject to, our collaboration agreement governing our HBV-related activity in the China territory.

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, 2022 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.

THE COMPANY

We are a biopharmaceutical company advancing clinical candidates with the potential to improve the lives of millions of people living with chronic hepatitis B virus (“HBV”) infection around the world, an early stage development program targeting high-recurrence genital herpes associated with herpes simplex virus type 2 (HSV-2) and research programs focused on the discovery of novel antivirals to treat devastating viral diseases, including hepatitis delta virus (“HDV”) and transplant-related herpesviruses.

Our current business strategy is focused on three parallel paths:

- **Highly Potent Next-Generation HBV Core Inhibitors** – Advancing our novel next-generation core inhibitors (CIs) in clinical studies, with ABI-4334 (currently prioritized) and 3733 (currently paused) in ongoing Phase 1a and Phase 1b studies, respectively.
- **Novel Small Molecule Approaches for HBV and HDV** – Advancing research programs targeting (1) an orally bioavailable HBV/HDV entry inhibitor and (2) an orally bioavailable, liver-focused interferon- α receptor (“IFNAR”) agonist.
- **Novel Antivirals Targeting Herpesviruses** – Advancing (1) ABI-5366 (“5366”), a long-acting HSV-2 helicase inhibitor, and (2) our research program targeting a pan-herpes non-nucleoside polymerase inhibitor (“NNPI”) for transplant-associated infections.

HBV

Inspired by the hundreds of millions of people worldwide living with chronic HBV infection, the goal of our HBV program is to discover and develop finite and curative therapies for these patients. While we have learned that combination therapy with our first-generation CI product candidate, vebicorvir (“VBR”) plus the standard of care, nucleos(t)ide analog reverse transcriptase inhibitor (“NrtI”), did not result in a finite and curative treatment, we have designed and developed our next generation CIs for significantly increased potency and ability to engage an additional mechanism of action, targeting the viral reservoir, that VBR could not. We believe that a regimen of our next generation CIs in combination with NrtI therapy will be the antiviral backbone of future finite and curative therapies. To reach a finite and curative therapy, it may also be necessary to include additional mechanisms of action, whether discovered and developed internally or externally through collaborations, licenses, partnerships and other types of business arrangements.

Development Pipeline

To complement our CI programs seeking finite and curative chronic HBV therapies, we have leveraged the depth and breadth of our virology expertise to expand our pipeline with a focus on novel mechanisms acting on clinically validated targets in therapeutic areas of high unmet medical need. Since beginning this expansion of our portfolio in late 2021, we have announced several new programs, both in- and outside of HBV: our HDV/HBV entry inhibitor program, our IFNAR agonist program, our pan-herpes NNPI program for transplant-associated infections and the long-acting HSV-2 helicase inhibitor for high-recurrence genital herpes. We recently nominated 5366 as a development candidate for our HSV-2 program and look forward to future candidate nominations from our discovery virology pipeline.

We believe that these new programs are compelling complements to our CIs, as each program focuses on a clinically validated target in a virologic disease where innovation is critical to improving patients’ lives. In addition, because our new programs are focused on treatments for chronic diseases, rather than curative therapies, the path to proof-of-concept and registrational studies may be significantly shorter than that for our finite and curative HBV therapeutics.

We currently have corporate and administrative offices and research laboratory space in South San Francisco, California as well as registrational offices in China.

[Table of Contents](#)

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. We maintain a website at www.assemblybio.com. The information on our website is not incorporated by reference in this prospectus or any accompanying prospectus supplement, and you should not consider it a part of this prospectus or any accompanying prospectus supplement.

RISK FACTORS

Investing in our securities involves risk. See the risk factors described in our most recent Annual Report on Form 10-K (together with any material changes thereto contained in subsequent filings with the SEC that are incorporated by reference in this prospectus and any accompanying prospectus supplement) and those contained in our other filings with the SEC that are incorporated by reference in this prospectus and any accompanying prospectus supplement. Before making an investment decision, you should carefully consider these risks as well as other information we include or incorporate by reference in this prospectus and any accompanying prospectus supplement. These risks could materially affect our business, financial condition or results of operations and cause the value of our securities to decline. You could lose all or part of your investment.

USE OF PROCEEDS

Except as otherwise set forth in any accompanying prospectus supplement, we expect to use the net proceeds from the sale of securities for general corporate purposes, including the financing of our operations, the possible repayment of indebtedness, if applicable, and possible business acquisitions.

DESCRIPTION OF SECURITIES

This prospectus contains summary descriptions of the common stock, preferred stock, debt securities, warrants and subscription rights that may be offered and sold from time to time. These summary descriptions are not meant to be complete descriptions of each security. However, at the time of an offering and sale, this prospectus together with the accompanying prospectus supplement will contain the material terms of the securities being offered.

DESCRIPTION OF CAPITAL STOCK

General

The following summary description of our capital stock is based on the provisions of the Delaware General Corporation Law (the “DGCL”), our certificate of incorporation, as amended, and our bylaws, as amended. This description does not purport to be complete and is qualified in its entirety by reference to the full text of the DGCL, as it may be amended from time to time, and to the terms of our certificate of incorporation and bylaws, as each may be amended from time to time, which are incorporated by reference as exhibits to the registration statement of which this prospectus is a part. See “Where You Can Find More Information.” As used in this “Description of Capital Stock,” the terms “Assembly Bio,” “Assembly,” the “Company,” “we,” “our” and “us” refer to Assembly Biosciences, Inc., a Delaware corporation, and do not, unless otherwise specified, include our subsidiaries.

Authorized Capital Stock

Our authorized capital stock consists of 150,000,000 shares of common stock, par value \$0.001 per share, and 5,000,000 shares of preferred stock, par value \$0.001 per share. The number of authorized shares of any class may be increased or decreased by an amendment to our certificate of incorporation proposed by our board of directors and approved by a majority of outstanding shares voted on the issue at a meeting at which a quorum exists.

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 when and as declared by our board of directors or any authorized committee thereof out of assets or 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.

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 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

Table of Contents

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.

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.

Anti-Takeover Effects of Provisions of the Certificate of Incorporation, Bylaws and Other Agreements

Certain provisions of 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 Antitakeover 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 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 seven. Newly created directorships resulting from any increase in our authorized number

[Table of Contents](#)

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. This provision will not apply to litigation brought to enforce any liability or duty created by: the Securities Act of 1933, as amended; the Securities Exchange Act of 1934, as amended; or the rules and regulations thereunder. 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 has 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.

Listing

Our common stock is listed on The Nasdaq Global Select Market under the symbol "ASMB."

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is American Stock Transfer & Trust Company, LLC. The transfer agent and registrar's address is 6201 15th Avenue, Brooklyn, New York 11219.

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;

Table of Contents

- 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
- 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;

Table of Contents

- 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;
- 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;

Table of Contents

- 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;
- 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 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

Table of Contents

- 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.

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;

Table of Contents

- 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;

Table of Contents

- 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.

Table of Contents

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 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,

Table of Contents

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 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

Table of Contents

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 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

Table of Contents

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.

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.

Governing Law

The indenture and the debt securities shall be construed in accordance with and governed by the laws of the State of New York.

DESCRIPTION OF WARRANTS

We may issue warrants for the purchase of shares of our common stock, shares of preferred stock or our debt securities. We may issue warrants independently or together with other securities, and they may be attached to or separate from the other securities. Each series of warrants will be issued under a separate warrant agreement that we will enter into with a bank or trust company, as warrant agent, as detailed in an accompanying prospectus supplement. The warrant agent will act solely as our agent in connection with the warrants and will not assume any obligation, or agency or trust relationship, with you.

The prospectus supplement relating to a particular issue of warrants will describe the terms of those warrants, including, when applicable:

- the offering price;
- the currency or currencies, including composite currencies, in which the purchase price and/or exercise price of the warrants may be payable;
- the number of warrants offered;
- the exercise price and the amount of securities you will receive upon exercise;
- the procedure for exercise of the warrants and the circumstances, if any, that will cause the warrants to be automatically exercised;
- the rights, if any, we have to redeem the warrants;
- the date on which the right to exercise the warrants will commence and the date on which the warrants will expire;
- the name of the warrant agent; and
- any other material terms of the warrants.

After warrants expire they will become void. The prospectus supplement may provide for the adjustment of the exercise price of the warrants.

Warrants may be exercised at the appropriate office of the warrant agent or any other office indicated in an accompanying prospectus supplement. Before the exercise of warrants, holders will not have any of the rights of holders of the securities purchasable upon exercise and will not be entitled to payments made to holders of those securities.

The description in an accompanying prospectus supplement of any warrants we offer will not necessarily be complete and will be qualified in its entirety by reference to the applicable warrant agreement, which will be filed with the SEC if we offer warrants. For more information on how you can obtain copies of any warrant agreement if we offer warrants, see "Where You Can Find More Information." We urge you to read the applicable warrant agreement and any accompanying prospectus supplement in their entirety.

DESCRIPTION OF SUBSCRIPTION RIGHTS

We may issue subscription rights to purchase shares of our common stock, shares of our preferred stock or our debt securities. We may issue subscription rights independently or together with any other offered security, which may or may not be transferable by the stockholder. In connection with any offering of subscription rights, we may enter into a standby arrangement with one or more underwriters or other purchasers pursuant to which the underwriters or other purchasers may be required to purchase any securities remaining unsubscribed for after such offering.

The prospectus supplement relating to any subscription rights we may offer will contain the specific terms of the subscription rights. These terms may include the following:

- the price, if any, for the subscription rights;
- the number and terms of each share of common stock or preferred stock or debt securities which may be purchased per each subscription right;
- the exercise price payable for each share of common stock or preferred stock or debt securities upon the exercise of the subscription rights;
- the extent to which the subscription rights are transferable;
- any provisions for adjustment of the number or amount of securities receivable upon exercise of the subscription rights or the exercise price of the subscription rights;
- any other terms of the subscription rights, including the terms, procedures and limitations relating to the exchange and exercise of the subscription rights;
- the date on which the right to exercise the subscription rights shall commence, and the date on which the subscription rights shall expire;
- the extent to which the subscription rights may include an over-subscription privilege with respect to unsubscribed securities; and
- if applicable, the material terms of any standby underwriting or purchase arrangement entered into by us in connection with the offering of subscription rights.

The description in an accompanying prospectus supplement of any subscription rights we offer will not necessarily be complete and will be qualified in its entirety by reference to the applicable subscription rights certificate or subscription rights agreement, which will be filed with the SEC if we offer subscription rights. For more information on how you can obtain copies of any subscription rights certificate or subscription rights agreement if we offer subscription rights, see “Where You Can Find More Information.” We urge you to read the applicable subscription rights certificate, the applicable subscription rights agreement and any accompanying prospectus supplement in their entirety.

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.

Table of Contents

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.

Table of Contents

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.

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 depositary, 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 depositary's system, and the rights of these indirect owners will be governed solely by the applicable procedures of the depositary 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.

[Table of Contents](#)

Only the depositary 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 the securities being offered hereby in one or more of the following ways from time to time:

- to underwriters for resale to purchasers;
- directly to purchasers;
- through agents or dealers to purchasers; or
- through a combination of any of these methods.

In addition, we may enter into derivative or hedging transactions with third parties, or sell securities not covered by this prospectus to third parties in privately negotiated transactions. In connection with such a transaction, the third parties may sell securities covered by and pursuant to this prospectus and any accompanying prospectus supplement. If so, the third party may use securities borrowed from us or the selling stockholders or others to settle such sales and may use securities received from us to close out any related short positions. We may also loan or pledge securities covered by this prospectus and any accompanying prospectus supplement to third parties, who may sell the loaned securities or, in an event of default in the case of a pledge, sell the pledged securities pursuant to this prospectus and any accompanying prospectus supplement.

We will identify the specific plan of distribution, including any underwriters, dealers, agents or direct purchasers and their compensation in a prospectus supplement.

LEGAL MATTERS

Unless otherwise indicated in any accompanying prospectus supplement, Skadden, Arps, Slate, Meagher & Flom LLP will provide opinions regarding the authorization and validity of the securities. Skadden, Arps, Slate, Meagher & Flom LLP may also provide opinions regarding certain other matters. Any underwriters will be advised about legal matters by their own counsel, which will be named in an accompanying prospectus supplement.

EXPERTS

Ernst & Young LLP, independent registered public accounting firm, has audited our consolidated financial statements included in our Annual Report on Form 10-K for the year ended December 31, 2022, as set forth in their report, which is incorporated by reference in this prospectus and elsewhere in the registration statement. Our consolidated financial statements are incorporated by reference in reliance on Ernst & Young LLP's reports, given on their authority as experts in accounting and auditing.

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

The expenses relating to the registration of the securities will be borne by the registrant.

Securities and Exchange Commission Registration Fee	\$ 16,530
Accounting Fees and Expenses	\$ *
Legal Fees and Expenses	\$ *
Printing Fees	\$ *
Transfer Agents and Trustees' Fees and Expenses	\$ *
Rating Agency Fees	\$ *
Stock Exchange Listing Fees	\$ *
Miscellaneous	\$ *
Total	\$ 16,530

* Fees and expenses (other than the Securities and Exchange Commission registration fee to be paid upon the filing of this registration statement) will depend on the number and nature of the offerings, and cannot be estimated at this time. An estimate of the aggregate expenses in connection with the issuance and distribution of securities being offered will be included in any applicable prospectus supplement.

Item 15. Indemnification of Directors and Officers.

The registrant is a Delaware corporation. Reference is made to Section 102(b)(7) of the General Corporation Law of the State of Delaware (the "DGCL"), which enables a corporation in its certificate of incorporation to eliminate or limit the personal liability of a director for violations of the director's fiduciary duty, except:

- for any breach of the director's duty of loyalty to the corporation or its stockholders;
- for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law;
- pursuant to Section 174 of the DGCL (providing for liability of directors for unlawful payment of dividends or unlawful stock purchases or redemptions); or
- for any transaction from which a director derived an improper personal benefit.

Reference is also made to Section 145 of the DGCL, which provides that a corporation may indemnify any persons, including officers and directors, who are, or are threatened to be made, parties to any threatened, pending or completed legal 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 is or was a director, officer, employee or agent of such corporation or is or was serving at the request of such corporation as a director, officer, 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 such director, officer, employee or agent 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, with respect to any criminal action or proceeding, had no reasonable cause to believe that the person's conduct was unlawful. A Delaware corporation may indemnify officers and directors in an action by or in the right of the corporation under the same conditions, except that no indemnification is permitted without judicial approval if the officer or director is adjudged to be liable to the corporation. Where an officer or director is successful on the merits or otherwise in the defense of any action referred to above, the corporation must indemnify him or her against the expenses that such officer or director actually and reasonably incurred. The indemnification permitted under the DGCL is not exclusive, and a corporation is empowered to purchase and maintain insurance against liabilities whether or not indemnification would be permitted by statute.

Table of Contents

The registrant's Sixth Amended and Restated Certificate of Incorporation and Amended and Restated Bylaws provide for indemnification of its directors and officers to the fullest extent currently permitted by the DGCL. The registrant also has indemnification agreements with its directors and officers. In addition, the registrant maintains liability insurance for its directors and officers.

Item 16. List of Exhibits.

Exhibit List

<u>Exhibit No.</u>	<u>Description of Exhibits</u>
1.1*	Form of Underwriting Agreement.
3.1	Certificate of Incorporation of the registrant (incorporated by reference to Exhibit 3.1 to the registrant's Current Report on Form 8-K filed on May 27, 2022).
3.2	Amended and Restated By-Laws (incorporated by reference to Exhibit 3.1 to the registrant's Current Report on Form 8-K filed on December 12, 2022).
3.3*	Form of Certificate of Designations with respect to any preferred stock issued hereunder.
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 Warrant Agreement (including form of Warrant Certificate).
4.5*	Form of Subscription Rights Agreement (including form of Subscription Rights Certificate).
5.1	Opinion of Skadden, Arps, Slate, Meagher & Flom LLP.
23.1	Consent of Ernst & Young LLP, Independent Registered Public Accounting Firm.
23.2	Consent of Skadden, Arps, Slate, Meagher & Flom LLP (included in Exhibit 5.1).
24.1	Powers of Attorney (included on signature pages hereto).
25.1*	Statement of Eligibility on Form T-1 of trustee under the Indenture.
107	Filing Fee Table

* 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.

Item 17. Undertakings.

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 SEC pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than 20 percent change in the maximum aggregate offering price set forth in the "Calculation of Registration Fee" table in the effective registration statement;
 - (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 (i), (ii) and (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 SEC by the registrant pursuant to Section 13 or Section 15(d) of the Securities Exchange Act of 1934 that are incorporated by reference in this registration statement, or is contained in a form of prospectus filed pursuant to Rule 424(b) that is part of this 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 this registration statement as of the date the filed prospectus was deemed part of and included in this 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 this 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 this registration statement or made in a document incorporated or deemed incorporated by reference into this registration statement or prospectus that is part of this 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 this registration statement or prospectus that was part of this 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.

The undersigned registrant hereby undertakes 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.

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

The undersigned registrant hereby undertakes 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 in accordance with the rules and regulations prescribed by the SEC under Section 305(b) (2) of the Act.

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 on Form S-3 to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of South San Francisco, State of California on March 22, 2023.

Assembly Biosciences, Inc.

By: /s/ Jason A. Okazaki

Name: Jason A. Okazaki

Title: Chief Executive Officer and President

In accordance with the requirements of the Securities Act of 1933, as amended, this Registration Statement has been signed by the following persons in the capacities and on the dates stated. Each person whose signature appears below constitutes and appoints Jason A. Okazaki and John O. Gunderson and each of them severally, as his or her true and lawful attorney-in-fact and agent, each acting along with full power of substitution and resubstitution, for him or her and in his or her name, place and stead, in any and all capacities, to sign any or all amendments (including post-effective amendments) and exhibits to the Registration Statement on Form S-3, and to any registration statement filed under SEC Rule 462, and to file the same, with all exhibits thereto, and all documents in connection therewith, with the SEC, granting unto 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 he or she might or could do in person, hereby ratifying and confirming all that said attorney-in-fact and agent, or his or her substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, this registration statement on Form S-3 has been signed by the following persons in the capacities indicated on March 22, 2023.

<u>Signature</u>	<u>Title</u>
<u>/s/ Jason A. Okazaki.</u> Jason A. Okazaki, A.O., M.D.	Chief Executive Officer, President and Director (Principal Executive Officer and Principal Financial Officer)
<u>/s/ Jeanette M. Bjorkquist</u> Jeanette M. Bjorkquist	Executive Director, Accounting and Treasury (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/ Gina Consylman</u> Gina Consylman	Director
<u>/s/ Richard D. DiMarchi, Ph.D.</u> Richard D. DiMarchi, Ph.D.	Director
<u>/s/ Sir Michael Houghton, Ph.D.</u> Sir Michael Houghton, Ph.D.	Director

[Table of Contents](#)

<u>Signature</u>	<u>Title</u>
<u>/s/ Lisa R. Johnson-Pratt, M.D.</u> Lisa R. Johnson-Pratt, M.D.	Director
<u>/s/ Susan Mahony, Ph.D.</u> Susan Mahony, Ph.D.	Director
<u>/s/ John G. McHutchison, A.O., M.D.</u> John G. McHutchison, A.O., M.D.	Director
	II-6

SKADDEN, ARPS, SLATE, MEAGHER & FLOM LLP
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March 22, 2023

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) subscription rights to purchase shares of Common Stock, shares of Preferred Stock or Debt Securities (“Subscription Rights”), which may be issued under one or more subscription rights certificates (each, a “Subscription Rights Certificate”) and/or pursuant to one or more subscription rights agreements (each, a “Subscription Rights Agreement”) proposed to be entered into by the Company and one or more subscription agents to be named therein, (vi) units of the Company (“Units”), each consisting of common stock, preferred stock, debt securities and warrants in any combination, which may be issued pursuant to one or more agreements proposed to be entered into by the Company and one or more unit agents to be named therein, and (vii) 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, Warrants or Subscription Rights 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, Subscription Rights, Units and Indeterminate Securities, offered pursuant to the Registration Statement are collectively referred to herein as the “Securities.”

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 forms of Indentures filed as exhibits to the Registration Statement;
- (d) an executed copy of a certificate of John O. Gunderson, Corporate Secretary of the Company, dated the date hereof (the “Secretary’s Certificate”);
- (e) a copy of the Company’s Sixth Amended and Restated Certificate of Incorporation certified by the Secretary of State of the State of Delaware as of March 13, 2023, and certified pursuant to the Secretary’s Certificate;
- (f) a copy of the Company’s Amended and Restated Bylaws, as in effect as of the date hereof and certified pursuant to the Secretary’s Certificate; and
- (g) a copy of certain resolutions of the Board of Directors of the Company, adopted on March 16, 2023, 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.

We do not express any opinion with respect to the laws of any jurisdiction other than the laws of the State of New York.

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 Subscription Rights Agreements, the Units and any applicable underwriting or purchase agreement.

The opinions stated in paragraphs 1 through 6 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 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 Subscription Rights offered by the Company (the “Offered Subscription Rights”), when (a) the general conditions shall have been satisfied, (b) the Common Stock, Preferred Stock and/or Debt Securities relating to such Offered Subscription Rights have been duly authorized for issuance by the Company and (c) the Subscription Rights Certificates have been duly executed, delivered and countersigned in accordance with the provisions of the applicable Subscription Rights Agreement, the Offered Subscription Rights, 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.

6. 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 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.

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 or governmental orders 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, Subscription Rights 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, Subscription Rights, 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, subscription 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 (we do not make this assumption with respect to the certificate of incorporation of the Company, the bylaws of the Company or these 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. 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

Consent of Independent Registered Public Accounting Firm

We consent to the reference to our firm under the caption “Experts” in the Registration Statement (Form S-3) and related Prospectus of Assembly Biosciences, Inc. for the registration of common stock, preferred stock, debt securities, warrants, subscription rights and units, and to the incorporation by reference therein of our report dated March 22, 2023, with respect to the consolidated financial statements of Assembly Biosciences, Inc., included in its Annual Report (Form 10-K) for the year ended December 31, 2022, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP
San Jose, California
March 22, 2023

Calculation of Filing Fee Table

Form S-3
(Form Type)Assembly Biosciences, Inc.
(Exact Name of Registrant as Specified in its Charter)

Table 1: Newly Registered Securities and Carry Forward Securities

Newly Registered Securities

	Security Type	Security Class Title	Fee Calculation Rule	Amount Registered	Proposed Maximum Offering Price Per share	Maximum Aggregate Offering Price	Fee Rate	Amount of Registration Fee	
Fees to Be Paid	Equity	Common Stock, par value \$0.001 per share	457(o)	(1)(2)	(3)				
Fees to Be Paid	Equity	Preferred Stock, par value \$0.001 per shar	457(o)	(1)(2)	(3)				
Fees to Be Paid	Debt	Debt Securities	457(o)	(1)(2)	(3)				
Fees to Be Paid	Other	Warrants	457(o)	(1)(2)	(3)				
Fees to Be Paid	Other	Subscription Rights	457(o)	(1)(2)	(3)				
Fees to Be Paid	Other	Units ⁽⁴⁾	457(o)	(1)(2)	(3)				
Fees to Be Paid	Unallocated (Universal Shelf)	—	457(o)	(1)(2)	(3)	\$150,000,000	\$0.0001102	\$16,530	
Fees Previously Paid	—	—	—	—	—	—	—	—	
	Total Offering Amounts						\$150,000,000	0.0001102	\$16,530
	Total Fees Previously Paid								—
	Total Fee Offsets								—
	Net Fee Due								\$16,530

- (1) Assembly Biosciences, Inc. (the “Company”) is hereby registering an indeterminate amount and number of each applicable identified class of the identified securities up to a proposed maximum aggregate offering price of \$150,000,000, which may be offered from time to time at indeterminate prices, including securities that may be purchased by underwriters. The Company has estimated the proposed maximum aggregate offering price solely for the purpose of calculating the registration fee pursuant to Rule 457(o) under the Securities Act of 1933, as amended (the “Securities Act”). Securities registered hereunder may be sold separately, together or as units with other securities registered hereunder.
- (2) Pursuant to Rule 416 under the Securities, this registration statement shall also cover any additional shares of the registrant’s securities that become issuable by reason of any share splits, share dividends or similar transactions.
- (3) Estimated solely for the purpose of calculating the registration fee. No separate consideration will be received for shares of common stock that are issued upon conversion of debt securities or preferred stock or upon exercise of common stock warrants registered hereunder. The aggregate maximum offering price of all securities issued pursuant to this registration statement will not exceed \$150,000,000.
- (4) Any securities registered under the registration statement may be sold separately or as units with other securities registered under the registration statement.