

SCHEDULE 14A INFORMATION

Proxy Statement Pursuant to Section 14(a) of the Securities Exchange Act of 1934

Filed by the Registrant
Filed by a Party other than the Registrant

Check the appropriate box:

- Preliminary Proxy Statement
- Confidential, for Use of the Commission Only (as permitted by Rule 14a-6(e)(2))
- Definitive Proxy Statement
- Definitive Additional Materials
- Soliciting Material Pursuant to § 240.14a-12

Assembly Biosciences, Inc.

(Name of Registrant as Specified In Its Charter)

Payment of Filing Fee (Check the appropriate box)

- No fee required.
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1. Title of each class of securities to which transaction applies:

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3. Per unit price or other underlying value of transaction computed pursuant to Exchange Act Rule 0-11 (set forth the amount on which the filing fee is calculated and state how it was determined):

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1. Amount Previously Paid:

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**ASSEMBLY BIOSCIENCES, INC.
331 Oyster Point Blvd., Fourth Floor
South San Francisco, California 94080**

**NOTICE OF 2020 ANNUAL MEETING OF STOCKHOLDERS
To Be Held Thursday, June 11, 2020**

April 27, 2020

Dear Stockholders:

You are cordially invited to attend the 2020 Annual Meeting of Stockholders (the Annual Meeting) of Assembly Biosciences, Inc., a Delaware corporation (we, us, Assembly or the Company). The Annual Meeting will be held at our offices at 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080, on Thursday, June 11, 2020 at 8:00 a.m. Pacific Daylight Time (PDT). We intend to hold our Annual Meeting in person. However, we are sensitive to the public health and travel concerns our stockholders may have and recommendations that public health officials may issue due to the evolving circumstances surrounding the spread of the coronavirus and the resulting COVID-19 outbreak. As a result, we may impose additional procedures or limitations on meeting attendees (beyond those described herein) or may decide to hold the stockholder meeting in a different location or solely by means of remote communication (i.e., a virtual-only stockholder meeting). If we take this step, we will announce the decision to do so in advance, and details regarding how to participate will be set forth in a press release issued by the Company and available at investor.assemblybio.com. We encourage you to check this website prior to the meeting if you plan to attend. The meeting will be held for the following purposes:

1. To elect the eight nominees named in the attached proxy statement to our Board of Directors (the Board);
2. To approve, on a non-binding advisory basis, our named executive officers' compensation, as disclosed in the proxy statement accompanying this notice;
3. To ratify the selection of Ernst & Young LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2020;
4. To approve an amendment to the Assembly Biosciences, Inc. 2018 Stock Incentive Plan to increase the number of shares reserved for issuance thereunder by 1,600,000 shares;
5. To approve an amendment and restatement of our Fourth Amended and Restated Certificate of Incorporation to enable stockholders who hold in the aggregate at least 25% of our outstanding common stock to request special stockholder meetings;
6. If properly presented at the Annual Meeting, to vote on a stockholder proposal requesting the Board to take steps necessary to give stockholders who hold at least 15% of our outstanding common stock the right to request a special stockholder meeting; and
7. To vote on such other matters that may properly come before the meeting and any adjournment or postponement thereof.

These matters are more fully described in the proxy statement accompanying this notice.

Our Board of Directors has fixed the close of business on April 13, 2020 as the record date for the determination of stockholders entitled to notice of and to vote at the Annual Meeting and any adjournment or postponement thereof. See the attached proxy statement for information on how to obtain directions to attend the Annual Meeting and vote in person.

To ensure your representation at the Annual Meeting, you are requested to submit your vote as instructed in the Important Notice Regarding the Availability of Proxy Materials that will be sent to you. You may also request a paper proxy card at any time on or before May 28, 2020 to submit your vote by mail. If you attend the Annual Meeting and file with our Corporate Secretary an instrument revoking your proxy or a duly executed proxy bearing a later date, your proxy will not be used.

Important Notice Regarding the Availability of Proxy Materials for the Annual Meeting to be held on Thursday, June 11, 2020 at 8:00 a.m. PDT at Assembly's offices located at 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080.

The proxy statement and the Annual Report for the fiscal year ended December 31, 2019 are available at: www.proxyvote.com.

We hope that you will attend the meeting in person on June 11, 2020, and we very much appreciate your continuing interest in our Company.

By Order of the Board of Directors,

A handwritten signature in black ink, appearing to read 'J. McHutchison', written over a horizontal line.

John G. McHutchison, A.O., M.D.
Chief Executive Officer and President

We currently intend to hold the Annual Meeting in person, and you are cordially invited to attend the Annual Meeting in person. Whether or not you expect to attend the Annual Meeting, please complete, date, sign and return the proxy card mailed to you, or vote over the telephone or the Internet as instructed in the Important Notice Regarding the Availability of Proxy Materials that you will receive in the mail, or vote by mail by requesting a printed copy of the proxy card, as promptly as possible to ensure your representation at the Annual Meeting. Even if you have voted by proxy, you may still vote in person if you attend the Annual Meeting. Please note, however, that if your shares are held of record by a broker, bank or other nominee and you wish to vote at the Annual Meeting, you must obtain a proxy issued in your name from that record holder. Due to the ongoing public health impact of the coronavirus and the related COVID-19 pandemic, we are planning for the possibility that the Annual Meeting of Stockholders may be held solely by means of remote communication (i.e., a virtual-only stockholder meeting). If we take this step, we will announce the decision to do so in advance, and details regarding how to participate will be set forth in a press release issued by the Company and available at investor.assemblybio.com. We encourage you to check this website prior to the meeting if you plan to attend.



**ASSEMBLY BIOSCIENCES, INC.
331 Oyster Point Blvd., Fourth Floor
South San Francisco, California 94080**

**PROXY STATEMENT
FOR THE 2020 ANNUAL MEETING OF STOCKHOLDERS**

JUNE 11, 2020

INFORMATION CONCERNING SOLICITATION AND VOTING

The Board of Directors (the Board) of Assembly Biosciences, Inc., a Delaware corporation (we, us, Assembly or the Company), is soliciting your proxy to vote at the 2020 Annual Meeting of Stockholders (the Annual Meeting) to be held at our offices at 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080 on Thursday, June 11, 2020 at 8:00 a.m. Pacific Daylight Time (PDT), including any adjournments or postponements of the meeting. We intend to hold our Annual Meeting in person. However, we are sensitive to the public health and travel concerns our stockholders may have and recommendations that public health officials may issue due to the evolving circumstances surrounding the spread of the coronavirus and the resulting COVID-19 outbreak. As a result, we may impose additional procedures or limitations on meeting attendees (beyond those described herein) or may decide to hold the stockholder meeting in a different location or solely by means of remote communication (i.e., a virtual-only stockholder meeting). If we take this step, we will announce the decision to do so in advance, and details regarding how to participate will be set forth in a press release issued by the Company and available at investor.assemblybio.com. We encourage you to check this website prior to the meeting if you plan to attend.

You are invited to attend the Annual Meeting to vote on the proposals described in this proxy statement. However, you do not need to attend the meeting to vote your shares. Instead, you may follow the instructions in the Important Notice Regarding the Availability of Proxy Materials (the Proxy Availability Notice) described below to submit your proxy over the telephone or through the Internet, or you may vote by mail by using the proxy card provided or requesting a printed copy of the proxy card.

We sent the Proxy Availability Notice on or about April 27, 2020 to our stockholders of record and beneficial owners as of April 13, 2020, the record date for the Annual Meeting. The proxy materials, including this proxy statement, proxy card or voting instruction card and our Annual Report for the fiscal year ended December 31, 2019 are being distributed and made available on or about April 27, 2020. This proxy statement contains important information for you to consider when deciding how to vote on the matters brought before the Annual Meeting. Please read it carefully.

This proxy statement and the Proxy Availability Notice contain instructions for accessing and reviewing our proxy materials on the Internet and for voting by proxy over the Internet, by phone or by mail. The Proxy Availability Notice and the proxy card will also provide instructions on how you can elect to receive future proxy materials electronically or in printed form by mail. If you choose to receive future proxy materials electronically, you will receive an email next year with instructions containing a link to the proxy materials and a link to the proxy voting site. Your election to receive proxy materials electronically or in printed form by mail will remain in effect until you terminate such election. You will need to obtain your own Internet access if you choose to access the proxy materials and/or vote over the Internet. If you prefer to receive printed copies of our proxy materials, the Proxy Availability Notice contains instructions on how to request the materials by mail. For stockholders who have elected to receive proxy materials electronically, you will not receive printed copies of the proxy materials unless you request them. If you elect to receive the materials by mail, you may also vote by proxy on the proxy card or voter instruction card that you will receive in response to your request.

Choosing to receive future proxy materials electronically will allow us to provide you with the information you need more rapidly, will save us the cost of printing and mailing documents to you and will conserve natural resources.

TABLE OF CONTENTS

| | Page |
|---|-------------|
| Proxy Statement Summary | 1 |
| Questions and Answers About These Proxy Materials and Voting | 4 |
| Proposal No. 1: Election of Directors | 12 |
| General | 12 |
| Nominees for Director | 12 |
| Required Vote | 19 |
| Recommendation of the Board of Directors | 19 |
| The Board of Directors and Corporate Governance | 20 |
| Meetings of the Board | 20 |
| Board Composition | 20 |
| Independence of Directors | 21 |
| Board Leadership Structure | 21 |
| Risk Oversight | 21 |
| Board Committees | 22 |
| Audit Committee | 22 |
| Compensation Committee | 23 |
| Nominating and Governance Committee | 24 |
| Science and Technology Committee | 25 |
| Code of Ethics and Code of Conduct | 25 |
| Director Compensation | 26 |
| Stockholder Communications | 27 |
| Stockholder Engagement | 27 |
| Proposal No. 2: Advisory Vote to Approve Our Named Executive Officers' Compensation | 28 |
| General | 28 |
| Required Vote | 29 |
| Recommendation of the Board of Directors | 29 |
| Matters Relating to Our Independent Registered Public Accounting Firm | 30 |
| Pre-Approval Policies and Procedures | 30 |
| Fees and Services | 30 |
| Report of the Audit Committee of the Board of Directors | 30 |
| Proposal No. 3: Ratification of the Selection of the Independent Registered Public Accounting Firm | 32 |
| General | 32 |
| Required Vote | 32 |
| Recommendation of the Board of Directors | 32 |
| Proposal No. 4: Approval of an Amendment to the Assembly Biosciences, Inc. 2018 Stock Incentive Plan | 33 |
| Background | 33 |
| Purpose | 33 |
| Rationale | 34 |
| Material Terms of the Amended Plan | 35 |
| Eligibility | 41 |
| New Plan Benefits | 41 |
| Equity Plans | 42 |
| Required Vote | 43 |
| Recommendation of the Board of Directors | 43 |
| Proposal No. 5: Approve an Amendment and Restatement of our Fourth Amended and Restated Certificate of Incorporation to Enable Stockholders who hold at Least 25% of our Outstanding Common Stock to Request Special Meetings | 44 |
| Overview | 44 |
| Rationale for Our Proposed Charter Amendment | 44 |

| | |
|---|-----|
| <u>The Proposed Charter Amendment and Proposed Bylaws Amendment</u> | 45 |
| <u>The Related Stockholder Proposal</u> | 47 |
| <u>Additional Information</u> | 48 |
| <u>Vote Required</u> | 49 |
| <u>Board of Directors' Recommendation</u> | 49 |
| <u>Proposal No 6: Stockholder Proposal Regarding Special Stockholder Meetings</u> | 50 |
| <u>Stockholder Proposal</u> | 50 |
| <u>Board Statement in Opposition to the Stockholder Proposal</u> | 50 |
| <u>Vote Required and Board of Directors' Recommendation</u> | 52 |
| <u>Executive Officers</u> | 53 |
| <u>Executive Compensation</u> | 55 |
| <u>Named Executive Officers</u> | 55 |
| <u>Leadership Transition</u> | 55 |
| <u>Executive Summary</u> | 56 |
| <u>2019 Accomplishments</u> | 56 |
| <u>Say-on-Pay Vote</u> | 57 |
| <u>Compensation Philosophy and Overview</u> | 57 |
| <u>At-Risk and Long-Term Pay</u> | 58 |
| <u>Role of the Compensation Committee; Oversight of Executive Compensation</u> | 58 |
| <u>The Compensation Consultant</u> | 59 |
| <u>Peer Group Process</u> | 59 |
| <u>Summary Compensation Table</u> | 61 |
| <u>Narrative Disclosure to Summary Compensation Table</u> | 62 |
| <u>Base Salary</u> | 63 |
| <u>Annual Performance-Based Cash Bonus</u> | 63 |
| <u>Long-term Equity Incentive Awards</u> | 65 |
| <u>Compensation Terms of New NEOs and One-Time Compensation Elements Related to Leadership Changes</u> | 66 |
| <u>Other Compensation</u> | 69 |
| <u>Employment Arrangements</u> | 69 |
| <u>Other Executive Compensation Policies</u> | 72 |
| <u>Outstanding Equity Awards at December 31, 2019</u> | 74 |
| <u>Certain Relationships and Related Party Transactions</u> | 75 |
| <u>Security Ownership of Certain Beneficial Owners and Management</u> | 76 |
| <u>Deadline for Stockholder Proposals for the 2020 Annual Meeting of Stockholders</u> | 79 |
| <u>Delivery of Documents to Stockholders Sharing an Address</u> | 79 |
| <u>Other Matters</u> | 79 |
| <u>Appendix A: Proposed Amendment No. 1 to Assembly Biosciences, Inc. 2018 Stock Incentive Plan</u> | A-1 |
| <u>Appendix B: Assembly Biosciences, Inc. 2018 Stock Incentive Plan, Incorporating Proposed Amendment</u> | B-1 |
| <u>Appendix C: Proposed Fifth Amended and Restated Certificate of Incorporation</u> | C-1 |

PROXY STATEMENT SUMMARY

This proxy summary highlights information that may be contained elsewhere in this proxy statement. This summary does not contain all information that you should consider, and you should read the entire proxy statement carefully before voting. Page references are supplied to help you find further information in this proxy statement.

Proxy Voting Matters

| | | <i>Our Board's Recommendation</i> |
|--|-------------------------------------|---------------------------------------|
| <i>Proposal No. 1 – Election of Directors (page 12)</i> The Board and the Nominating and Governance Committee believe that the eight director nominees possess the necessary qualifications to provide effective oversight of our business. | <input checked="" type="checkbox"/> | FOR each Director Nominee |
| <i>Proposal No. 2 – Executive Compensation (page 28)</i> The Board recommends that stockholders approve, on a non-binding advisory basis, our named executive officers' compensation | <input checked="" type="checkbox"/> | FOR |
| <i>Proposal No. 3 – Ratification of the Selection of Ernst & Young LLP as Independent Auditors (page 32)</i> The Audit Committee and the Board believe that the continued retention of Ernst & Young LLP to serve as the Independent Auditors for the fiscal year ending December 31, 2020 is in the best interests of the Company and its stockholders. As a matter of good corporate governance, stockholders are being asked to ratify the Audit Committee's selection of the Independent Auditors. | <input checked="" type="checkbox"/> | FOR |
| <i>Proposal No. 4 – Amendment to 2018 Stock Incentive Plan to Increase Number of Reserved Shares by 1,600,000 Shares (page 33)</i> The Board believes that it is in the best interest of the Company to increase the number of shares reserved under our 2018 Stock Incentive Plan by 1,600,000 shares. | <input checked="" type="checkbox"/> | FOR |
| <i>Proposal No. 5 – Amend and Restate Certificate of Incorporation to Provide Stockholders with Right to Call Special Meetings (page 44)</i> The Board recommends that stockholders approve an amendment and restatement to the Amended and Restated Certificate of Incorporation to enable stockholders who hold in the aggregate at least 25% of our outstanding common stock to call special stockholder meetings because the Board and the Nominating and Governance Committee believe that an ownership threshold of at least 25% in the aggregate, along with appropriate procedural requirements, would achieve a reasonable balance between enhancing stockholder rights and adequately protecting the long-term interests of the Company and its stockholders. | <input checked="" type="checkbox"/> | FOR |
| <i>Proposal No. 6 – Stockholder Proposal requesting the Board to take steps necessary to give stockholders the right to call a special stockholder meeting (page 50)</i> The Board recommends that stockholders vote against this stockholder proposal because the Board and the Nominating and Governance Committee believe the 15% ownership threshold will unduly risk giving a stockholder or small group of stockholders a disproportionate amount of influence over our affairs and distracting management and the Board from their focus on delivering long-term stockholder value. | <input checked="" type="checkbox"/> | AGAINST |

Governance Highlights

We are committed to good corporate governance, which promotes the long-term interests of stockholders, strengthens Board and management accountability and helps build public trust in the Company. The Board of Directors and Corporate Governance section beginning on page 20 describes our governance framework, which includes the following highlights:

- Board Independence*
- Eight of our ten current directors are independent.
 - Seven of our eight Board nominees are independent.
 - Dr. McHutchison, our Chief Executive Officer and President, is the only management nominee to the Board.
 - The independent directors hold regular executive sessions, and any independent director may raise matters for discussion at these executive sessions.
- Independent Chair*
- The Chair of the Board is independent.
- Board Composition*
- The Board fixed the number of directors at eight as of the Annual Meeting.
 - We regularly assess our Board performance and can adjust the number of directors according to our needs.
 - Our directors possess a diverse mix of skills, experience and backgrounds.
- Accountability to Stockholders*
- *Proxy Access.* Our Bylaws provide proxy access, allowing a stockholder or group of up to 20 stockholders continuously owning an aggregate of 3% or more of our outstanding common stock for at least three years to nominate and include in our proxy materials director nominees constituting up to the greater of 20% of the number of directors then in office or two nominees, provided the stockholders and nominees otherwise satisfy the requirements of our Bylaws.
 - *Annual Election of Directors.* Our Fourth Amended and Restated Certificate of Incorporation (the Certificate of Incorporation) provides for the annual election of directors.
 - *No Poison Pill.* We do not have a poison pill.
- Independent Board Committees*
- We have four Board committees – Audit, Nominating and Governance, Compensation and Science and Technology Committees.
 - All of the Board committees are composed entirely of independent directors, and each has a written charter that is reviewed and reassessed annually and is posted on our website.
 - Our Board and each committee may engage independent advisors at its sole discretion.
- Risk Oversight*
- Our full Board is responsible for risk oversight and has designated committees to have particular oversight of certain key risks. Our Board oversees management as it fulfills its responsibilities for the assessment and mitigation of risks and for taking appropriate risk.
- Board/Committee Self-evaluation*
- We have an annual self-evaluation process for the Board.
 - We have an annual self-evaluation process for each standing committee of the Board.
- Ethics/Corporate Responsibility*
- All of our directors and executive officers are required to abide by our Code of Conduct.
 - Our Board has adopted Corporate Governance Guidelines to assist in the exercise of its responsibilities.

Executive Compensation

Our Compensation Philosophy is “Provide Competitive Overall Compensation That Attracts, Retains and Motivates Superior Performers.” We believe that executive compensation should be designed to closely align the interests of our named executive officers (NEOs) and stockholders and to attract, motivate, reward and retain superior management talent. Our executive compensation is comprised of the following components:

| | Plan/Compensation | Purpose | Relevant Performance Metric | Fixed or Variable? |
|-------------------------------------|--|--|---|---------------------------|
| Annual/Short Term Incentives | <i>Base Salary</i> | Provide fair and competitive compensation for individual performance and level of responsibility associated with position | N/A | Fixed |
| | <i>Annual Performance-based Cash Bonus</i> | Provide a short-term annual performance-based cash incentive opportunity through a bonus plan that is based upon achievement of established performance goals | Both Company-wide and individual goals | Variable |
| Long-Term Incentive | <i>Long-term Equity Incentive Awards</i> | Provide long-term incentive opportunities in the form of equity awards in order to retain those individuals with the leadership abilities necessary for increasing long-term stockholder value while aligning their interests with our stockholders’ interests | Equity awards vest over a three- or four-year period and incentivize performance, because stock options have value only to the extent the market value of our common stock increases and restricted stock units only have value if the executive continues to provide services through the vesting period | Variable |

QUESTIONS AND ANSWERS ABOUT THESE PROXY MATERIALS AND VOTING

Why did I receive the Important Notice Regarding the Availability of Proxy Materials instead of a full set of proxy materials?

In accordance with the rules and regulations adopted by the U.S. Securities and Exchange Commission (SEC), we have elected to provide access to our proxy materials over the Internet instead of mailing a printed copy of our proxy materials to each stockholder. Accordingly, we sent a Proxy Availability Notice on or about April 27, 2020 to most stockholders of record entitled to vote at the Annual Meeting. Stockholders may access the proxy materials on a website referred to in the Proxy Availability Notice commencing on or about April 27, 2020 or may request a printed set of the proxy materials be sent to them by following the instructions in the Proxy Availability Notice.

Why did I receive a full set of proxy materials and the Proxy Availability Notice?

We are providing paper copies of the proxy materials to stockholders who have previously requested to receive them in paper form or for whom an election to receive proxy materials electronically by email or over the Internet are not on file in writing. If you would like to reduce the environmental impact and the costs incurred by us in mailing proxy materials, you may elect to receive all future proxy materials electronically by email or over the Internet. To sign up for electronic delivery, please follow the instructions provided with your proxy materials and on your proxy card or voting instruction card for using the Internet and, when prompted, indicate that you agree to receive or access future stockholder communications electronically. Alternatively, you can go to www.proxyvote.com and enroll for online delivery of Annual Meeting and proxy materials.

What does it mean if I receive more than one Proxy Availability Notice?

If you receive more than one Proxy Availability Notice, your shares may be registered in more than one name or in different accounts. Please follow the voting instructions on each Proxy Availability Notice to ensure that all of your shares are voted. All of your shares may be voted at www.proxyvote.com regardless of which account they are registered or held in.

How do I attend the Annual Meeting?

We intend to hold the Annual Meeting in person at our offices at 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080, on Thursday, June 11, 2020 at 8:00 a.m. PDT. However, we are sensitive to the public health and travel concerns our stockholders may have and recommendations that public health officials may issue due to the evolving circumstances surrounding the spread of the coronavirus and the resulting COVID-19 outbreak. As a result, we may impose additional procedures or limitations on meeting attendees (beyond those described herein) or may decide to hold the stockholder meeting in a different location or solely by means of remote communication (i.e., a virtual-only stockholder meeting). If we take this step, we will announce the decision to do so in advance, and details regarding how to participate will be set forth in a press release issued by the Company and available at investor.assemblybio.com. We encourage you to check this website prior to the meeting if you plan to attend.

Admission to the meeting will be limited to our stockholders of record, persons holding proxies from our stockholders of record and beneficial owners of our common stock. If you wish to attend and vote at the Annual Meeting, you must bring: (1) valid photo identification, such as a driver's license or passport; and (2) evidence of stock ownership as of April 13, 2020 (the Record Date), such as an account statement, proxy card or voting information form. If your shares are held through a broker, bank or other nominee, you must bring proof of your ownership of the shares. This could consist of, for example, a bank or brokerage firm account statement or a letter from your bank or broker confirming your ownership as of the record date. Cameras, recording devices and other electronic devices will not be permitted at the Annual Meeting. For directions to the Annual Meeting, please contact John Gunderson at jgunderson@assemblybio.com or +1.833.509.4583.

Who can vote at the Annual Meeting?

Only stockholders of record at the close of business on April 13, 2020 will be entitled to vote at the Annual Meeting. On the Record Date, there were 32,707,348 shares of common stock outstanding and entitled to vote.

Stockholder of Record: Shares Registered in Your Name

If on April 13, 2020, your shares were registered directly in your name with our transfer agent, VStock Transfer, LLC, then you are a stockholder of record. As a stockholder of record, you may vote in person at the meeting or vote by proxy. Whether or not you plan to attend the meeting, we urge you to fill out and return your proxy card or vote by proxy over the telephone or Internet as instructed below to ensure your vote is counted.

Beneficial Owner: Shares Registered in the Name of a Broker or Bank

If on April 13, 2020, your shares were held not in your name, but rather in an account at a broker, bank or other similar organization, then you are the beneficial owner of shares held in “street name” and the Proxy Availability Notice is being forwarded to you by that organization. The organization holding your account is considered to be the stockholder of record for purposes of voting at the Annual Meeting. As a beneficial owner, you have the right to direct your broker or other agent regarding how to vote the shares in your account. You are also invited to attend the Annual Meeting. However, since you are not the stockholder of record, you may not vote your shares in person at the meeting unless you request and obtain a valid proxy from your broker or other agent.

What am I voting on?

There are six matters scheduled for a vote:

1. Election of eight directors;
2. Approval, on a non-binding advisory basis, of our named executive officers’ compensation, as disclosed in this proxy statement in accordance with SEC rules;
3. Ratification of the selection by the Audit Committee of the Board of Ernst & Young LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2020;
4. Approval of an amendment to the Assembly Biosciences, Inc. 2018 Stock Incentive Plan (the 2018 Plan) to increase the number of shares reserved for issuance thereunder by 1,600,000 shares;
5. Approval of an amendment and restatement of our Fourth Amended and Restated Certificate of Incorporation to enable stockholders who hold in the aggregate at least 25% of our outstanding common stock to request special stockholder meetings; and
6. If properly presented at the Annual Meeting, to vote on a stockholder proposal requesting the Board to take steps necessary to give stockholders who hold at least 15% of our outstanding common stock the right to request a special stockholder meeting.

What if another matter is properly brought before the meeting?

The Board knows of no other matters that will be presented for consideration at the Annual Meeting. If any other matters are properly brought before the meeting, it is the intention of the persons named in the accompanying proxy to vote on those matters in accordance with their best judgment.

How do I vote?

You may either vote “FOR” all of our nominees to the Board or you may “WITHHOLD” your vote for all of the nominees or “WITHHOLD” your vote for any individual nominee by specifying the name of the nominee on your proxy card. For each of the other matters to be voted on, you may vote “FOR” or “AGAINST,” or you may abstain from voting.

The procedures for voting depend upon whether your shares are registered in your name or are held by a bank, broker or other nominee:

Stockholder of Record: Shares Registered in Your Name

If you are a stockholder of record, you may vote in person at the Annual Meeting, vote by proxy using a proxy card that we have provided, that you may request or that we may elect to deliver at a later time, vote by proxy over the telephone or vote by proxy over the Internet. Whether or not you plan to attend the meeting, we urge you to vote by proxy to ensure your vote is counted. You may still attend the meeting and vote in person even if you have already voted by proxy.

- To vote in person, attend the Annual Meeting, and we will give you a ballot when you arrive.
- To vote using a proxy card, complete, sign and date the proxy card and return it pursuant to the instructions provided. Your vote must be received by June 10, 2020 to be counted.
- To vote over the telephone, dial toll-free +1.800.690.6903 using a touch-tone phone and follow the recorded instructions. You will be asked to provide the company control number from your proxy card or Proxy Availability Notice. Your vote must be received by 11:59 p.m. Eastern Daylight Time (EDT) on June 10, 2020 to be counted.
- To vote over the Internet, go to www.proxyvote.com to complete an electronic proxy card. You will be asked to provide the company control number from your proxy card. Your vote must be received by 11:59 p.m. EDT on June 10, 2020 to be counted.

Beneficial Owner: Shares Registered in the Name of Broker or Bank

If you are a beneficial owner of shares registered in the name of your broker, bank, or other nominee, you should have received a Proxy Availability Notice containing a voting instruction form from that organization rather than from us. In order to provide voting instructions to the holder of record of your shares, please refer to the materials forwarded by your broker, bank, or other nominee.

- To vote in person at the Annual Meeting, contact your broker, bank or other nominee to request a legal proxy from the bank, broker or other nominee that retains your shares. Also, please bring identification to the Annual Meeting.
- To vote using the voting instruction form accompanying the Proxy Availability Notice, complete, sign and date the voting instruction form and return it pursuant to the instructions provided. Your vote must be received by June 10, 2020 to be counted.
- To vote over the telephone, dial toll-free +1.800.454.8683 using a touch-tone phone and follow the recorded instructions. You will be asked to provide the company control number from your voting instruction form or Proxy Availability Notice. Your vote must be received by 11:59 p.m. EDT on June 10, 2020 to be counted.
- To vote over the Internet, go to www.proxyvote.com to complete an electronic proxy. You will be asked to provide your sixteen-digit control number from your voting instruction form. Your vote must be received by 11:59 p.m. EDT on June 10, 2020 to be counted.

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| <p>Internet proxy voting is provided to allow you to vote your shares online, with procedures designed to ensure the authenticity and correctness of your proxy vote instructions. However, please be aware that you must bear any costs associated with your Internet access, such as usage charges from Internet access providers and telephone companies.</p> |
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How many votes do I have?

You have one vote for each share of common stock you owned as of April 13, 2020 for each matter that is voted upon at the Annual Meeting.

Who is paying for this proxy solicitation?

We will pay for the entire cost of soliciting proxies. In addition to these proxy materials, our directors and employees may also solicit proxies in person, by telephone or by other means of communication. Directors and employees will not be paid any additional compensation for soliciting proxies. We may also reimburse brokerage firms, banks and other nominees for their reasonable out-of-pocket expenses for forwarding proxy materials to beneficial owners and seeking instruction with respect thereto.

Can I vote my shares by filling out and returning the Proxy Availability Notice?

No. The Proxy Availability Notice does, however, provide instructions on how to vote by Internet, telephone, mail (by requesting a paper proxy card or voting instruction card), and in person at the Annual Meeting.

If you receive a proxy statement and a paper proxy card together with the Proxy Availability Notice, the paper proxy card may be used to vote your shares.

Can I change my vote or revoke my proxy after submitting my proxy?*Stockholder of Record: Shares Registered in Your Name*

Yes. You can change your vote or revoke your proxy at any time before the deadline to vote. If you are the record holder of your shares, you may change your vote or revoke your proxy in any one of the following ways:

- You may submit another properly completed proxy card with a later date.
- You may grant a subsequent proxy by telephone or over the Internet.
- You may send a timely written notice that you are revoking your proxy to our Corporate Secretary at 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080.
- You may attend the Annual Meeting and vote in person. Simply attending the meeting will not, by itself, revoke your proxy.

Your most current vote (prior to the deadline) by proxy card, telephone or Internet proxy will be the one that is counted.

Beneficial Owner: Shares Registered in the Name of Broker, Bank

Yes. You can change your vote or revoke your voting instruction form at any time before the deadline to vote. If your shares are held by your broker or bank as a nominee or agent, you should follow the instructions provided by your broker, bank or other nominee. Note that you may also revoke your proxy in any one of the following ways:

- You may grant a subsequent voting instruction by telephone or over the Internet.
- You may attend the Annual Meeting and vote in person if you request and obtain a valid proxy from your broker, bank or other nominee. Simply attending the meeting will not, by itself, revoke your voting instruction form.

Your most current vote (prior to the deadline) by voting instruction form, telephone or Internet proxy will be the one that is counted.

What are “broker non-votes”?

Broker non-votes occur when a beneficial owner of shares held in “street name” does not give voting instructions to the broker, bank or other nominee holding the shares as to how to vote on matters deemed “non-routine.” Generally, if shares are held in street name, the beneficial owner of the shares is entitled to give voting instructions to the broker, bank or other nominee holding the shares. If the beneficial owner does not provide voting instructions, the broker, bank or other nominee can still vote the shares with respect to matters that are considered to be “routine,” but not with respect to “non-routine” matters. Under Nasdaq rules and their interpretations, “nonroutine” matters are matters that may substantially affect the rights or privileges of stockholders, such as mergers, stockholder proposals, elections of directors (even if not contested) and executive compensation, including the advisory stockholder votes on executive compensation. Therefore, it is critical that you indicate your vote on these proposals if you want your vote to be counted.

The only “routine” matter on the agenda for the Annual Meeting is Proposal No. 3—Ratification of the Selection of the Independent Registered Public Accounting Firm. Accordingly, the “non-routine” matters on the agenda for the Annual Meeting are Proposal No. 1—Election of Directors, Proposal No. 2—Advisory Vote to Approve Our Named Executive Officers’ Compensation, Proposal No. 4—Approval of an Amendment to the Assembly Biosciences, Inc. 2018 Stock Incentive Plan, Proposal No. 5—Approval of the Board’s Proposal to Amend and Restate our Certificate of Incorporation to Permit Stockholders Holding In the Aggregate At Least 25% of our Outstanding Common Stock to Request Special Stockholder Meetings and Proposal No. 6— If properly presented at the meeting, Stockholder Proposal Requesting the Board to take steps necessary to give Stockholders holding at least 15% of our Outstanding Common Stock the Right to Request Special Stockholder Meetings.

How are votes counted?

Votes will be counted by the inspector of election appointed for the meeting, who will separately count (1) for the proposal to elect directors, votes “FOR,” “WITHHOLD” and broker non-votes and (2) with respect to other proposals, votes “FOR” and “AGAINST,” abstentions and, if applicable, broker non-votes. “WITHHOLD” votes will have no effect and will not be counted toward the election of directors. With respect to the other proposals, abstentions will be counted toward the vote total for each proposal and will have the same effect as “AGAINST” votes. Broker non-votes will be counted to determine whether a quorum is present at the Annual Meeting. Broker non-votes will have no effect and will not be counted toward the vote total for Proposal No. 1, Proposal No. 2, Proposal No. 4 and Proposal No. 6, but they will have the same effect as votes cast against Proposal No. 5.

What if I return a proxy card or otherwise vote but do not make specific choices?

If you return a signed and dated proxy card or otherwise vote without marking voting selections, your shares will be voted:

- “FOR” the election of the eight director nominees identified in this proxy statement;
- “FOR” the approval, on a non-binding advisory basis, of our named executive officers’ compensation;
- “FOR” the ratification of the selection of Ernst & Young LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2020;
- “FOR” the approval of an amendment to the 2018 Plan to increase the number of shares reserved for issuance thereunder by 1,600,000 shares;
- “FOR” the approval of the Board’s proposal to amend and restate our Certificate of Incorporation to permit stockholders holding in the aggregate at least 25% of our outstanding common stock to request special stockholder meetings;
- “AGAINST” the stockholder proposal requesting that the Board take steps necessary to give stockholders holding at least 15% of our outstanding common stock the right to request special meetings, if properly presented at the Annual Meeting; and
- To transact such other business as may properly come before the Annual Meeting and any adjournments or postponements thereof as determined in the discretion of your proxyholder.

What is the quorum requirement?

A quorum of stockholders is necessary to hold a valid meeting. A quorum will be present if stockholders holding a majority of the outstanding shares entitled to vote as of the Record Date are present at the Annual Meeting in person or represented by proxy. On the Record Date, there were 32,707,348 shares of common stock outstanding and entitled to vote. As a result, the holders of 16,353,675 shares must be present in person or represented by proxy at the Annual Meeting for there to be a quorum.

Your shares will be counted toward a quorum only if you submit a valid proxy (or one is submitted on your behalf by your broker, bank or other nominee) by June 10, 2020 or if you vote in person at the Annual Meeting. Abstentions and broker non-votes will be counted toward the quorum requirement. If there is no quorum, the holders of a majority of shares present at the Annual Meeting in person or represented by proxy may adjourn the Annual Meeting to another date.

Once a share is represented for any purpose at the Annual Meeting, it is deemed present for quorum purposes for the remainder of the meeting and any adjournment thereof unless a new record date is set for the adjournment.

How many votes are needed to approve each proposal?

Assuming the presence of a quorum at the Annual Meeting, the following sets forth the votes necessary for each of the proposals being submitted to the stockholders:

| <u>Proposal</u> | <u>Description</u> | <u>Vote Required</u> | <u>Discretionary Voting Allowed</u> |
|-----------------|--|---|-------------------------------------|
| No. 1 | Election of Eight Directors | Plurality | No |
| No. 2 | Advisory Vote on Named Executive Officers' Compensation | Majority Present & Entitled to Vote | No |
| No. 3 | Ratification of the Selection of Ernst & Young LLP as Independent Registered Public Accounting Firm for 2020 | Majority Present & Entitled to Vote | Yes |
| No. 4 | Amendment to the 2018 Plan to Increase the Number of Shares Reserved for Issuance Thereunder by 1,600,000 Shares | Majority Present & Entitled to Vote | No |
| No. 5 | Board's Proposal to Amend and Restate Our Certificate of Incorporation to Permit Stockholders Holding in the Aggregate 25% of Outstanding Shares of Common Stock to Request Special Stockholder Meetings | Affirmative Vote of Majority of Outstanding Common Stock Entitled to Vote | No |
| No. 6 | Stockholder Proposal Requesting Board to Take Steps Necessary to Permit Stockholders Holding 15% of Outstanding Shares of Common Stock to Request Special Stockholder Meetings | Majority Present & Entitled to Vote | No |

The election of directors will be determined by a plurality of the votes cast at the Annual Meeting. This means that the eight nominees receiving the highest number of "FOR" votes will be elected as directors. "WITHHOLD" votes and broker non-votes, if any, are not treated as votes cast, and therefore will have no effect on the proposal to elect directors.

With regard to the votes: (1) to approve, on a non-binding advisory basis, our named executive officers' compensation; (2) to ratify the selection of Ernst & Young LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2020; (3) to approve an amendment to the 2018 Plan; and (4) if properly presented at the Annual Meeting, to approve the stockholder proposal requesting the Board to take steps necessary to permit stockholders holding 15% of the outstanding shares to request special stockholder meetings, a "Majority Present & Entitled to Vote" standard means the affirmative vote of the holders of a majority of the shares of common stock present in person or represented by proxy at the Annual Meeting and entitled to vote on such matter is required for the proposal to pass. For purposes of determining whether the proposal has passed, abstentions will be treated as votes cast against the proposal, but broker non-votes will have no impact on the outcome of the proposal.

The vote to amend and restate our Certificate of Incorporation requires the affirmative vote of a majority of the shares of common stock outstanding and entitled to vote. For purposes of determining whether the proposal has passed, abstentions and broker non-votes will be treated as votes cast against the proposal.

Accordingly, assuming a quorum is present:

- Proposal No. 1: For the election of directors, the eight nominees receiving the highest number of "FOR" votes from the holders of shares present in person or represented by proxy at the Annual Meeting and entitled to vote on Proposal No. 1 will be elected. Only votes "FOR" will affect the outcome. "WITHHOLD" votes and broker non-votes will have no effect on the outcome of the election of directors.
- Proposal No. 2: To be approved, a majority of the shares of common stock held by holders present in person or represented by proxy at the Annual Meeting and entitled to vote on Proposal No. 2 must be voted "FOR" the advisory approval of our named executive officers' compensation. Abstentions will be deemed a vote against Proposal No. 2. Broker non-votes will not be considered toward vote totals on Proposal No. 2 and will have no effect on the outcome of the vote.
- Proposal No. 3: To be approved, a majority of the shares of common stock held by holders present in person or represented by proxy at the Annual Meeting and entitled to vote on Proposal No. 3 must be voted "FOR" the ratification of the selection of Ernst & Young LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2020. Abstentions will be deemed a vote against Proposal No. 3. Broker non-votes will not be considered toward vote totals on Proposal No. 3; however, the ratification of the selection of Ernst & Young LLP is a matter on which a broker, bank or other nominee has discretionary voting authority, so we do not expect any broker non-votes with respect to Proposal No. 3.
- Proposal No. 4: To be approved, a majority of the shares of common stock held by holders present in person or represented by proxy at the Annual Meeting and entitled to vote on Proposal No. 4 must be voted "FOR" approval of the amendment to the 2018 Plan. Abstentions will be deemed a vote against Proposal No. 4. Broker non-votes will not be considered toward vote totals on Proposal No. 4 and will have no effect on the outcome of the vote.
- Proposal No. 5: To be approved, a majority of the shares of common stock outstanding and entitled to vote on Proposal No. 5 must be voted "FOR" approval of the amendment and restatement of our Certificate of Incorporation to permit stockholders holding in the aggregate 25% of our outstanding common shares to request special stockholder meetings. Abstentions and broker non-votes will both be deemed a vote against Proposal No. 5.
- Proposal No. 6: To be approved, a majority of the shares of common stock held by holders present in person or represented by proxy at the Annual Meeting and entitled to vote on Proposal No. 6 must be voted "FOR" approval of stockholder proposal requesting the Board to take steps necessary to give stockholders holding at least 15% of our outstanding common stock the right to request a special stockholder meeting, if properly presented. Abstentions will be deemed a vote against Proposal No. 6. Broker non-votes will not be considered toward vote totals on Proposal No. 6 and will have no effect on the outcome of the vote.

How can I find out the results of the voting at the Annual Meeting?

Preliminary voting results will be announced at the Annual Meeting. In addition, final voting results will be reported in a Current Report on Form 8-K that we expect to file within four business days after the Annual Meeting. If final voting results are not available to us in time to file a Form 8-K within four business days after the Annual Meeting, we intend to file a Form 8-K to report preliminary results and, within four business days after the final results are known to us, file an additional Form 8-K to report the final results.

What proxy materials are available on the Internet?

The proxy statement and our Annual Report for the fiscal year ended December 31, 2019 are available free of charge at www.proxyvote.com. You can request a copy of our Annual Report free of charge by calling +1.833.509.4583 or by sending an email to our Corporate Secretary at CorpSecretary@assemblybio.com. Please include your contact information with the request.

Our Annual Report on Form 10-K for the fiscal year ended December 31, 2019 as filed with the SEC is accessible free of charge on our website. It contains audited consolidated financial statements covering our fiscal years ended December 31, 2017, 2018 and 2019. The Annual Report on Form 10-K, without exhibits, is included in the 2019 Annual Report to Stockholders that is available with this proxy statement.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This proxy statement contains forward-looking statements. These statements relate to future events or our future financial performance and involve known and unknown risks, uncertainties and other factors that could cause our actual results, levels of activity, performance or achievement to differ materially from those expressed or implied by these forward-looking statements.

Forward-looking statements include all statements that are not historical facts. In some cases, you can identify forward-looking statements by terms such as “may,” “will,” “should,” “could,” “would,” “expects,” “plans,” “anticipates,” “believes,” “estimates,” “projects,” “predicts,” “potential,” or the negative of those terms, and similar expressions and comparable terminology intended to identify forward-looking statements. These statements reflect our current views with respect to future events and are based on assumptions and subject to risks and uncertainties, including those outlined in our Annual Report on Form 10-K for the year ended December 31, 2019. Given these uncertainties, you should not place undue reliance on these forward-looking statements. These forward-looking statements represent our estimates and assumptions only as of the date of this proxy statement and, except as required by law, we undertake no obligation to update or revise publicly any forward-looking statements, whether due to new information, future events or otherwise after the date of this proxy statement.

PROPOSAL NO. 1: ELECTION OF DIRECTORS

General

Our Amended and Restated Bylaws provide that the number of our directors is to be within a range of three to ten, with the exact number set by the Board. Our Board has set the number of directors at eight.

Our Board currently consists of ten directors. Two of our existing directors will retire at the end of their term. There are eight nominees for election to the Board this year. Each director to be elected and qualified will hold office until the next annual meeting of the stockholders and until his or her successor is duly elected and qualified, or, if sooner, until the director's death, resignation or removal. Each of the nominees listed below is currently a director. Other than John G. McHutchison, A.O., M.D., who the Board appointed as a director in connection with his appointment as our Chief Executive Officer in August 2019, each of the director nominees was previously elected by the stockholders. Directors are elected by a plurality of the votes of the holders of shares present in person or represented by proxy and entitled to vote on the election of directors. The eight nominees receiving the highest number of affirmative votes at the Annual Meeting will be elected.

Nominees for Director

The Nominating and Governance Committee has recommended, and the Board has approved, the nomination of each of Anthony E. Altig, Richard D. DiMarchi, Ph.D., Myron Z. Holubiak, Helen S. Kim, Alan J. Lewis, Ph.D., Susan Mahony, Ph.D., John G. McHutchison, A.O., M.D. and William R. Ringo, Jr. to serve as a director of our Company. The Board has determined that all of these nominees for director, except for Dr. McHutchison, are independent as determined in accordance with the rules of the Nasdaq Stock Market and the SEC. There are no family relationships among any of our nominees for director or executive officers. The respective names, ages, lengths of service on our Board and brief biographical summaries of our nominees for director are as follows:

| <u>Name</u> | <u>Age (as of 04/13/2020)</u> | <u>Director Since</u> | <u>Business Experience</u> |
|------------------|-------------------------------|-----------------------|---|
| Anthony E. Altig | 64 | 2012 | Mr. Altig joined our Board in January 2012. From 2008 to December 2017, Mr. Altig was the Chief Financial Officer of Biotix Holdings, Inc., a company that manufactures microbiological consumables, which was acquired by Mettler Toledo in September 2017. From 2004 to 2007, Mr. Altig served as the Chief Financial Officer of Diversa Corporation (subsequently Verenium Corporation), a public company developing specialized industrial enzymes. Prior to joining Diversa, Mr. Altig served as the Chief Financial Officer of Maxim Pharmaceuticals, Inc., a public biopharmaceutical company. In addition, Mr. Altig serves as a director and chairman of the audit committee for TearLab Corporation (formerly OccuLogix, Inc.), a publicly traded eyecare technology company. He formerly served as a director of MultiCell Technologies, Inc. and Optimer Pharmaceuticals, Inc., a pharmaceutical company, which was a public company until its acquisition by Cubist Pharmaceuticals, Inc. in October 2013. Mr. Altig received his B.B.A. in business from the University of Hawaii at Manoa and is a Certified Public Accountant (inactive). |

Because of these and other professional experiences, Mr. Altig possesses particular knowledge and experience in finance and accounting, financial audit, public company board service and corporate governance and corporate operations that strengthen the Board's collective qualifications, skills and experience. Among other experiences, qualifications, attributes and skills, Mr. Altig's extensive management experience and financial expertise, as well as his experience serving on the boards of directors of several public pharmaceutical and healthcare companies, led to the conclusion of our Board that he should serve as a director due to our business and structure.

| Name | Age (as of 04/13/2020) | Director Since | Business Experience |
|----------------------------|------------------------|----------------|---|
| Richard D. DiMarchi, Ph.D. | 67 | 2014 | <p>Dr. DiMarchi joined our Board in July 2014 upon the closing of the Assembly Pharmaceuticals, Inc. acquisition through its merger with a wholly owned subsidiary of Assembly (the Merger). Dr. DiMarchi is a co-founder of Assembly Pharmaceuticals, Inc. and served on its board from its inception in 2012 through the Merger. Dr. DiMarchi is a Distinguished Professor of Chemical Biology and Gill Chair in Biomolecular Sciences at Indiana University and Chief Scientific Officer of MBX Biosciences, Inc. From February 2016 until March 2020, Dr. DiMarchi served as Vice President of Research at Novo Nordisk Research Labs. Dr. DiMarchi was a co-founder and board member of biotechnology companies Ambrx, Inc. (until it was acquired by a consortium of entities affiliated with Shanghai Fosun Pharmaceutical Group, HOPU Investments, China Everbright Limited's healthcare fund and WuXi PharmaTech) and Marcadia Biotech Inc. (until it was acquired by Roche in 2010). Dr. DiMarchi was a founder of Calibrium LLC, which was acquired by Novo Nordisk in 2015 and advisor to Twilight Ventures. Dr. DiMarchi retired as Group Vice President at Eli Lilly & Company (Lilly), where he provided leadership for more than two decades in biotechnology, endocrine research, and product development. Dr. DiMarchi previously served as a board member of the biotechnology trade group BIO, Ionis Pharmaceuticals, Inc. (f/k/a Isis Pharmaceuticals, Inc.) and Millennium BioTherapeutics, Inc. His current research is focused on developing macromolecules with enhanced therapeutic properties through biochemical and chemical optimization, an approach he has termed chemical biotechnology. Dr. DiMarchi contributed significantly to the discovery of Humalog® and to the commercial development of pharmaceutical products Humulin®, Humatrope®, Glucagon®, Xigris®, Forteo®, and Evista®. Dr. DiMarchi is the recipient of numerous prestigious awards and in 2014 was inducted to the National Inventors Hall of Fame and in 2015 to the National Academy of Medicine. Dr. DiMarchi received a B.S. with honors from Florida Atlantic University and his Ph.D. in Biochemistry from Indiana University, and completed his postdoctoral studies at the Rockefeller University.</p> |

Because of these and other professional experiences, Dr. DiMarchi possesses particular knowledge and experience with our business and industry, innovation and academia. Among other experiences, qualifications, attributes and skills, Dr. DiMarchi's scientific training, extensive experience in the pharmaceutical industry, as well as his experience serving on the board of directors of several private pharmaceutical companies, led to the conclusion of our Board that he should serve as a director due to our business and structure.

| Name | Age (as of 04/13/2020) | Director Since | Business Experience |
|-------------------|-------------------------------|-----------------------|---|
| Myron Z. Holubiak | 73 | 2010 | <p>Mr. Holubiak joined our Board in July 2010. Since March 2016 Mr. Holubiak has served as President, Chief Executive Officer and a director of Citius Pharmaceuticals, Inc., a late stage drug development company focused on critical care drug products. From September 2014 until March 2016, Mr. Holubiak was the founder and Chief Executive Officer and President of Leonard-Meron Biosciences, Inc., which merged with Citius Pharmaceuticals, Inc. in March 2016. Mr. Holubiak is the former President of Roche Laboratories, Inc., USA, a major research-based pharmaceutical company, a position he held from December 1998 to August 2001. Prior to that, he held many sales and marketing positions at Roche Laboratories during his 19-year tenure there. From September 2002 until June 2016, Mr. Holubiak served on the board of directors of BioScrip, Inc., a publicly traded company and a leading home infusion provider with nationwide pharmacy and nursing capabilities and was chairman of the board of BioScrip, Inc. from April 2012 until June 2016. Mr. Holubiak was president of 1-800-DOCTORS, Inc., a private physician finder company, from May 2007 to January 2014 and a member of its board of directors until September 2017. Since July 2015, Mr. Holubiak also has been a member of the board of directors of bioAffinity Technologies, Inc., a private cancer screening and diagnostics company. From April 2013 to April 2015, Mr. Holubiak was also a trustee of the Academy of Managed Care Pharmacy Foundation. Mr. Holubiak received his B.S. in Molecular Biology and Biophysics from the University of Pittsburgh. Mr. Holubiak has received advanced business training from the Harvard Business School, the London School of Economics and the Centre for Health Economics at the University of York.</p> |

Because of these and other professional experiences, Mr. Holubiak possess particular knowledge and experience in senior leadership, public company board service, corporate governance and corporate operations. Among other experiences, qualifications, attributes and skills, Mr. Holubiak's extensive experience managing pharmaceutical and healthcare companies, together with his experience serving on the board of directors of public and private companies, led to the conclusion of our Board that he should serve as a director due to our business and structure.

| Name | Age (as of 04/13/2020) | Director Since | Business Experience |
|--------------|---------------------------|-------------------|---|
| Helen S. Kim | 57 | 2018 | <p>Ms. Kim joined our Board in March 2018. Since April 2019, Ms. Kim has been a managing director at Vida Ventures. Prior to that, from March 2018 until April 2019, Ms. Kim was a partner at The Column Group, a science-driven venture capital firm that invests in private companies. From November 2014 until January 2018, Ms. Kim served as executive vice president of business development at Kite Pharma, Inc. where she led all business and corporate development initiatives including its sale to Gilead Sciences, Inc. (Gilead) in September 2017. From January 2012 to January 2014, Ms. Kim served as strategic advisor to NGM Biopharmaceuticals, Inc. and from August 2009 to January 2012, Ms. Kim served as chief business officer of NGM Biopharmaceuticals, Inc. Ms. Kim's additional industry experience includes executive positions at Kosan Biosciences, Affymax, Inc., Onyx Pharmaceuticals, Inc., Protein Design Labs, Inc. and Chiron Corporation. In addition to her industry experience, from August 2003 to November 2007, Ms. Kim served as chief program officer for the Gordon and Betty Moore Foundation. Currently, she serves as a director on the board of Exicure, Inc., a public company, and Applied Molecular Transport Inc., A2 Biotherapeutics, Inc., PACT Pharma, Inc. and ReCode Therapeutics, Inc., each of which is a private company. Ms. Kim formerly served as a director and member of the audit committee of Sunesis Pharmaceuticals, Inc. and WCCT Global, Inc. and a director of Forsight Labs, Vision 4. Ms. Kim received a B.S. in Chemical and Biomedical Engineering from Northwestern University and an M.B.A. from the University of Chicago.</p> |

Because of these and other professional experiences, Ms. Kim possesses particular knowledge and experience with our industry, senior leadership, business strategy, business development, public company board service and corporate operations. Among other experiences, qualifications, attributes and skills, Ms. Kim's extensive experience in leadership roles in biotechnology companies, together with her experience serving on the board of directors of a public company and several private biotechnology companies, led to the conclusion of our Board that she should serve as a director due to our business and structure.

| Name | Age (as of 04/13/2020) | Director Since | Business Experience |
|----------------------|------------------------|----------------|--|
| Alan J. Lewis, Ph.D. | 74 | 2015 | <p>Dr. Lewis joined our Board in December 2015. From March 2015 until December 2019, Dr. Lewis served as Chief Executive Officer and director of DiaVacs, Inc., a biotechnology company that offers dendritic cell therapy for autoimmunity and juvenile diabetes. From October 2012 to March 2014, Dr. Lewis was Chief Executive Officer and a director of Medistem, Inc., a publicly traded biotechnology company, and developer of stem cell therapies that was acquired by Intrexon Corporation. From July 2010 until November 2011, Dr. Lewis was Chairman, President and Chief Executive Officer of cancer drug developer Ambit Biosciences, Inc., which was subsequently acquired by Daiichi Sankyo Company, Limited. From January 2009 until June 2010, Dr. Lewis was President and Chief Executive Officer of the Juvenile Diabetes Research Foundation. From February 2006 until December 2008, Dr. Lewis was President and Chief Executive Officer of stem cell company Novocell, Inc., a privately held regenerative disease biotechnology company. Prior to that, Dr. Lewis served as Chief Executive Officer and a director of Signal Pharmaceuticals until its acquisition by Celgene Corporation. Dr. Lewis was named President of Celgene’s Signal Research division in San Diego, where he directed its integrated drug discovery program in oncology and inflammation and served on Celgene’s corporate executive committee. Dr. Lewis is on the board of directors of BioMarin Pharmaceuticals, Inc., where he chairs the science and technology committee, and Scancell Holdings Plc, where he serves on the audit committee and remuneration committee. Dr. Lewis holds a B.Sc. in Physiology and Biochemistry from Southampton University and a Ph.D. in Pharmacology from the University of Wales, and he completed his postdoctoral training at Yale University. Dr. Lewis has honorary fellowships from the University of Swansea and the University of Cardiff.</p> |

Because of these and other professional experiences, Dr. Lewis possesses particular knowledge and experience with our industry, senior leadership, innovation and technology and public company board service and governance. Among other experiences, qualifications, attributes and skills, Dr. Lewis’ extensive experience in management and the operation of pharmaceutical and healthcare companies and his scientific background, together with his experience serving on the board of directors of a public company and several private biotechnology companies, led to the conclusion of our Board that he should serve as a director due to our business and structure.

| Name | Age (as of 04/13/2020) | Director Since | Business Experience |
|---------------------|-------------------------------|-----------------------|--|
| Susan Mahony, Ph.D. | 55 | 2017 | <p>Dr. Mahony joined our Board in December 2017. From 2011 until her retirement in August 2018, Dr. Mahony served as Senior Vice President and President of Lilly Oncology and was a member of the executive committee at Lilly. Prior to that, from 2000 until 2011, Dr. Mahony served in a variety of leadership roles at Lilly, including Senior Vice President Human Resources and Diversity, President and General Manager Lilly Canada, and Executive Director Global Development. Dr. Mahony worked in sales and marketing at Bristol-Myers Squibb Company from 1995 to 2000, at Amgen Limited from 1991 to 1995, and at Schering Plough from 1989 to 1991. Dr. Mahony is on the board of directors of Vifor Pharma, Zymeworks Inc. and Horizon Therapeutics plc, which are all public companies, and Cereius Inc., a private company. Dr. Mahony earned a B.Sc. and Ph.D. in pharmacy and was awarded an Honorary Doctorate from Aston University, and she earned an M.B.A. from London Business School.</p> |

Because of these and other professional experiences, Dr. Mahony possesses particular knowledge and experience in all aspects of corporate functions and company operations that strengthen the Board's collective qualifications, skills and experience. Among other experiences, qualifications, attributes and skills, Dr. Mahony's extensive experience in management at public pharmaceutical companies, together with her experience serving on the board of directors of public and private companies, led to the conclusion of our Board that she should serve as a director due to our business and structure.

| Name | Age (as of 04/13/2020) | Director Since | Business Experience |
|---------------------------------|------------------------|----------------|---|
| John G. McHutchison, A.O., M.D. | 62 | 2019 | <p>Dr. McHutchison has served as our Chief Executive Officer and President and as a director since August 2019. Prior to joining us, Dr. McHutchison was the Chief Scientific Officer and Head of Research and Development of Gilead. Prior to joining Gilead in 2010, Dr. McHutchison worked at Duke University Medical Center, where he served as Associate Director of the Duke Clinical Research Institute. He also held the positions of Professor of Medicine in the Division of Gastroenterology at Duke University Medical Center, Associate Director at Duke Clinical Research Institute and Co-Director of the Duke Clinical and Translational Science Award. Prior to his positions at Duke University, Dr. McHutchison spent nearly ten years at Scripps Clinic, most recently as Medical Director, Liver Transplantation. He also previously held an Assistant Professorship in Medicine at the University of Southern California. In June 2018, Dr. McHutchison was appointed an Officer of the Order of Australia in recognition of his distinguished service to medical research in gastroenterology and hepatology. Dr. McHutchison has undergraduate degrees in medicine and surgery from the University of Melbourne in Australia and completed his residency in internal medicine and fellowship in gastroenterology at the Royal Melbourne Hospital. He is a member of the Royal Australasian College of Physicians.</p> |

Because of these and other professional experiences, Dr. McHutchison possesses extensive knowledge of our business and industry and experience in senior leadership, clinical development, innovation and technology development, corporate operations and academia. Among other experiences, qualifications, attributes and skills, Dr. McHutchison's status as an internationally recognized leader in infectious diseases, liver diseases, and gastrointestinal diseases and the leadership he demonstrated at Gilead as he led the organization in the successful filing of numerous New Drug Applications across multiple therapeutic areas, including the curative treatment regimens for chronic hepatitis C and treatment of chronic hepatitis B, led to the conclusion of our Board that he should serve as a director due to our business and structure.

| Name | Age (as of 04/13/2020) | Director Since | Business Experience |
|-----------------------|------------------------|----------------|--|
| William R. Ringo, Jr. | 74 | 2014 | <p>Mr. Ringo became a director upon the closing of the Merger in July 2014 and became non-executive Chairman of the Board in February 2015. Mr. Ringo has served as Interim Chief Executive Officer of Five Prime Therapeutics, Inc. (Five Prime) since September 2019. From July 2010 until December 2015, Mr. Ringo was a senior advisor with Barclays Capital, the global investment banking division of Barclays Bank PLC. From July 2010 until December 2015, Mr. Ringo served as a strategic advisor with Sofinnova Ventures, a life sciences-focused investment firm. Prior to his advisory roles with Barclays Capital and Sofinnova Ventures, Mr. Ringo served as Senior Vice President of Strategy and Business Development for Pfizer Inc., a biopharmaceutical company, from April 2008 until his retirement in April 2010. From 2004 to 2006, Mr. Ringo served as President and Chief Executive Officer of Abgenix, Inc., a biotechnology company acquired by Amgen, Inc. Mr. Ringo served on the Onyx Pharmaceuticals, Inc. board of directors from February 2011 until the October 2013 acquisition by Amgen, Inc. From 2001 to 2007, he served on various boards of directors, including the following public companies: Encysive Pharmaceuticals, Inc.; Inspire Pharmaceuticals, Inc.; and InterMune, Inc., where he was the non-executive chairman of the board of directors after serving as interim Chief Executive Officer from June 2003 to September 2003. From 1994 to 2002, he served as a director and chairman of the board for Community Health Systems, Inc. His experience in the global pharmaceutical sector also includes nearly 30 years with Lilly. Over the course of his career with Lilly, Mr. Ringo served in numerous executive roles, including Product Group President for oncology and critical care, President of internal medicine products, President of the infectious diseases business unit, and Vice President of sales and marketing for U.S. pharmaceuticals. He also was a member of Lilly's operating committee. Mr. Ringo is the chairman of the board of Five Prime. In the last five years, Mr. Ringo was formerly a director of Immune Design Corp., Sangamo Biosciences, Inc., Mirati Technologies, Inc. and, prior to its being acquired by Lilly, Dermira, Inc. Mr. Ringo received a B.S. in business administration and an M.B.A. from the University of Dayton.</p> |

Because of these and other professional experiences, Mr. Ringo possesses extensive knowledge of our business and industry and experience in senior leadership, financial audit, business development, public company board service, governance, financing and capital markets and corporate operations. Among other experience, qualifications, attributes and skills, Mr. Ringo's extensive management experience in the pharmaceutical industry and experience in the capital markets, as well as his experience serving on the boards of directors of public pharmaceutical companies and on the boards of directors of several private pharmaceutical companies, led to the conclusion of our Board that he should serve as a director due to our business and structure.

Required Vote

Assuming a quorum is present, the eight nominees receiving the highest number of "FOR" votes from the holders of shares present in person or represented by proxy at the Annual Meeting and entitled to vote on Proposal No. 1 shall be elected as directors to serve until the 2021 Annual Meeting of Stockholders and until their successors have been duly elected and qualified or, if sooner, until the director's death, resignation or removal. Only votes "FOR" will affect the outcome. "WITHHOLD" votes and broker non-votes will have no effect on the outcome of the election of directors.

Recommendation of the Board of Directors

THE BOARD OF DIRECTORS RECOMMENDS A VOTE "FOR" THE ELECTION OF EACH NAMED NOMINEE FOR DIRECTOR.

THE BOARD OF DIRECTORS AND CORPORATE GOVERNANCE

This section describes key corporate governance guidelines and practices that we have adopted. Complete copies of the charters of our committees of the Board and our Corporate Governance Guidelines, Code of Conduct and Code of Ethics described below may be found in the Investors section of our website www.assemblybio.com. Alternatively, you can request a copy of any of these documents free of charge by writing to Assembly Biosciences, Inc., attn: Corporate Secretary, 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080. Information on our website is not incorporated by reference into this proxy statement.

Meetings of the Board

Our Company is under the general oversight of the Board as provided by the laws of Delaware and our Amended and Restated Bylaws. During the fiscal year ended December 31, 2019, the Board held 11 meetings and acted by unanimous written consent four times. Applicable Nasdaq listing standards require that independent directors meet regularly in executive session. Our independent directors met in executive sessions at which only independent directors were present at the end of the Board meetings in 2019.

The Board adopted a formal policy that a Board meeting be held on the same date as the annual stockholders meeting and all directors of the Company are encouraged to attend our annual meetings of stockholders. Every 2019 director nominee that served as a director at the time the 2019 annual meeting of stockholders was in attendance in person other than Ms. Kim and Dr. Mahony, who could not attend due to business and personal conflicts, Dr. McHutchison was neither a nominee nor a member of our Board at the time of the 2019 annual meeting of stockholders.

Board Composition

Our Nominating and Governance Committee aims to assemble a Board that brings to us a variety of perspectives and skills derived from high-quality business and professional experience. Directors should possess high personal and professional ethics, integrity and values and be committed to representing the best interests of our stockholders. The Board is composed of individuals that enhance the gender, age and ethnic diversity of the Board.

In fulfilling its responsibilities to select and recommend director nominees to serve on our Board, our Nominating and Governance Committee annually evaluates our incumbent Board members and other candidates, if any, against the following criteria in determining whether to recommend these directors for nomination:

- the appropriate size of our Board and its committees;
- the perceived needs of our Board for particular skills, background and business experience;
- the skills, background, reputation and depth and breadth of business experience of nominees;
- nominees' independence from management;
- diversity, including of experience, competency in relevant fields, gender, race, ethnicity and age; and
- applicable regulatory and listing requirements, including independence requirements and legal considerations.

Our Corporate Governance Guidelines provide that the Nominating and Governance Committee must be satisfied that each recommended nominee to the Board meets the following minimum qualifications:

- nominee shall have experience at a strategic or policymaking level in a business, government, non-profit or academic organization of high standing;
- nominee shall be highly accomplished in his or her respective field, with superior credentials and recognition;

- nominee shall be well regarded in the community and shall have a long-term reputation for high ethical and moral standards;
- nominee shall have sufficient time and availability to devote to the affairs of the Company, particularly accounting for the number of boards of directors on which he or she may serve; and
- to the extent he or she serves or has previously served on other boards of directors, the nominee shall have a demonstrated history of actively contributing at board meetings.

Other than the foregoing, there are no stated minimum criteria for director nominees, although our Nominating and Governance Committee may also consider such other factors as it may deem, from time to time, to be in the best interests of our Company and our stockholders.

After ten years of dedicated service, Mark Auerbach, a current director, will not stand for re-election and will retire from our Board at the Annual Meeting. In addition, Derek A. Small, our former Chief Executive Officer and President until August 2019 and an Assembly employee through December 2019 and current director, will not stand for re-election and will retire from our Board at the Annual Meeting.

Independence of Directors

Our Board assesses the independence of each of our directors under the Nasdaq Stock Market Rules (the Nasdaq listing rules), because our common stock is listed on the Nasdaq Global Select Market. Using the test provided in Rule 5605(a)(2) of the Nasdaq listing rules, the Board has determined that, except for John G. McHutchison, A.O., M.D., our Chief Executive Officer and President, all current directors and director nominees (Anthony E. Altig, Richard D. DiMarchi, Ph.D., Myron Z. Holubiak, Helen S. Kim, Alan J. Lewis, Ph.D., Susan Mahony, Ph.D. and William R. Ringo, Jr.) are independent. As part of this determination of independence, our Board considered the relationships that each non-employee director or director nominee has with us and all other facts and circumstances that the Board deemed relevant in determining independence, including the beneficial ownership of our capital stock by such individual and the association of certain of our directors with third parties, including Indiana University, from whom we license certain intellectual property. After considering these factors, our Board has affirmatively determined that each of Mr. Altig, Dr. DiMarchi, Mr. Holubiak, Ms. Kim, Dr. Lewis, Dr. Mahony and Mr. Ringo does not have a relationship with us that would interfere with the exercise of independent judgment in carrying out his or her responsibilities as a director.

Board Leadership Structure

Our Board does not have a specific policy regarding the separation of the roles of the Chairman of the Board and the Chief Executive Officer and believes it is in the best interests of our Company and our stockholders to be able to exercise discretion in combining or separating these positions as we deem appropriate in light of prevailing circumstances. The roles are currently separated, with Mr. Ringo serving as independent Chairman. The Board believes that this structure currently best serves the interests of our stockholders because it allows our Chief Executive Officer to focus primarily on our business strategy and operations and most effectively leverages the experience of the Chairman. It also enhances the Board's independent oversight of our senior management team and enables better communication and relations between the Board, the Chief Executive Officer and other members of our senior management team. In that regard, our independent Chairman presides over Board meetings and the executive sessions of the non-management and independent directors of the Board. Our approach provides flexibility to allow our Board to modify our leadership structure in the future as appropriate. We believe that we, like many U.S. companies, are well served by this flexible leadership structure.

Risk Oversight

The Board is actively involved in the oversight of risks that could affect us. This oversight is conducted primarily through committees of the Board, particularly the Audit Committee, the Compensation Committee and the Nominating and Governance Committee, but the full Board has retained responsibility for general oversight of risks. The Board satisfies this responsibility through regular reports by each committee chair regarding the committee's considerations and actions, as well as through regular reports directly from officers responsible for oversight of particular risks.

Board Committees

The Board has four standing committees. Each committee operates under a charter that has been adopted by the Board, which can be found in the Corporate Governance section of the Investors section of our website at www.assemblybio.com. Information on our website is not incorporated by reference into this proxy statement. Each of the committees has authority to engage legal counsel or other experts or consultants as it deems appropriate to carry out its responsibilities. The table below sets forth the current membership of each of the standing committees and the number of meetings each committee held in 2019, excluding actions taken by unanimous written consent. All directors other than Ms. Kim attended 75% or more of the aggregate meetings of the Board and all meetings of the committees on which he or she served during the period for which he or she was a director or committee member, as applicable, in 2019. The Board expects to review and take action regarding 2020 committee assignments at its meeting immediately following the Annual Meeting. The table also sets forth the independence of each director. For purposes of this table, “independent” means the director is (1) independent under the Nasdaq listing rules, (2) a “non-employee director” as defined in Rule 16b-3 of the Securities Exchange Act of 1934, as amended (the Exchange Act), and (3) an “outside director” as that term is defined for purposes of Section 162(m) of the Internal Revenue Code of 1986, as amended (the Code).

| | Independent | Audit Committee | Compensation Committee | Nominating and Governance Committee | Science and Technology Committee |
|---------------------------------|-------------|-----------------|------------------------|-------------------------------------|----------------------------------|
| Number of Meetings in 2019 | | 6 | 10 | 2 | 2 |
| Anthony E. Altig+ | ✓ | ✓ | | ✓ | |
| Mark Auerbach+ | ✓ | ✓** | ✓ | | |
| Richard D. DiMarchi, Ph.D. | ✓ | | | | ✓** |
| Myron Z. Holubiak | ✓ | | ✓** | ✓ | |
| Helen S. Kim | ✓ | | | | ✓ |
| Alan J. Lewis, Ph.D. | ✓ | | | ✓** | ✓ |
| Susan Mahony, Ph.D. | ✓ | | ✓ | | ✓ |
| John G. McHutchison, A.O., M.D. | | | | | |
| William R. Ringo, Jr.* | ✓ | ✓ | ✓ | | |
| Derek A. Small | | | | | |

* Chairman of the Board

** Committee Chair

+ “Audit Committee Financial Expert” as defined in Item 407(d) of Regulation S-K

Audit Committee

The Audit Committee was established in accordance with Section 3(a)(58)(A) of the Exchange Act by the Board to oversee and appraise our accounting and financial reporting processes, the audit process, our process for monitoring compliance with laws, regulations and our Code of Conduct and Code of Ethics, and the quality and integrity of our financial statements and reports. In addition, the Audit Committee oversees the qualification, selection, independence and performance of our independent registered public accounting firm and recommends to the Board the appointment of our independent registered public accounting firm. Our Audit Committee is also responsible for reviewing and approving all related person transactions, including transactions with executive officers and directors, for potential conflicts of interests or other improprieties.

At the direction of the Nominating and Governance Committee, the Audit Committee conducts an annual performance evaluation of the Audit Committee and reports to the Board on the results of such evaluation.

The charter for our Audit Committee requires that the Audit Committee have at least three independent directors. Our Audit Committee currently consists of Mr. Auerbach (Chair), Mr. Altig and Mr. Ringo. The Board annually reviews the Nasdaq listing rules' definition of independence for Audit Committee members and has determined that Messrs. Auerbach, Altig and Ringo are each independent (as independence is currently defined in Rule 5605(a)(2) of the Nasdaq listing rules and within the meaning of Section 10A-3(b)(1) of the Exchange Act). The Board has determined that Messrs. Altig and Auerbach each qualify as an "audit committee financial expert" as that term is defined in Item 407(d) of Regulation S-K promulgated by the SEC. In making that determination, the Board relied on the past business experience of Mr. Altig and Mr. Auerbach. The Board made a qualitative assessment of Mr. Altig's level of knowledge and experience based on several factors, including his experience as the chief financial officer of several public companies and having been a certified public accountant. The Board made a qualitative assessment of Mr. Auerbach's level of knowledge and experience based on a number of factors, including his extensive financial experience, his experience as a chief financial officer, his accounting degree and his experience as a director of several public companies, including his service as the chair of the audit committee of one of those public companies. Due to Mr. Auerbach's retirement from the Board as of the Annual Meeting, at the Board meeting immediately following the Annual Meeting, the Board will appoint both (1) a third director that meets the requirements of Nasdaq and the SEC to serve as the member of the Audit Committee and (2) a new chair of the Audit Committee.

Compensation Committee

The charter for our Compensation Committee requires the committee to have not less than three members. Our Compensation Committee currently consists of Mr. Holubiak (Chair), Mr. Auerbach, Dr. Mahony and Mr. Ringo. Our Board has determined that Messrs. Holubiak, Auerbach and Ringo and Dr. Mahony are each independent under the Nasdaq listing rules, each is a "non-employee director" as defined in Rule 16b-3 promulgated under the Exchange Act and each is an "outside director" as that term is defined for purposes of Section 162(m) of the Code.

The purpose of our Compensation Committee is to discharge our Board's responsibilities relating to compensation of our directors, executive officers and employees and to administer our equity compensation and other benefit plans. In carrying out these responsibilities, our Compensation Committee reviews all components of executive officer compensation for consistency with our Compensation Committee's primary objectives of attracting and retaining key management personnel, driving long-term strategic values and enhancing stockholder value. The Compensation Committee charter specifies that the Compensation Committee will, among other things:

- review the recommendations of management with respect to our annual corporate goals and objectives and advise the Board regarding such annual corporate goals and objectives;
- taking into consideration the Board-approved corporate goals and objectives, review and approve the annual goals and objectives applicable to our principal executive officer and other executive officers;
- evaluate the principal executive officer's and the other executive officers' performance in light of approved goals and objectives;
- determine and approve the compensation levels and other terms of employment of the principal executive officer and other executive officers based on this evaluation, including with respect to each executive officer, his or her base salary, cash and equity-based compensation, annual performance-based cash bonus, special benefits, perquisites and incidental benefits and other incentive compensation, benefits and terms of employment;
- review and approve the compensation of our other employees that the Compensation Committee may specify from time to time, and delegate authority to specified executive officer(s) to review and approve the compensation of other non-executive officer employees;
- review and approve any employment agreements, severance plans (including any benefits to be provided in connection with a change in control) and any other compensatory agreements for the principal executive officer and other executive officers, including adopting, amending and terminating such agreements, plans or arrangements;
- review with the principal executive officer and any other appropriate officers the material criteria used by the principal executive officer and management in evaluating employee performance throughout the Company and in establishing appropriate compensation, retention, incentive, severance and benefit policies and programs;

- review and recommend to the Board changes to the compensation of our directors;
- oversee the administration of, and periodically review and make changes to, our incentive compensation plans, equity-based compensation plans, and any material employee benefit, bonus, retirement, severance and other compensation plans;
- prepare the Compensation Committee report and recommend the inclusion of the report in our proxy statement or Annual Report on Form 10-K as required;
- retain and approve the compensation of any compensation consultants; and
- evaluate the independence of any such compensation consultants.

Under the Compensation Committee charter, the Compensation Committee may, in its discretion, delegate its duties to a subcommittee consisting of one or more of its members and delegate authority to specified executive officers to review and approve the compensation of non-executive officer employees. At the direction of the Nominating and Governance Committee, the Compensation Committee shall perform an annual performance evaluation and report to the Board on its results.

The charter of the Compensation Committee grants the Compensation Committee full access to all of our books, records, facilities and personnel, as well as authority to obtain, at our expense, advice and assistance from compensation consulting firms, legal counsel and other advisors as it deems appropriate to assist it in the evaluation of the compensation of directors, the principal executive officer or the other executive and non-executive officers of the Company, and the fulfillment of its other duties.

Nominating and Governance Committee

The charter for the Nominating and Governance Committee requires the committee to consist of not less than two directors. Our Nominating and Governance Committee currently consists of three directors, Dr. Lewis (Chair), Mr. Altig and Mr. Holubiak. The Board has determined that each of Dr. Lewis, Mr. Altig and Mr. Holubiak are independent under the Nasdaq listing rules.

The primary purpose of our Nominating and Governance Committee is to select, and recommend to our Board, director nominees for each election of directors and recommend any corporate governance guidelines it deems appropriate. Additionally, the Committee has general oversight of our compliance with legal and regulatory requirements of our business operations, other than compliance with securities laws and regulations, including our financial reporting and disclosure obligations, or anti-bribery laws, which in each case shall be the responsibility of the Audit Committee.

The Nominating and Governance Committee will review and assess the adequacy of its charter at least once annually and recommend changes to the Board for approval.

Candidates for nomination as director may come to the attention of our Nominating and Governance Committee from time to time through incumbent directors, management, stockholders or third parties. Our Amended and Restated Bylaws contain provisions for stockholders to recommend persons for nomination as a director and, subject to certain conditions, to nominate director candidates for inclusion in our proxy statement, as set forth in this proxy statement under “Deadline for Stockholder Proposals for 2021 Annual Meeting of Stockholders.” Candidates for potential nomination may be considered at meetings of our Nominating and Governance Committee at any point during the year. Such candidates will be evaluated against the criteria set forth above, and the Nominating and Governance Committee’s policy will be to evaluate any recommendation for director nominees proposed by stockholders using the same criteria. If our Nominating and Governance Committee believes at any time that it is desirable that our Board consider additional candidates for nomination, the Committee may poll directors and management for suggestions or conduct research to identify possible candidates and may, if our Nominating and Governance Committee believes it is appropriate, engage a third-party search firm to assist in identifying qualified candidates.

Once director candidates are identified, the Nominating and Governance Committee conducts a review and evaluation of the qualifications of any proposed director candidate as it deems appropriate. There is no difference in the evaluation process of a candidate recommended by a stockholder as compared to the evaluation process of a candidate identified by any of the other means described above.

If the Nominating and Governance Committee determines that a candidate should be nominated for election to the Board, the candidate's nomination is then recommended to the Board, and the directors may in turn conduct their own review to the extent they deem appropriate. When the Board has agreed upon a candidate, such candidate is recommended to the stockholders for election at an annual meeting of stockholders or appointed as a director by a vote of the Board as appropriate.

All of the director nominees (Anthony E. Altig, Richard D. DiMarchi, Ph.D., Myron Z. Holubiak, Helen S. Kim, Alan J. Lewis, Ph.D., Susan Mahony, Ph.D., John G. McHutchison, A.O., M.D. and William R. Ringo, Jr.) have been recommended by the Nominating and Governance Committee to the Board for re-election or election, as applicable, as our directors at the Annual Meeting, and the Board has approved such recommendations.

Science and Technology Committee

Our Science and Technology Committee consists of Dr. DiMarchi (Chair), Ms. Kim, Dr. Lewis and Dr. Mahony. The primary purpose of our Science and Technology Committee is to assist the Board with oversight of our research and development activities, including to advise the Board with respect to strategic and tactical scientific matters. In furtherance of its purpose, the Science and Technology Committee reviews, among other things:

- our overall scientific and research and development strategy;
- our research and development programs;
- our regulatory compliance/quality programs, as applicable;
- related external scientific research, discoveries and commercial developments, as appropriate;
- our overall intellectual property strategies and our portfolio of patents;
- management's decisions regarding the allocation, deployment, utilization of and investment in our scientific assets; and
- management's decisions regarding acquiring or divesting scientific technology or otherwise investing in research or development programs.

The Science and Technology Committee charter requires that the Science and Technology Committee meet at least twice per year. The Chair of the Science and Technology Committee, in consultation with the other members and management, may set meeting agendas. The Science and Technology Committee will review and assess the adequacy of its charter at least once annually and recommend changes to the Board for approval.

Code of Ethics and Code of Conduct

Our Board has adopted a Code of Ethics for our principal executive officer and all senior financial officers and a Code of Conduct applicable to all of our employees and our directors. Both codes can be found in the Corporate Governance section of the Investors section of our website at www.assemblybio.com. If we make any substantive amendments to, or grant any waivers from, the Code of Ethics or Code of Conduct, as applicable, for our principal executive officer, principal financial officer, principal accounting officer, controller or persons performing similar functions, or any officer or director, we will disclose the nature of such amendment or waiver on our website or in a Current Report on Form 8-K.

Director Compensation

Our directors play a critical role in guiding our strategic direction and overseeing the management of our Company. The many responsibilities and risks and the substantial time commitment of being a director require that we provide adequate compensation commensurate with our directors' workload and opportunity costs. Non-employee directors receive a combination of annual cash retainers and equity awards in amounts that correlate to their responsibilities and levels of Board participation, including service on Board committees. Neither Dr. McHutchison nor Mr. Small, who are not independent directors, receives separate compensation for service as a director.

The following table sets forth the annualized cash compensation payable to our non-employee directors in 2019.

| Director Position | Annual Cash Compensation⁽¹⁾ |
|--|---|
| All Non-Employee Directors | \$ 40,000 |
| Chair of the Board | \$ 37,500 (2) |
| Audit Committee Chair | \$ 18,750 (3) |
| Audit Committee Members (other than Chair) | \$ 9,375 (4) |
| Chair of Compensation Committee | \$ 13,750 (5) |
| Compensation Committee Members (other than Chair) | \$ 6,875 (6) |
| Chair of Nominating & Governance or Science and Technology Committees | \$ 10,000 |
| Nominating & Governance or Science and Technology Committee Members (other than Chair) | \$ 5,000 |

- (1) The annual cash compensation that we paid to Board members, other than Dr. McHutchison and Mr. Small, was based on their positions on the Board or the committees of the Board, and we do not compensate the Board members on a per meeting basis. The amounts reflected in the table were in effect for 2019 unless otherwise noted.
- (2) From January 1, 2019 through March 31, 2019, the cash compensation paid to the Chair of the Board for service as Chair of the Board was paid at an annualized rate of \$30,000. Effective April 1, 2019, this compensation was increased to an annualized rate of \$40,000.
- (3) From January 1, 2019 through March 31, 2019, the cash compensation paid to the Chair of the Audit Committee for service as Chair of the Audit Committee was paid at an annualized rate of \$15,000. Effective April 1, 2019, this compensation was increased to an annualized rate of \$20,000.
- (4) From January 1, 2019 through March 31, 2019, the cash compensation paid members of the Audit Committee for service on the Audit Committee was paid at an annualized rate of \$7,500. Effective April 1, 2019, this compensation was increased to an annualized rate of \$10,000.
- (5) From January 1, 2019 through March 31, 2019, the cash compensation paid to the Chair of the Compensation Committee for service as Chair of the Compensation Committee was paid at an annualized rate of \$10,000. Effective April 1, 2019, this compensation was increased to an annualized rate of \$15,000.
- (6) From January 1, 2019 through March 31, 2019, the cash compensation paid members of the Compensation Committee for service on the Compensation Committee was paid at an annualized rate of \$5,000. Effective April 1, 2019, this compensation was increased to an annualized rate of \$7,500.

Upon appointment to the Board, each new non-employee director appointee is granted an option to purchase 20,000 shares of our common stock, which vests over three years in three approximately equal installments on each anniversary of the date of grant. Each year, on the date of our annual meeting of stockholders, each non-employee director that is elected will be entitled to receive a grant of an equity award, which will vest in full upon the earlier of the first anniversary of the grant date and the next annual meeting of stockholders. The exercise price per share of equity awards that constitute options is the fair market value of a share of our common stock on the date of the grant of the option. All options have a term of ten years. In 2019, non-employee individuals elected to serve on the Board of Directors at the 2019 annual meeting of stockholders were granted an option to purchase 10,000 shares of common stock.

The following table sets forth information regarding cash and non-cash compensation earned by or paid to each of our non-employee directors serving as directors during 2019.

| Name | Fees Earned or Paid in Cash (\$) | Option Awards (\$)(1)(2) | Total (\$) |
|----------------------------|--|--------------------------------|---------------|
| Anthony E. Altig | 54,375 | 114,707 | 169,082 |
| Mark Auerbach | 65,625 | 114,707 | 180,332 |
| Richard D. DiMarchi, Ph.D. | 50,000 | 114,707 | 164,707 |
| Myron Z. Holubiak | 58,750 | 114,707 | 173,457 |
| Helen S. Kim | 45,000 | 114,707 | 159,707 |
| Alan J. Lewis, Ph.D. | 55,000 | 114,707 | 169,707 |
| Susan Mahony, Ph.D. | 51,875 | 114,707 | 166,582 |
| William R. Ringo, Jr. | 93,750 | 114,707 | 208,457 |

- (1) As of December 31, 2019, our non-employee directors held the following unexercised options to purchase shares of our common stock: Mr. Altig, 109,000 shares; Mr. Auerbach, 109,000 shares; Dr. DiMarchi, 109,000 shares; Mr. Holubiak, 109,000 shares; Ms. Kim, 37,500 shares; Dr. Lewis, 65,000 shares; Dr. Mahony, 37,500 shares; and Mr. Ringo, 94,000 shares. Our non-employee directors did not hold any other equity awards as of such date.
- (2) The reported amounts in the table above represent the aggregate grant date fair value of the options granted in 2019 computed in accordance with Financial Accounting Standards Boards (FASB) Accounting Standards Codification (ASC) Topic 718. Assumptions used in the calculation of these amounts are included in Note 7 of the consolidated financial statements included in our Annual Report on Form 10-K for the year ended December 31, 2019.

Stockholder Communications

Stockholders and other interested parties may communicate with the Board by writing to John G. McHutchison, A.O., M.D., our Chief Executive Officer and President, at Assembly Biosciences, Inc., 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080. Dr. McHutchison received no such communications after his appointment as Chief Executive Officer and President in August 2019, and Mr. Small received no such communications during his tenure as Chief Executive Officer and President in 2019. Upon receipt of a stockholder communication indicating a desire to communicate with the Board, Dr. McHutchison will review the communication and determine whether the communication should be directed to the Board or any individual director. All communications will be forwarded in this manner; provided, however, that Dr. McHutchison reserves the right not to forward to the Board or any individual director any materials that he deems in his reasonable discretion to be unduly frivolous, hostile, threatening or similarly inappropriate for communication to the Board or any individual director.

Stockholder Engagement

Senior management regularly engages with our stockholders at industry conferences and investor meetings. In response to feedback gained through our engagement program, we remain focused on delivering on our growth and clinical development strategies, and we continue to enhance the transparency and disclosure of our financial, operational and environmental and governance performance.

Our investor relations team keeps the Board regularly updated on the views of stockholders and provides reports from financial and other advisers concerning institutional stockholder feedback.

In December 2019, we received a letter from a stockholder requesting that we include in this proxy statement a proposal requesting that the Board take steps necessary to amend our bylaws and any other governing document necessary to give stockholders with an aggregate of 15% net long of our outstanding common stock the power to call a special meeting of stockholders. We acknowledged receipt of the proposal and included it in this proxy statement. A vote will be taken on this proposal if the proposal is properly presented at the meeting.

PROPOSAL NO. 2: ADVISORY VOTE TO APPROVE OUR NAMED EXECUTIVE OFFICERS' COMPENSATION

General

Under the Dodd-Frank Wall Street Reform and Consumer Protection Act of 2010 (the Dodd-Frank Act) and Section 14A of the Exchange Act, our stockholders are entitled to vote to approve, on a non-binding advisory basis, the compensation of our named executive officers (Named Executive Officers or NEOs) as disclosed in this proxy statement in accordance with the SEC's rules. This vote is commonly known as the "Say on Pay" vote. This vote is not intended to address any specific item of compensation, but rather our NEOs' overall compensation and the philosophy, policies and practices described in this proxy statement.

We provide our stockholders with the opportunity to cast an advisory vote on our NEOs' compensation every year. Approximately 91% of the votes cast on our "Say on Pay" vote were voted in favor of the proposal in 2019.

Our NEOs' compensation subject to this vote is disclosed in the "Executive Compensation" section of this proxy statement and the compensation tables and the related narrative disclosure contained in this proxy statement. As discussed in these disclosures, our compensation philosophy is to provide competitive overall compensation that attracts and retains top performers. To achieve these goals, our compensation program is structured to:

- provide total compensation, compensation elements and other benefits that are competitive with those companies that are competing for available employees;
- provide a mix of compensation that offers (1) a market-competitive base salary, with targeted annual performance-based cash bonus opportunities based on individual achievement and Company performance against corporate goals, generally measured over a 12-month performance period, and (2) the opportunity to share in the long-term growth of our Company through equity compensation; and
- reward exceptional performance by individual employees.

Accordingly, the Board is asking the stockholders to indicate their support for the compensation of our NEOs as described in this proxy statement by casting a non-binding advisory vote "FOR" the following resolution:

"RESOLVED, that the Company's stockholders hereby approve, on a non-binding advisory basis, the compensation of the Company's named executive officers, as disclosed in the proxy statement for the 2020 Annual Meeting of Stockholders pursuant to the compensation disclosure rules of the Securities and Exchange Commission, including the compensation tables and narrative discussion in the proxy statement for the 2020 Annual Meeting of Stockholders."

The "Executive Compensation" section of this proxy statement contains more details on our NEOs' compensation, and we urge you to read it carefully before casting your vote on this proposal. Because the vote is advisory, it is not binding on us, the Board or the Compensation Committee of the Board. Nevertheless, the views expressed by the stockholders, whether through this vote or otherwise, are important to our management, the Board and the Compensation Committee. Our management, the Board and Compensation Committee intend to consider the results of this vote in making recommendations and determinations in the future regarding executive compensation arrangements and our executive compensation principles, policies and procedures.

We submit the compensation of our NEOs to our stockholders for a non-binding advisory vote on an annual basis. Accordingly, the next stockholder advisory vote on the compensation of our NEOs after the Annual Meeting is expected to take place at the 2021 Annual Meeting of Stockholders. Based on the non-binding advisory vote regarding the frequency of future executive compensation advisory votes conducted at the 2018 annual meeting of stockholders, the next vote on the non-binding advisory frequency of such non-binding advisory votes will occur no later than our 2024 annual meeting of stockholders.

Required Vote

Assuming a quorum is present, to be approved, a majority of the shares of common stock held by holders present in person or represented by proxy at the Annual Meeting and entitled to vote on Proposal No. 2 must be voted “FOR” the approval, on a non-binding advisory basis, of our NEOs’ compensation as disclosed in this proxy statement. Abstentions will be deemed a vote against Proposal No. 2. Broker non-votes will not be considered towards vote totals on Proposal No. 2 and will have no effect on the outcome of the vote.

Recommendation of the Board of Directors

THE BOARD OF DIRECTORS RECOMMENDS A VOTE “FOR” THE APPROVAL, ON A NON-BINDING ADVISORY BASIS, OF OUR NAMED EXECUTIVE OFFICERS’ COMPENSATION.

MATTERS RELATING TO OUR INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

Pre-Approval Policies and Procedures

The charter of the Audit Committee provides that the Audit Committee shall pre-approve all auditing services and the terms thereof (which may include providing comfort letters in connection with underwritten securities offerings) and non-audit services (other than non-audit services prohibited under Section 10A(g) of the Exchange Act or the applicable rules of the SEC or the Public Company Accounting Oversight Board) to be provided to us by the independent registered public accounting firm. The pre-approval requirement is waived with respect to the provision of non-audit services for us if the “de minimis” provisions of Section 10A(i)(1)(B) of the Exchange Act are satisfied. This authority to pre-approve non-audit services may be delegated to one or more members of the Audit Committee, who shall present all decisions to pre-approve an activity to the full Audit Committee at its first meeting following such decision. The Audit Committee pre-approved all services provided by Ernst & Young LLP, our independent registered public accounting firm for the fiscal years ended December 31, 2019 and 2018.

Fees and Services

The following table represents aggregate fees billed to us for services related to the fiscal years ended December 31, 2019 and 2018 by Ernst & Young LLP, our independent registered public accounting firm:

| Fees | 2019 | 2018 |
|--------------------|---------------------|-------------------|
| Audit Fees(1) | \$ 1,586,312 | \$ 809,895 |
| Audit-Related Fees | — | — |
| Tax Fees(2) | 223,376 | 131,072 |
| All Other Fees(3) | 3,485 | 25,000 |
| Total | \$ 1,813,173 | \$ 965,967 |

- (1) Audit Fees consisted of fees and expenses covering the integrated audit of our consolidated financial statements, of our internal control over financial reporting, review of the interim condensed consolidated financial statements, statutory audits, accounting and financial reporting consultations, and the issuance of consents in connection with registration statement filings with the SEC and comfort letters in connection with registered securities offerings.
- (2) Tax Fees consist of fees and expenses for corporate tax compliance, routine on-call tax services, international tax advisory services, indirect (non-income) tax advisory and tax incentives and domestic tax advisory services.
- (3) All Other Fees consist of fees billed in the indicated year for an annual subscription to Ernst & Young LLP’s online resource library and a cybersecurity risk assessment in 2018.

All of the services described above were pre-approved by our Audit Committee. The Audit Committee concluded that the provision of these services by Ernst & Young LLP would not affect their independence.

Report of the Audit Committee of the Board of Directors

The Audit Committee reviews our financial reporting process on behalf of the Board. Management has the primary responsibility for the preparation and integrity of the consolidated financial statements and the reporting process, including establishing and monitoring the system of internal financial controls. In this context, the Audit Committee hereby reports as follows:

1. The Audit Committee has reviewed and discussed our audited consolidated financial statements for the year ended December 31, 2019 with management.
2. The Audit Committee has discussed with Ernst & Young LLP, our independent registered public accounting firm, the matters required to be discussed by the applicable requirements of the Public Company Accounting Oversight Board (PCAOB) and the SEC.

3. The Audit Committee has received the written disclosures and the letter from Ernst & Young LLP required by applicable requirements of the PCAOB regarding the independent accountants' communications with the Audit Committee concerning independence and has discussed with Ernst & Young LLP its independence.
4. Based on the review and discussions described above, among other things, the Audit Committee has recommended to the Board that the audited consolidated financial statements be included in our Annual Report on Form 10-K for fiscal year ended December 31, 2019.

Submitted by:

The Audit Committee
Mark Auerbach, Chairman
Anthony E. Altig
William R. Ringo, Jr.

PROPOSAL NO. 3: RATIFICATION OF THE SELECTION OF THE INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

General

The Board has selected Ernst & Young LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2020 and has further directed that management submit the selection of the independent registered public accounting firm for ratification by the stockholders at the Annual Meeting. Ernst & Young LLP has served as our independent registered public accounting firm since 2015.

Neither our Amended and Restated Bylaws nor other governing documents or law require stockholder ratification of the selection of Ernst & Young LLP as our independent registered public accounting firm. However, the Board is submitting the selection of Ernst & Young LLP to the stockholders for ratification as a matter of good corporate practice. If the stockholders fail to ratify the selection, the Board will reconsider whether to retain Ernst & Young LLP. Even if the selection is ratified, the Board, in its discretion, may direct the appointment of different independent registered public accounting firm at any time during the year if the Board determines that such a change would be in the best interest of the Company and its stockholders. Representatives of Ernst & Young LLP are expected to attend the Annual Meeting, where they will have an opportunity to make a statement and be available to respond to appropriate questions.

Required Vote

Assuming a quorum is present, to be approved, a majority of the shares of common stock held by holders present in person or represented by proxy at the Annual Meeting and entitled to vote on Proposal No. 3 must be voted "FOR" the ratification of the selection of Ernst & Young LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2020. Abstentions will be deemed a vote against Proposal No. 3. Broker non-votes will not be considered towards vote totals on Proposal No. 3; however, the ratification of the selection of Ernst & Young LLP is a matter on which a broker, bank or other nominee has discretionary voting authority, so we do not expect any broker non-votes with respect to Proposal No. 3.

Recommendation of the Board of Directors

THE BOARD OF DIRECTORS RECOMMENDS A VOTE "FOR" THE RATIFICATION OF THE SELECTION OF ERNST & YOUNG LLP AS OUR INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM.

Background

On May 30, 2018, we adopted the Assembly Biosciences, Inc. 2018 Stock Incentive Plan, which was amended by Amendment No. 1 to Assembly Biosciences, Inc. 2018 Stock Incentive Plan effective as of May 17, 2019 and by Omnibus Amendment to Assembly Biosciences, Inc. Stock Plans effective as of March 11, 2020 (as amended from time to time, the 2018 Plan). The 2018 Plan provides for the grant of equity awards to our employees, non-employee directors and consultants and is necessary to ensure that we can continue to grant equity awards to eligible recipients at levels determined to be appropriate by the Board, the Compensation Committee and/or the Chief Executive Officer pursuant to his Board delegated authority.

As of April 13, 2020, there were stock options to acquire 6,521,745 shares of common stock and 56,185 cash settled stock appreciation rights outstanding under our equity compensation plans. In addition, there were 852,600 shares subject to unvested restricted stock units (RSUs) with time-based vesting, 126,250 shares subject to vested RSUs that have not settled and 145,000 shares subject to unvested RSUs with performance-based vesting outstanding under our equity compensation plans. As of April 13, 2020, there were approximately 793,836 shares of common stock available and unallocated under our equity compensation plans, of which 512,375 shares are only issuable as inducement awards to new employees under our 2017 Inducement Award Plan, our 2019 Inducement Award Plan and our 2020 Inducement Award Plan collectively. As a result, as of April 13, 2020, there are approximately 281,461 shares of common stock available under our shareholder approved plans, of which 170,286 shares of common stock remain available and unallocated for issuance under the 2018 Plan.

On March 11, 2020, the Board, upon the recommendation of the Compensation Committee and subject to the approval of our stockholders at the Annual Meeting, approved Amendment No. 3 to the 2018 Plan (the Amendment) to increase the number of shares reserved under the 2018 Plan from 3,000,000 to 4,600,000 (as further amended, the Amended Plan). The proposed increase of 1,600,000 shares equals approximately 4.9% of the Company's outstanding shares and equals approximately 4.6% of our outstanding shares inclusive of the outstanding 2,424,242 prefunded warrants that were issued in December 2019.

Purpose

The purpose of the Amended Plan is to encourage ownership in the Company by our employees, directors and consultants and our affiliates whose long-term employment by, or involvement with, us is considered essential to our continued progress. This aligns the interests of the award recipients and stockholders and also permits the award recipients to share in our success. The Amended Plan provides an essential component of the total compensation package offered to our employees and other 2018 Plan participants. It reflects the importance that we place on motivating employees and other 2018 Plan participants to achieve superior results over the long term and paying employees and other 2018 Plan participants based on such achievements. We strongly believe that our equity compensation programs and emphasis on employee and non-employee director stock ownership have been integral to our progress and that emphasis on, and continuation of, those programs is necessary for us to achieve superior performance in the future. All of our, and our affiliates', employees, directors and our consultants are eligible to participate in the Amended Plan.

The purpose of the Amendment is to increase the number of shares reserved for issuance under the 2018 Plan by 1,600,000 shares. We believe the ability to grant competitive equity awards is a necessary and powerful recruiting and retention tool for us to attract and retain the quality and number of personnel we need to continue the forward momentum of our business. Our employees are critical to the continued advancement of our lead product candidate in our hepatitis B virus (HBV) Cure program in ongoing Phase 2 clinical studies and planned Phase 3 registrational studies, the initiation of Phase 2 clinical studies for our HBV Cure program's second product candidate and the continuation of Phase 1a/1b clinical studies for our HBV Cure program's third product candidate, as well as the continued advancement of our Microbiome program's lead product candidate's ongoing Phase 1b clinical studies and continued nonclinical studies related to other indications. We believe this is a modest increase that will be sufficient to meet our retention and anticipated new hire needs until the next annual meeting of stockholders and will underpin one of our core compensation philosophies, pay for performance, by giving our employees and other 2018 Plan participants the opportunity to share in our long-term and motivate the creation of long-term stockholder value through equity compensation.

Rationale

We believe you should vote to approve the Amendment for the following reasons:

- *We are committed to sound equity compensation practices.* We recognize that equity compensation awards dilute stockholder equity and so must be used judiciously. Although our employee headcount is rapidly increasing as our business grows, we have generally aligned our compensation practices with industry norms among our peer group described in this proxy statement under “Executive Compensation—Compensation Adjustments and Peer Group Process.” We believe our use of equity has been responsible and mindful of stockholder interests.
- *Equity awards align the interests of management with those of stockholders.* We believe the grant of equity awards, particularly stock options and performance-based vesting RSUs are effective tools to align management and stockholder interests, as management only realizes value from these awards if our stock price appreciates and meaningful performance metrics are achieved. For example, approximately 86% of the new hire equity awards granted to our Chief Executive Officer are performance-based and will only realize value if certain performance metrics are achieved and if our stock price appreciates.
- *The Amended Plan contains provisions that protect stockholder interests.* The Amended Plan contains features that we believe further align the interests of our employees and directors with those of our stockholders, including a minimum vesting requirement of one year for all time-vesting awards that are made to employees, subject to acceleration in the event of death, disability, retirement, separation of service or a Corporate Transaction (as defined below), and a minimum vesting requirement of the earlier of (1) one year and (2) the next annual meeting of the stockholders for time-based vesting awards that are made to directors, subject to acceleration in the event of death, disability or a Corporate Transaction (as discussed below). The Amended Plan also has no automatic acceleration of vesting provisions upon a Corporate Transaction unless the equity awards are not assumed in connection with the Corporate Transaction.
- *Equity compensation helps us to attract and retain talent.* A talented, motivated and effective management team and workforce are essential to our continued progress. Equity compensation is an important component of our total compensation because we believe it will incentivize managers and employees to think and act like owners. Our employees are our most valuable assets, and the awards permitted under the Amended Plan are vital to our ability to attract and retain outstanding and highly skilled individuals. If the Amendment is not approved by stockholders, retaining the best talent will be increasingly difficult as the number of shares available and unallocated under the 2018 Plan is projected to fall below the number of shares of common stock that we will need to grant annual equity awards to employees in 2021 at levels comparable to our peers.
- *Continued access to broad-based equity compensation will help enable rapid growth.* To align the interests of our new hires with those of our current stockholders, our practice is to provide new hires with meaningful initial equity awards upon hiring. Of the 2,433,928 shares of common stock underlying equity awards granted in 2019, approximately 66% were issued to new hires, 30% were issued as retention awards to existing employees and 3% were issued to non-employee directors. Since the beginning of 2019, our headcount has increased from 95 to 117 as of April 13, 2020. In 2020, as we advance our product candidates into further clinical trials and increase our discovery efforts for new product candidates, we anticipate continuing to increase headcount in our HBV Cure program, our Microbiome program, our clinical team and our general and administrative team. In connection with these new hires, we expect to continue our practice of providing meaningful initial equity awards, as well as making annual awards and retention award grants to existing employees to ensure continued alignment with our stockholders. We believe that our stockholders’ long-term interests are best served by equity compensation awards designed to achieve these goals.

- *In 2019, approximately 66% of the equity awards we issued were associated with enhancements in our senior leadership team, including the hiring of a new Chief Executive Officer and President, a new Chief Financial Officer and a new Chief Medical Officer.* In 2019, we significantly enhanced and strengthened our leadership with the appointments of John G. McHutchison, A.O., M.D. as Chief Executive Officer and President; Thomas J. Russo, CFA as Chief Financial Officer; Luisa M. Stamm, M.D., Ph.D. as Chief Medical Officer; Steven J. Knox as SVP, Clinical Development; David R. Houck, PhD. as SVP Manufacturing and Program Management; and Michele Anderson, as SVP, Regulatory Affairs and Quality Assurance. These key hires were critical as we progress four clinical candidates across our HBV Cure and Microbiome programs.
- *We recruit employees in highly competitive labor markets and need to provide competitive compensation arrangements to attract and retain talent.* The San Francisco Bay Area, where we are headquartered and where 68% of our employees are located, is among the most challenging markets in the world for hiring, particularly for life sciences and biotechnology companies. To attract and retain an experienced and highly educated workforce with the skills necessary to advance our programs, we need to offer competitive compensation packages consisting of attractive cash and equity components. Our Compensation Committee has retained Radford, a part of Aon plc, to serve as an independent outside compensation consultant. In this capacity, Radford collects and analyzes compensation information from a comparative group of biotechnology companies and provides us with recommendations regarding these compensation packages.
- *Our current equity-pay mix aligns employee incentives with stockholder gains.* Our employee compensation consists of base salary payable in cash, annual performance-based cash bonuses and long-term incentives in the form of equity awards. Our annual long-term performance-based equity incentive award grants are a combination of stock option and RSUs; however, in certain circumstances, the Compensation Committee may consider other equity awards under the Amended Plan, including restricted stock, stock appreciation rights and dividend equivalent rights. Equity awards provide effective incentives for our employees to work toward achieving business results and scientific advances that will increase the long-term value of our stock as employees only realize value from stock options and stock appreciation rights if the shares of common stock appreciate and the value of other equity awards depends on the price of our common stock.
- *Equity compensation helps us avoid business disruption due to compensation programs.* If the Amendment is not approved, we will have to restructure existing compensation programs for reasons not directly related to the achievement of our business objectives. Such restructuring will likely necessitate the replacement of components of compensation to be awarded in equity with cash, or with other instruments that may not necessarily align employee interests with those of stockholders as effectively. If we were to replace equity awards with cash, this would divert our cash reserves away from our research and development activities and our clinical trials, which could negatively impact the progress of our product candidates, and in turn, impair stockholder value. We believe that such actions would be highly disruptive to us and our employees.
- *We believe our equity awards create strong, long-term incentives for our employees.* We believe that our employees and other plan participants holding equity is beneficial for our stockholders as equity represents a shared long-term interest of our employees, other plan participants and stockholders in the value of our common stock.

Material Terms of the Amended Plan

The following is a summary of the principal provisions of the Amended Plan and its operation, including the proposed Amendment. A copy of the proposed Amendment is attached as Appendix A to this proxy statement. A copy of the full 2018 Plan (as amended to date), with proposed deletions indicated by strike-out and proposed revisions to be made by the Amendment indicated by bold and underline, is attached as Appendix B to this proxy statement and is incorporated herein by reference. The following description of the Amended Plan does not purport to be complete and is qualified in its entirety by reference to Appendix B. Capitalized terms used in this summary and not otherwise defined will have the meanings ascribed to such terms in the Amended Plan.

Purpose of the Amended Plan. The purpose of the Amended Plan is to encourage ownership in the Company by employees, directors and consultants of the Company and its affiliates whose long-term employment by or involvement with the Company is considered essential to our continued progress and, thereby, aligning the interests of the award recipients and stockholders and permitting the award recipients to share in our success. The Amended Plan provides an essential component of the total compensation package offered to our employees and other plan participants. It reflects the importance we place on motivating employees and other plan participants to achieve superior results over the long-term and paying employees and other plan participants based on such achievements. We strongly believe that our equity compensation programs and emphasis on employee and non-employee director stock ownership have been integral to our progress and that a continuation of, and emphasis on, those programs is necessary for us to achieve superior performance in the future. All of our employees, directors and consultants and those of our affiliates are eligible to participate in the Amended Plan.

Types of Awards. The Amended Plan provides for the grant of non-qualified and incentive stock options (Options), stock appreciation rights (SAR), dividend equivalent rights, unrestricted stock, restricted stock, RSUs or other rights or benefits under the Amended Plan (collectively, Awards).

Shares Subject to the Amended Plan. No more than 4,600,000 shares of common stock may be issued pursuant to Awards under the Amended Plan. The number of shares available for Awards, as well as the terms of outstanding Awards, are subject to adjustment as provided in the Amended Plan for stock splits, stock dividends, recapitalizations and other similar events.

Each share of common stock subject to an Award granted pursuant to the Amended Plan will reduce the aggregate number of shares available under the Amended Plan by one share of common stock. Any shares of common stock that again become available for issuance under the Amended Plan due to a forfeiture, expiration or cancellation of an Award (or if the Award otherwise becomes unexercisable) will generally be added back to the aggregate plan limit of the Amended Plan in this same manner and such shares will again be available for subsequent Awards, except as prohibited by law. In the event any Option or other Award granted under the Amended Plan is exercised through the tendering of shares of common stock (either actually or through attestation) or withholding shares of common stock, or in the event tax withholding obligations are satisfied by tendering or withholding shares of common stock, any shares of common stock so tendered or withheld shall not again be available for awards under the Amended Plan. Shares of Common Stock subject to a SAR granted pursuant to Section 6(k) of the Amended Plan that are not issued in connection with cash or stock settlement of the exercise of the SAR shall not again be available for award under the Amended Plan. Shares of common stock reacquired by the Company on the open market or otherwise using cash proceeds from the exercise of Options shall not be available for awards under the Amended Plan.

Director Compensation Limit. The Amended Plan provides that the value of all Awards awarded under the Amended Plan and all other cash compensation paid by the Company to any non-employee director in any calendar year shall not exceed \$1,000,000.

Administration. The Amended Plan will be administered by the Board or a committee designated by the Board (the Committee), which committee is constituted in such a manner as to satisfy the applicable laws and to permit such grants and related transactions under the Amended Plan to be exempt from Section 16(b) of the Exchange Act in accordance with Rule 16b-3. Once appointed, such Committee shall continue to serve in its designated capacity until otherwise directed by the Board. Currently, the Compensation Committee generally serves as the Committee specified in the Amended Plan and acts as the administrator thereunder; however, the Board delegated authority to our Chief Executive Officer acting as a committee of one to serve as the administrator in the context of granting awards under the Amended Plan to newly hired employees or in connection with promotions to individuals that are not Section 16 officers, direct reports of the Chief Executive Officer or above the level of Vice President. Awards granted by the Chief Executive Officer are limited to a preset range prepared in consultation with our Compensation Consultant and consistent with our compensation philosophy. We refer to the entity or individual administering the Amended Plan as the Administrator.

Subject to the terms of the Amended Plan, the Administrator has express authority to determine the employees, directors or consultants who will receive Awards, the number of shares of common stock or other consideration to be covered by each Award, and the terms and conditions of Awards. The administrator has broad discretion to prescribe, amend and rescind rules relating to the Amended Plan and its administration, to interpret and construe the Amended Plan and the terms of all Award agreements, and to take all actions necessary or advisable to administer the Amended Plan or to effectuate its purposes. Subject to the terms of the Amended Plan, the administrator may accelerate the vesting of any Award, allow the exercise of unvested Awards, and may modify, replace, cancel or renew any Award.

Indemnification. We will indemnify and defend members of the Committee and their delegates to the extent permitted by law on an after-tax basis against all reasonable expenses, including attorneys' fees, actually and necessarily incurred in connection with the defense of any claim, investigation, action, suit or proceeding, or in connection with any appeal therein, to which they or any of them may be a party by reason of any action taken or failure to act under or in connection with the Amended Plan, or any Award granted thereunder, and against all amounts paid by them in settlement thereof (provided such settlement is approved by the Company) or paid by them in satisfaction of a judgment in any such claim, investigation, action, suit or proceeding, except in relation to matters as to which it shall be adjudged in such claim, investigation, action, suit or proceeding that such person is liable for gross negligence, bad faith or intentional misconduct; provided, however, that within 30 days after the institution of such claim, investigation, action, suit or proceeding, such person shall offer to us, in writing, the opportunity at our expense to defend the same.

Minimum Vesting. Time-based awards granted to employees under the Amended Plan are subject to a one-year minimum vesting requirement other than in the case of death, disability, retirement, separation of service or a Corporate Transaction. Time-based awards granted to directors under the Amended Plan may not vest until the earlier of one year from the grant date and the next annual meeting of the stockholders, other than in the case of death, disability or a Corporate Transaction.

Eligibility. The Administrator may grant Options that are intended to qualify as incentive stock options (ISOs) only to employees of the Company or an affiliate that is a "parent corporation" or "subsidiary corporation" within the meaning of Section 424 of the Code, and may grant all other Awards to any employee, director or consultant. The Amended Plan and the discussion below use the term "Grantee" to refer to the holder of an Award, or the shares of common stock issuable or issued upon exercise, vesting or settlement of an Award, under the Amended Plan.

Options. Options granted under the Amended Plan provide Grantees with the right to purchase shares of common stock at a predetermined exercise price. The Administrator may grant Options that are intended to qualify as ISOs or Options that do not so qualify (Non-Qualified Stock Options). To qualify as ISOs, Options must meet additional federal tax requirements, including a \$100,000 limit on the value of shares subject to ISOs that first become exercisable by a Grantee in any one calendar year.

Exercise Price of Options. The exercise price of ISOs granted to Grantees who own more than ten percent of the common stock of the Company or an affiliate on the grant date of the ISO may not be less than 110% of the fair market value of the shares of common stock subject to the ISO on the grant date. The exercise price of all other Options may not be less than 100% of the fair market value of the shares of common stock subject to the Option on the grant date.

Exercise of Options. To the extent exercisable in accordance with the applicable Award agreement, each Option may be exercised in whole or in part, and from time to time during its term, subject to earlier termination relating to a Grantee's termination of continuous service. With respect to Options, the Administrator has the discretion to accept payment of the exercise price by any of the following methods (or any combination of them): cash or check in U.S. dollars, promissory note with such recourse, interest, security and redemption provisions as the Administrator determines, surrender of shares of common stock, broker assisted exercise, with respect to Options that are not ISOs, by net exercise or by past or future services rendered to the Company or an affiliate. No more than 4,600,000 shares of common stock may be granted in the form of incentive stock options.

Prohibition on Repricing. Except in connection with certain corporate adjustment events, we may not, without stockholder approval, amend an Award granted under the Amended Plan to reduce the Award's exercise price per share, cancel and regrant new Awards with lower prices per share than the original price per share of the cancelled Awards, or cancel any Awards in exchange for cash or the grant of replacement Awards with an exercise price that is less than the exercise price of the original Awards, essentially having the effect of a repricing.

Restricted Stock and Restricted Stock Units. The Administrator may grant (1) shares of restricted stock that are forfeitable until certain vesting requirements are met and (2) RSUs that represent the right to receive payment, in cash or in shares of common stock or other securities or a combination thereof, subject to the passage of time and continuous service or the attainment of performance criteria as established by the Administrator. The Administrator has discretion to determine the terms and conditions under which a Grantee's interests in restricted stock and RSUs become vested and non-forfeitable.

Unrestricted Stock. The Administrator may grant unrestricted stock in lieu of paying cash compensation.

Dividend Equivalent Rights. The Administrator may grant awards of dividend equivalent rights, which entitle the Grantee to compensation measured by dividends paid with respect to shares of common stock.

Income Tax Withholding. As a condition for the issuance of shares of common stock pursuant to Awards, the Amended Plan requires the Grantee to make such arrangements as we may require for satisfaction of any applicable federal, state, local or foreign withholding tax obligations that may arise in connection with the Award or the issuance of shares of common stock. Subject to approval by the Administrator, Grantees may elect to have their tax withholding obligations satisfied by tendering previously owned shares of common stock or authorizing the Company to withhold shares of common stock to be issued pursuant to exercise or vesting. Any shares held back to satisfy such tax withholding will not be available for future issuance under the Amended Plan.

Transferability. Unless the Administrator provides otherwise, in its sole discretion, no Award may be sold, pledged, assigned, hypothecated, transferred, or disposed of in any manner other than by will or by the laws of descent or distribution and may be exercised, during the lifetime of the Grantee, only by the Grantee. Notwithstanding the foregoing, the Grantee may designate one or more beneficiaries of the Grantee's Award in the event of the Grantee's death on a beneficiary designation form provided by the Administrator.

Certain Corporate Transactions. Effective upon the consummation of a Corporate Transaction, all outstanding Awards under the Amended Plan shall terminate unless they are assumed or replaced in connection with the Corporate Transaction. To the extent all outstanding Awards granted under the Amended Plan shall terminate, except as may be otherwise expressly provided in the relevant Award Agreement, all Awards with solely time-based vesting that are not vested and/or exercisable immediately prior to the effective time of the Corporate Transaction shall become fully vested and exercisable as of immediately prior to the effective time of the Corporate Transaction and all Awards with conditions and restrictions relating to the attainment of performance goals shall be deemed to vest and become nonforfeitable as of the Corporate Transaction as provided in the relevant Award Agreement or if not provided for in the relevant Award Agreement shall be deemed to vest and become nonforfeitable as of the Corporate Transaction assuming the higher of (a) achievement of all relevant performance goals at the "target" level (prorated based upon the length of time within the performance period that has elapsed prior the Corporate Transaction or partial achievement of the performance goals), or (b) actual achievement of all relevant performance goals as of the date of such Corporate Transaction. In the event of such termination of the Awards, the Company shall have the option (in its sole discretion) to (1) make or provide for a payment, in cash or in kind, to the Grantees holding Options and SARs, in exchange for the cancellation thereof, in an amount equal to the difference between (A) the Sale Price multiplied by the number of Shares subject to outstanding Options and SARs and (B) the aggregate exercise price of all such outstanding Options and SARs (provided that, in the case of an Option or SAR with an exercise price equal to or more than the Sale Price, such Option or SAR shall be cancelled for no consideration); or (2) permit each Grantee, within a specified period of time prior to the consummation of the Corporate Transaction as determined by the Administrator, to exercise all outstanding Options and SARs (to the extent then exercisable including due to acceleration as contemplated by Section 13(a) of the Amended Plan if the Awards are not assumed or replaced) held by such Grantee as of immediately prior to the effective time of the Corporate Transaction. In the event of a termination of Awards pursuant to Section 13(a) of the Amended Plan, the Company shall also have the option (in its sole discretion) to make or provide for a payment, in cash or in kind, to the Grantees holding other Awards in an amount equal to the Sale Price multiplied by the number of vested Shares under such Awards. For purposes of Section 13(a) of the Amended Plan, "Sale Price" means the value as determined by the Administrator of the consideration payable, or otherwise to be received by stockholders, per share pursuant to a Corporate Transaction.

The Administrator has the authority, exercisable either in advance of any actual or anticipated Corporate Transaction or at the time of an actual Corporate Transaction and exercisable at the time of the grant of an Award under the Amended Plan or any time while an Award remains outstanding, to provide for the full or partial automatic vesting and exercisability of one or more outstanding unvested Awards under the Amended Plan and the release from restrictions on transfer and repurchase or forfeiture rights of such Awards in connection with a Corporate Transaction on such terms and conditions as the Administrator may specify. The Administrator also shall have the authority to condition any such Award vesting and exercisability or release from such limitations upon the subsequent termination of the continuous service of the Grantee within a specified period following the effective date of the Corporate Transaction. The Administrator may provide that any Awards so vested or released from such limitations in connection with a Corporate Transaction shall remain fully exercisable until the expiration or sooner termination of the Award. Any ISOs accelerated in connection with a Corporate Transaction shall remain exercisable as an ISO under the Code only to the extent the \$100,000 limitation of Section 422(d) of the Code is not exceeded.

“Corporate Transaction” means any of the following transactions, provided, however, that the Administrator shall determine under (4) and (5) whether multiple transactions are related, and its determination shall be final, binding and conclusive: (1) a merger or consolidation in which we are not the surviving entity, except for a transaction the principal purpose of which is to change the state in which we are incorporated; (2) the sale, transfer or other disposition of all or substantially all of our assets; (3) the complete liquidation or dissolution of the Company; (4) any reverse merger or series of related transactions culminating in a reverse merger (including, but not limited to, a tender offer followed by a reverse merger) in which we are the surviving entity but (A) the shares of common stock outstanding immediately prior to such merger are converted or exchanged by virtue of the merger into other property, whether in the form of securities, cash or otherwise, or (B) in which securities possessing more than 50% of the total combined voting power of our outstanding securities are transferred to a person or persons different from those who held such securities immediately prior to such merger or the initial transaction culminating in such merger; or (5) acquisition in a single or series of related transactions by any person or related group of persons (other than the Company or by a Company-sponsored employee benefit plan) of beneficial ownership (within the meaning of Rule 13d-3 of the Exchange Act) of securities possessing more than 50% of the total combined voting power of our outstanding securities.

Term of the Amended Plan; Amendments and Termination. The term of the Amended Plan is ten years from May 30, 2018, except that no ISOs may be granted after April 5, 2028. The Board may, from time to time, amend, alter, suspend, discontinue or terminate the Amended Plan; provided, that any amendment to increase the number of shares of common stock available for Awards under the Amended Plan and certain other amendments will be subject to stockholder approval. Additionally, no amendment, suspension or termination of the Amended Plan shall materially and adversely affect Awards already granted unless it relates to an adjustment pursuant to certain transactions that change our capitalization or it is otherwise mutually agreed between the Grantee and the Administrator.

Notwithstanding the foregoing, the Administrator may adopt such amendments to the Amended Plan and the applicable award agreement or adopt other policies and procedures (including amendments, policies and procedures with retroactive effect), or take any other actions, that the Administrator determines are necessary or appropriate to (1) exempt the Award from Section 409A of the Code and/or preserve the intended tax treatment of the benefits provided with respect to the Award, or (2) comply with the requirements of Section 409A of the Code and related Department of Treasury guidance.

Expected U.S. Federal Income Tax Consequences. The following is a brief summary of certain U.S. federal tax consequences of certain transactions under the Amended Plan. This summary is not intended to be complete and does not describe state or local tax consequences. Grantees in the Amended Plan should review the current tax treatment with their individual tax advisors at the time of grant, exercise, vesting or any other transaction relating to an Award or the underlying shares.

Under the Code, we will generally be entitled to a deduction for federal income tax purposes at the same time and in the same amount as the ordinary income that Grantees recognize pursuant to Awards. For Grantees, the expected U.S. federal income tax consequences of Awards are as follows:

- *Non-Qualified Stock Options.* A Grantee will not recognize income at the time a Non-Qualified Stock Option is granted. At the time a Non-Qualified Stock Option is exercised, the Grantee will recognize ordinary income in an amount equal to the excess of (a) the fair market value of the shares of common stock issued to the Grantee on the exercise date over (b) the exercise price paid for the shares. At the time of sale of shares acquired pursuant to the exercise of a Non-Qualified Stock Option, the appreciation (or depreciation) in value of the shares after the date of exercise will be treated either as short-term or long-term capital gain (or loss) depending on how long the shares have been held.
- *ISOs.* A Grantee will not recognize income upon the grant of an ISO. There are generally no tax consequences to the Grantee upon exercise of an ISO (except that the amount by which the fair market value of the shares at the time of exercise exceeds the option exercise price is a tax preference item possibly giving rise to an alternative minimum tax). If the shares of common stock are not disposed of within two years from the date the ISO was granted or within one year after the ISO was exercised, any gain realized upon the subsequent disposition of the shares will be characterized as long-term capital gain and any loss will be characterized as long-term capital loss. If either of these holding period requirements are not met, then a “disqualifying disposition” occurs and (a) the Grantee recognizes ordinary income in the amount by which the fair market value of the shares at the time of exercise exceeded the exercise price for the ISO and (b) any remaining amount realized on disposition (except for certain “wash” sales, gifts or sales to related persons) will be characterized as capital gain or loss.
- *Stock Appreciation Rights.* A Grantee will not recognize income at the time a SAR is granted. At the time a SAR is exercised, the Grantee will recognize ordinary income in an amount equal to the excess of (a) the fair market value of the shares of common stock issued or the amount of cash paid, to the Grantee on the exercise date over (b) the exercise price paid for the shares. At the time of sale of shares acquired pursuant to the exercise of a SAR, the appreciation (or depreciation) in value of the shares after the date of exercise will be treated either as short-term or long-term capital gain (or loss) depending on how long the shares have been held.
- *Restricted Stock and Restricted Stock Units.* In general, a Grantee will not recognize income at the time of grant of restricted stock or RSUs, unless the Grantee elects with respect to restricted shares to accelerate income taxation to the date of the Award by making a timely Section 83(b) election. If the Grantee makes such an election, such Grantee would recognize ordinary compensation income equal to the excess of the fair market value of the restricted shares on the grant date over any amount the Grantee pays for them (in which case subsequent gain or loss would be capital in nature). In the absence of an election to accelerate income taxation to the date of an Award, a Grantee will recognize taxable compensation income at the time the Award vests in an amount equal to the excess of the fair market value of any property that the Grantee receives over the amount paid for such property by the Grantee, or, in the case of RSUs, upon receipt of cash or shares of common stock.
- *Unrestricted Stock.* In general, a Grantee will recognize income at the time of grant of unrestricted stock.
- *Parachute Payments.* Under certain circumstances, the accelerated vesting, cash-out or accelerated lapse of restrictions on Awards in connection with a change in control of the Company might be deemed an “excess parachute payment” for purposes of the golden parachute tax provisions of Code Section 280G, and the Grantee may be subject to a 20% excise tax and we may be denied a tax deduction.

- *Income Taxes and Deferred Compensation.* The Amended Plan provides that Grantees are solely responsible and liable for the satisfaction of all taxes and penalties that may arise in connection with Awards (including any taxes arising under Section 409A of the Code). Nevertheless, the Amended Plan permits the Administrator to establish one or more programs under the Amended Plan to permit selected Grantees the opportunity to elect to defer receipt of consideration upon exercise or vesting of an Award or other event that absent the election would entitle the Grantee to payment or receipt of shares of common stock or other consideration under an Award. The Administrator may establish the election procedures, the timing of such elections, the mechanisms for payments of, and accrual of interest or other earnings, if any, on amounts, shares of common stock or other consideration so deferred, and such other terms, conditions, rules and procedures that the Administrator deems advisable for the administration of any such deferral program.

Eligibility

Persons eligible to participate in the Amended Plan are our employees, directors and other consultants and those of our affiliates as selected from time to time by the Administrator in its discretion. As of April 13, 2020, approximately 124 individuals are currently eligible to participate in the Amended Plan, which includes six executive officers, 111 full-time employees who are not executive officers and seven non-employee directors. At this time, we do not have any plans to make future grants to any consultants.

New Plan Benefits

Because the grant of Awards under the Amended Plan is within the discretion of the Administrator, we cannot determine the dollar value or number of shares of common stock that will in the future be received by or allocated to any participant in the Amended Plan. Accordingly, in lieu of providing information regarding benefits that will be received under the Amended Plan, the following table provides information concerning the benefits that were received by the following persons and groups during 2019 under the 2018 Plan: (a) each named executive officer; (b) all current executive officers, as a group; (c) all current directors who are not executive officers, as a group; and (d) all employees who are not executive officers as a group.

| Name and Position | Options | | Stock Awards | |
|---|--------------------------------------|----------------------|----------------------|----------------------|
| | Weighted Average Exercise Price (\$) | Number of Awards (#) | Dollar Value (\$)(1) | Number of Awards (#) |
| John G. McHutchison, A.O., M.D. <i>Chief Executive Officer and President</i> | N/A | — | 2,251,000 | 200,000 |
| Thomas J. Russo, CFA <i>Chief Financial Officer</i> | N/A | — | N/A | — |
| Luisa M. Stamm, M.D., Ph.D. <i>Chief Medical Officer</i> | N/A | — | 193,320 | 12,000 |
| Derek A. Small, <i>Former Chief Executive Officer and President</i> | 19.69 | 65,000 | 639,925 | 32,500 |
| All current executive officers, as a group(2) | 17.82 | 152,500 | 3,674,945 (3) | 274,500 |
| All current directors who are not executive officers, as a group(4) | 15.22 | 80,000 | N/A | — |
| All current employees who are not executive officers, as a group(5) | 17.18 | 696,750 | 2,883,863 (3) | 153,152 |

(1) The valuation of stock awards is based on the grant date fair value computed in accordance with FASB ASC Topic 718. For a discussion of the assumptions used in calculating these values, see Note 7 to of the consolidated financial statements included in the Annual Report on Form 10-K for the fiscal year ended December 31, 2019.

(2) Includes grants made to Mr. Small, because the grants referenced occurred during his tenure as Chief Executive Officer and President.

(3) Represents the aggregate grant date fair value for the group.

(4) Subject to the terms of the Amended Plan, each non-employee director is expected to be granted options to purchase 10,000 shares of common stock at the Board meeting following the 2020 Annual Meeting.

(5) Additionally, we granted 19,800 SARs under the 2018 Plan to current employees that are not executive officers during 2019.

Equity Plans

The following table sets forth information as of December 31, 2019 regarding shares of common stock that may be issued under our equity compensation plans:

| Plan Category | Number of securities to be issued upon exercise of outstanding options, warrants and rights (a) | Weighted average exercise price of outstanding options, warrants and rights ⁽¹⁾ (b) | Number of securities remaining available for future issuance under equity compensation plans (excluding securities reflected in column (a)) (c) |
|--|--|---|--|
| Equity compensation plans approved by our stockholders | 5,087,018 ⁽²⁾ | \$ 14.93 | 1,741,525 ⁽³⁾ |
| Equity compensation plans not approved by our stockholders | 1,300,349 ⁽⁴⁾ | \$ 19.40 | 10,425 ⁽⁵⁾ |
| Total | 6,387,367 | | 1,751,950 |

(1) The weighted average exercise price is calculated solely based on the exercise prices of the outstanding stock options and does not reflect the shares that will be issued upon the vesting of outstanding awards of RSUs, which have no exercise price.

(2) This number includes the following: 469,400 shares subject to stock options granted under the 2010 Equity Incentive Plan (2010 Plan); 2,432,233 shares subject to outstanding awards granted under the Assembly Biosciences, Inc. Amended and Restated 2014 Stock Incentive Plan (2014 Plan), of which 2,199,713 were subject to outstanding stock options and 232,520 were subject to outstanding RSUs; 1,753,947 shares subject to outstanding awards granted under the 2018 Plan, of which 1,207,949 were subject to outstanding stock options, 511,198 were subject to outstanding RSUs and 34,800 are underlying SARs, which are not included in column (a), but are reflected in column (c); and 466,238 options assumed by us in connection with our merger with Assembly Pharmaceuticals. This number excludes purchase rights currently accruing under the Assembly Biosciences, Inc. 2018 Employee Stock Purchase Plan (2018 ESPP).

(3) This number includes: no shares under the 2010 Plan, which has been frozen; 217,779 shares available for issuance under the 2014 Plan; 1,204,599 shares available for issuance under the 2018 Plan; and 319,147 shares reserved for issuance under the 2018 ESPP. As of March 2, 2020, assuming each participant purchases the maximum number of shares in the current offering period, no more than 61,000 shares are subject to purchase in the current offering, which ends on May 14, 2020.

(4) This number includes 785,053 shares subject to outstanding awards granted under the 2017 Inducement Award Plan (2017 Inducement Plan), of which 770,053 were subject to outstanding stock options and 15,000 were subject to outstanding RSUs; 500,000 shares subject to stock options granted under the 2019 Inducement Award Plan (2019 Inducement Plan); 15,296 shares subject to warrants granted to one consultant.

(5) This number includes 10,425 shares available for issuance under the 2017 Inducement Plan and no shares under the 2019 Inducement Plan.

As of April 13, 2020, there are approximately 170,286 shares of common stock remaining available and unallocated for issuance under the 2018 Plan.

Required Vote

Assuming a quorum is present, to be approved, a majority of the shares of common stock held by holders present in person or represented by proxy at the Annual Meeting and entitled to vote on Proposal No. 4 must be voted “FOR” approval of the Amendment. Abstentions will be deemed a vote against Proposal No. 4. Broker non-votes will not be considered towards vote totals on Proposal No. 4.

Recommendation of the Board of Directors

THE BOARD OF DIRECTORS RECOMMENDS A VOTE “FOR” APPROVAL OF THE AMENDMENT TO THE ASSEMBLY BIOSCIENCES, INC. 2018 STOCK INCENTIVE PLAN.

**PROPOSAL NO. 5: APPROVAL OF AN AMENDMENT AND RESTATEMENT OF OUR FOURTH AMENDED AND RESTATED
CERTIFICATE OF INCORPORATION TO ENABLE STOCKHOLDERS WHO HOLD IN THE AGGREGATE AT LEAST 25% OF OUR
OUTSTANDING COMMON STOCK TO REQUEST SPECIAL STOCKHOLDER MEETINGS**

Overview

Stockholders do not presently have the right to request us to call a special meeting of stockholders. The Board's special meeting proposal is a result of the Board's ongoing review of our corporate governance principles and its consideration of the stockholder special meeting proposal put forth by James McRitchie in Proposal No. 6 (the Stockholder Proposal). After due consideration and a balancing of the competing interests discussed below, the Board has determined that stockholders should be provided the opportunity to consider this alternative. Accordingly, the Board has approved and recommends that stockholders approve, an amendment and restatement to our certificate of incorporation (the Proposed Charter Amendment) to permit stockholders who own, in the aggregate, at least 25% of our outstanding shares of common stock on a "net long" basis to call a special meeting of stockholders, subject to the procedures, terms and conditions set forth in our bylaws from time to time. Currently only a majority of the Board may call a special meeting of stockholders. The description in this proxy statement of the Proposed Charter Amendment is qualified in its entirety by reference to, and should be read in conjunction with, the full text of the Proposed Charter Amendment, which is attached to this proxy statement as Appendix C and conformed to show the changes made by the Proposed Charter Amendment.

Rationale for Our Proposed Charter Amendment

The ability of stockholders to call special meetings is increasingly considered an important aspect of good corporate governance. While the Board recognizes that providing a stockholder right to call special meetings is consistent with good corporate governance policies and practices, the Board also believes that special meetings of stockholders should be extraordinary events that are held only when strategic concerns or other similar considerations require that the matters to be addressed not be delayed until the next annual meeting. Moreover, because special meetings are expensive and time consuming for management and potentially disruptive to a company's normal business operations, the Board believes that a small percentage of stockholders should not be given the right to call special meetings of the stockholders for their own interests, which may not be shared by the majority of our stockholders.

The Board believes special stockholder meetings should only be called to consider matters that a significant portion of stockholders believe warrant immediate attention and cannot be delayed for consideration until the next annual meeting. To this end, the Board believes that its proposal strikes the appropriate balance between enhancing the rights of all stockholders and preventing the disruption and inappropriate use of corporate assets that would arise if, as the Stockholder Proposal provides, the required ownership threshold were set so low that owners of a small minority of shares could call a special stockholder meeting to consider a matter of little or no interest to most stockholders or that a significant majority of our stockholders may oppose.

To be clear, the Board believes stockholders should be permitted to call special stockholder meetings, but the Board must also consider the disruption that special meetings cause and the substantial costs they entail. Organizing and preparing for a special meeting involves substantial expense and requires significant attention from our management, diverting their focus from performing their primary functions of overseeing and operating our business in the best interests of all stockholders. For every special meeting called, we must provide each stockholder with a notice of meeting and proxy materials at significant legal, printing and mailing expenses, as well as incur the other costs normally associated with holding a stockholder meeting.

In addition, the Board has evaluated recent stockholder proposals and rights to call special meetings and believes that it must, in the best interests of all of our stockholders, limit the ability of a small minority of stockholders (such as the 15% proposed in the Stockholder Proposal) to utilize the mechanism of special meetings for their own interests, which may not be shared more broadly by our stockholders. To the contrary, the Board believes that only stockholders with significant, full and continuing economic interests and voting rights in our common stock should be entitled to request that we call a special meeting to consider a stockholder proposal. Too low of a threshold on the ability to call a special meeting could expose other stockholders to the risk of special meetings being called by a small group of stockholders focused on narrow or short-term interests, rather than actions that are in the long-term best interests of us and our stockholders.

It is also important to note that our bylaws provide proxy access, allowing a stockholder or group of up to 20 stockholders continuously owning an aggregate of 3% or more of our outstanding common stock for at least three years to nominate and include in our proxy materials director nominees constituting up to the greater of 20% of the number of directors then in office or two nominees, provided the stockholders and nominees otherwise satisfy the requirements of our bylaws.

Because of these considerations, the Board believes that establishing an aggregate ownership threshold of at least 25% of the outstanding common stock, on a “net long” basis, along with specified procedural requirements and limitations, for stockholders to call a special meeting achieves a reasonable balance between enhancing stockholder rights and adequately protecting the long term interests of us and our stockholders. The Board believes that an ownership threshold of at least 25% of the outstanding common stock is appropriate based on our current enterprise value and stockholder composition, as it would provide our stockholders with a meaningful right to request a special meeting and mitigate the risk that corporate resources are allocated inappropriately solely to serve the narrow self-interests of a small minority of stockholders.

The Proposed Charter Amendment and Proposed Bylaws Amendment

A summary of the Proposed Charter Amendment is provided below:

- A special stockholder meeting may be requested by one or more stockholders that own at least 25% in aggregate voting power of all shares entitled to vote on the matters to be brought before the proposed special meeting, in each case subject to any procedures, terms and conditions as may be further set forth in our bylaws from time to time;
- Only those matters set forth in the notice of the special meeting or brought by or at the direction of the Board may be considered or acted upon at a special meeting of stockholders.
- The requesting stockholder(s) must (1) continue to own (for the holding period set forth in our bylaws as in effect from time to time) shares representing at least 25% (in the aggregate) of the then voting power of all shares entitled to vote on the matters to be brought before the proposed special meeting, (2) provide information in writing regarding such stockholder(s), their stock ownership and the matters that they request to bring before the proposed special meeting and (3) comply with procedures and other terms and conditions relating to special meetings as set forth in our bylaws from time to time.
- A holder shall be deemed to “own” only those shares for which it possesses both (1) full voting and investment rights pertaining to such shares, and (2) a full economic interest in (including the opportunity for profit from and the risk of loss on) such shares, which term may be further defined in our bylaws from time to time.

If the Proposed Charter Amendment is approved by the stockholders pursuant to this Proposal No. 5 and filed with the Delaware Secretary of State, thereby resulting in the Proposed Charter Amendment becoming effective, then an amendment and restatement to our current amended and restated bylaws (the Proposed Bylaws Amendment), which has been approved by the Board subject to, and contingent upon, the Proposed Charter Amendment becoming effective, will become effective. The Proposed Bylaws Amendment will establish the procedures and other terms and conditions for stockholders, who hold in the aggregate at least 25% of our outstanding common stock, to call a special meeting. Set forth below is a summary of the terms and conditions set forth in the Proposed Bylaws Amendment:

- A special stockholder meeting may be requested by one or more stockholders that own at least 25% in aggregate voting power of all shares entitled to vote on the matters to be brought before the proposed special meeting. As discussed below the “ownership” concept is intended to reflect a “net long” position.
- Any requesting stockholder(s) must continue to satisfy the 25% level of stock ownership for the holding period set forth in our bylaws from time to time. This holding period will initially require that the requesting stockholder(s) satisfy the 25% requirement from the date of notice through date of the proposed special meeting, which shall occur within 120 days after a compliant special meeting request.

- Any requesting stockholder(s) must provide information in writing regarding such stockholder(s), their stock ownership and the matters that they request to bring before the proposed special meeting, and must satisfy other procedural requirements set forth in our Proposed Bylaws Amendment from time to time.
- If none of the stockholder(s) who submitted the special meeting request(s) (or their qualified representatives) appears at the stockholder requested special meeting to present the matter or matters to be brought before the special meeting as specified in the special meeting request(s), we need not present the matter or matters for a vote at the meeting, notwithstanding that we may have received proxies in respect of such vote.
- Stockholders requesting a special meeting may withdraw their request at any time prior to the meeting.

Our Proposed Charter Amendment and Proposed Bylaws Amendment use a “net long” definition of stock ownership for the purposes of determining whether requesting stockholders meet the 25% ownership threshold. Under the “net long” definition of stock ownership, we will deem a stockholder to only “own” those shares for which it possesses both (1) full voting and investment rights pertaining to such shares, and (2) a full economic interest in (including the opportunity for profit from and the risk of loss on) such shares. The Proposed Charter Amendment would also permit us to further define “net long” stock ownership in our bylaws from time to time. Currently, the Proposed Bylaws Amendment defines “own” as that term is used in our proxy access provision in Section 3.16 of our existing amended and restated bylaws (the Existing Bylaws). Specifically, the following shares do not count as “owned” for these purposes:

- Shares purchased or sold by such requesting stockholder that have not been settled or closed;
- Shares subject to short positions or otherwise sold short by such requesting stockholder;
- Shares borrowed by such requesting stockholder for any purpose or purchased by such stockholder pursuant to an agreement to resell to another person, or
- Shares subject to any hedging instrument or agreement, which instrument or agreement has, or is intended to have, or if exercised or settled would have, the purpose or effect of: (1) reducing in any manner, to any extent or at any time in the future, such stockholder’s full right to vote or direct the voting of any such shares and/or (2) hedging, offsetting or altering to any degree any gain or loss arising from the full economic interest in such shares by such stockholder.

Procedural Requirements

The Proposed Charter Amendment would also let us prescribe in our bylaws from time to time procedural requirements that a stockholder must satisfy to request a special stockholder meeting. The Proposed Bylaws Amendment provides for the following procedural requirements:

- Any special meeting request must set forth the same information as is required for stockholders proposing business at an annual stockholder meeting, including (1) the business proposed to be conducted at the meeting, (2) the name and address, as they appear on our books, of the stockholder(s) proposing such business, (3) the class and number of shares of our common stock that are beneficially owned by the requesting stockholders, (4) a representation that the requesting stockholder is a holder of record of our common stock entitled to vote at such meeting and intends to appear in person or by proxy at the meeting to propose such business, and (5) a statement whether or not the requesting stockholder(s) giving the notice and/or making a proposal, if any, will deliver a proxy statement and form of proxy to holders of, in the case of a business proposal, at least the percentage of voting power of all of the shares of our capital stock required under applicable law to approve the proposal (such statement being the Solicitation Statement).
- Any stockholder(s) requesting a special meeting must hold the requisite number of shares on the date of request and through the date of the special meeting and provide updated stock ownership information at the record date for, and within five business days before the date of, the special meeting.

- A special meeting request will not be valid if:
 - the proposed meeting relates to an item of business that is the same or substantially similar to any item of business that stockholders voted on at a stockholder meeting that occurred within 120 days preceding the date of such request; or
 - it is received within the period commencing 90 days prior to the anniversary of the date of the most recent annual stockholder meeting and ending on the date of the next annual stockholder meeting.
- The stockholder request for a special meeting may not relate to the nominations of persons for election to the Board unless such special meeting is held in lieu of an annual meeting of stockholders in accordance with Section 2.2 of the Proposed Bylaws Amendment.

Our Board believes that the requirements described above are important to, among other things, avoid duplicative and unnecessary special meetings regarding matters recently considered by stockholders or that stockholders will imminently consider at an upcoming stockholder meeting.

The Related Stockholder Proposal

As described under Proposal No. 6 below on page 50, a stockholder has notified us that he intends to submit a matter for stockholder consideration at our Annual Meeting. The Stockholder Proposal also relates to a stockholder's ability to request a special meeting. Although our Proposed Charter Amendment and Proposed Bylaws Amendment and the Stockholder Proposal relate to the same subject matter, the two proposals differ as follows:

- This Proposal No. 5 is binding on us, which means that if our stockholders approve our Proposed Charter Amendment, then we will amend our Fourth Amended and Restated Certificate of Incorporation (the Existing Charter) and Existing Bylaws as described above. In contrast, the Stockholder Proposal is not binding; it only asks (but does not require) that our Board establish a 15% stock ownership threshold for stockholders to request a special meeting. Under our Existing Charter, our Board does not have the authority to unilaterally adopt such amendments. Consequently, the Board would need to consider whether to submit detailed proposed amendments for stockholder consideration at a future meeting. Although the Stockholder Proposal is not binding, if our stockholders approve it and do not approve Proposal No. 5, our Board and our Nominating and Governance Committee would consider the Stockholder Proposal and further engage with our stockholders on it as a matter of good corporate governance.
- Our Proposed Charter Amendment and Proposed Bylaws Amendment provide for a stock-ownership threshold of 25% in aggregate voting power to request a special meeting. In contrast, the Stockholder Proposal provides for a 15% threshold. The stockholder proponent has not addressed why he believes that this lower 15% threshold is appropriate. We believe that our higher threshold protects our broader stockholder base from small groups of stockholders that may abuse the special meeting process for their own self-interest by calling numerous expensive, time consuming and distracting special meetings. Under the Stockholder Proposal, and based on our current stockholder composition, it would be possible for two or three stockholders to unilaterally call a special stockholders meeting. Our Board believes that a broader stockholder base should be required to call a special stockholders meeting.
- Our Proposed Charter Amendment and Proposed Bylaws Amendment contain procedural requirements that our Board believes are in the Company's and our stockholders' best interests to avoid abuse of the special meeting process. The Stockholder Proposal does not specify any such procedural protections. You should carefully read the Stockholder Proposal alongside this Proposal No. 5. You should also consider our "Board Statement in Opposition to the Stockholder Proposal" below on page 50, when considering how to vote on this Proposal No. 5 and the Stockholder Proposal.
- We believe that the additional right to call stockholder special meetings as provided in the Proposed Charter Amendment and Proposed Bylaws Amendment, when coupled with the existing ability of stockholders to present nominees and stockholder proposals at the annual meeting and the stockholders proxy access rights, affords our stockholders ample opportunities to have their concerns heard and addressed.

What If Our Stockholders Approve Both This Proposal No. 5 (our Proposed Charter Amendment) and Proposal No. 6 (the Stockholder Proposal), or Approve Only One of Them?

Our Stockholders may vote on both this Proposal No. 5 (our Proposed Charter Amendment) and Proposal No. 6 (the Stockholder Proposal). However:

- If our Proposed Charter Amendment receives a sufficient number of affirmative votes for approval as described below within this Proposal No. 5 under “Vote Required and Board of Directors’ Recommendation,” then it will be binding on us. In that event, our Proposed Charter Amendment and Proposed Bylaws Amendment will become effective, regardless of the voting outcome on the Stockholder Proposal. Also, in that event, we will not implement the Stockholder Proposal irrespective of its voting outcome (and even if the Stockholder Proposal also receives a majority affirmative vote as described in Proposal No. 6 under “Vote Required and Board of Directors’ Recommendations”).
- If the Stockholder Proposal receives a sufficient number of affirmative votes for approval and our Proposed Charter Amendment receives less than the number of affirmative votes necessary for approval, then our Board and our Nominating and Governance Committee will take the Stockholder Proposal under further advisement to determine appropriate next steps.
- If neither our Proposed Charter Amendment nor the Stockholder Proposal receives a sufficient number of affirmative votes for approval, then we will not implement either proposal. This means that our Existing Charter and Existing Bylaws will remain in effect without amendment.

If we proceed to implement our Proposed Charter Amendment and Proposed Bylaws Amendment in the circumstances described above, then our immediate next steps are outlined under “Additional Information” immediately below.

Additional Information

We have only summarized the Proposed Charter Amendment above, and you should review the full text of the Proposed Charter Amendment. We have attached a copy of our Existing Charter conformed to show proposed changes as Appendix C to this proxy statement, with the proposed deletions stricken through and proposed additions underlined in bold.

Note that although our Board has already approved our Proposed Charter Amendment and Proposed Bylaws Amendment, these amendments will only take effect if our stockholders also approve the Proposed Charter Amendment at the Annual Meeting. If so approved, then promptly after the Annual Meeting we intend to file our proposed Fifth Amended and Restated Certificate of Incorporation, as set forth in Appendix C, with the Secretary of State of the State of Delaware, at which time it will become effective. The Proposed Bylaws Amendment will become effective upon the Fifth Amended and Restated Certificate of Incorporation becoming effective.

If our stockholders do not approve our Proposed Charter Amendment, then we will not file our Fifth Amended and Restated Certificate of Incorporation, and neither it nor the related Proposed Bylaws Amendment will become effective. As noted above, this means that our Existing Charter and Existing Bylaws would remain in effect without amendment.

Vote Required

To be approved, a majority of the shares of common stock outstanding and entitled to vote on Proposal No. 5 must be voted “FOR” approval of the amendment and restatement of our Certificate of Incorporation to permit stockholders holding in the aggregate 25% of our outstanding common shares to request special stockholder meetings. Abstentions and broker non-votes will both be deemed a vote against Proposal No. 5.

Our Proposed Charter Amendment pursuant to this Proposal No. 5 is binding. If approved, this proposal would become effective upon the filing of the Proposed Charter Amendment with the Secretary of State of the State of Delaware, which we intend to do promptly after the required stockholder approval is obtained. Upon the approval of this Proposal No. 5 and the filing of the Proposed Charter Amendment with the Secretary of State of the State of Delaware, the Proposed Bylaws Amendment described above will become effective. If stockholders do not approve the Proposed Charter Amendment pursuant to this Proposal No. 5 by the requisite vote, then the Proposed Charter Amendment will not be filed with the Secretary of State of the State of Delaware, the Proposed Bylaws Amendment described above will not become effective and our stockholders will not have the ability to require us to call a special meeting of stockholders. Approval of our Proposed Charter Amendment pursuant to this Proposal No. 5 is not conditioned on approval or disapproval of the Stockholder Proposal set forth below.

Board of Directors’ Recommendation

THE BOARD OF DIRECTORS HAS UNANIMOUSLY APPROVED THIS PROPOSAL AND RECOMMENDS THAT YOU VOTE “FOR” THE AMENDMENT TO OUR CERTIFICATE OF INCORPORATION TO ENABLE STOCKHOLDERS WHO HOLD IN THE AGGREGATE AT LEAST 25% OF OUR OUTSTANDING COMMON STOCK TO CALL SPECIAL STOCKHOLDER MEETINGS.

PROPOSAL NO. 6: STOCKHOLDER PROPOSAL REGARDING SPECIAL STOCKHOLDER MEETINGS

James McRitchie has notified us that he intends to present Proposal No. 6 concerning our stockholders' ability to call a special stockholders meeting (set forth below) for stockholder consideration at our Annual Meeting. He has provided us with documentation indicating that he is the beneficial owner of at least \$2,000 in market value of shares of our common stock. The address of the stockholder will be provided to stockholders promptly upon written or oral request. We refer to his proposal as the "Stockholder Proposal." If the stockholder (or his "qualified representative") is present at the Annual Meeting and properly submits the Stockholder Proposal for a vote, then the Stockholder Proposal will be voted upon at the Annual Meeting. In accordance with federal securities laws, the Stockholder Proposal is presented below as submitted by the stockholder and is quoted verbatim and is presented in italics. We disclaim all responsibility for the content of the proposal and the supporting statement, including other sources referenced in the supporting statement.

FOR THE REASONS STATED IN THE BOARD OF DIRECTORS' STATEMENT IN OPPOSITION, WHICH FOLLOWS THE STOCKHOLDER PROPOSAL, THE BOARD OF DIRECTORS UNANIMOUSLY RECOMMENDS THAT YOU VOTE "AGAINST" THE STOCKHOLDER PROPOSAL.

Stockholder Proposal

Item 6 - Special Shareholder Meetings

RESOLVED: *The shareholders of Assembly Biosciences ('ASMB' or 'Company') hereby request that the Board of Directors take the steps necessary to amend our bylaws and each appropriate governing document to give holders with an aggregate of 15% net long of our outstanding common stock the power to call a special shareowner meeting. This proposal does not impact our Board's current power to call a special meeting.*

SUPPORTING STATEMENT: *ASMB does not allow shareholders to call a special meeting, whereas Delaware law, where ASMB is incorporated, allows those holding 10% of company shares to call a special meeting. A meaningful shareholder right to call a special meeting is a way to bring an important matter to the attention of both management and shareholders outside the annual meeting cycle. This is important because there could be 15-months between annual meetings.*

Currently, 65% of S&P 500 companies allow shareholders to call a special meeting. Well over half of S&P 1500 companies also allow shareholders this right.

According to Proxy Insight's "Resolution Tracker," in 2019 and 2018 the topic of providing shareholders a right to call a special meeting or to reduce the threshold to call such meetings won 60% at Rite Aid, 65% at Discover Financial Services, 60% at Occidental Petroleum, 57% at Netflix, 57% at Cognizant Technology Solutions, 66% at Spirit Aerosystems Holdings, and 94% at Nuance Communications.

Large funds such as Vanguard, TIAA-CREF, BlackRock and SSgA Funds Management, Inc. (State Street) support the right of shareholders to call special meetings. For example, BlackRock includes the following in its proxy voting guidelines: "[S]hareholders should have the right to call a special meeting ..."

We urge the Board to join the mainstream of major U.S. companies and establish a right for shareholders owning 15% of our outstanding common stock to call a special meeting.

Please vote for: Special Shareowner Meetings - Proposal No. 6

Board Statement in Opposition to the Stockholder Proposal

The Board has carefully considered this proposal and believes that it is not in the best interests of stockholders in light of the special meeting right that we have already approved and are asking our stockholders to adopt at the Annual Meeting, which will allow stockholders who hold, in the aggregate, at least 25% of our outstanding common stock to call a special meeting of stockholders (the Special Meeting Right). Accordingly, the Board unanimously recommends a vote "AGAINST" this proposal for the following reasons.

The Board believes that allowing stockholders who hold, in the aggregate at least 25% of our outstanding common stock, on a “net long” basis, to call a special meeting of stockholders achieves a reasonable balance between enhancing stockholder rights and adequately protecting the long-term interests of the Company and its stockholders. After careful consideration, on March 11, 2020, the Board of Directors:

- adopted a resolution setting forth an amendment and restatement to our Fourth Amended and Restated Certificate of Incorporation to remove the existing prohibition on the right of stockholders to call a special meeting and instead permit stockholders who hold, in the aggregate, at least 25% of our outstanding common stock to call a special meeting of stockholders, subject to any procedures, terms and conditions as may be further set forth in our bylaws (the Proposed Charter Amendment), and
- reviewed and, contingent upon the stockholders approving the Proposed Charter Amendment and it being filed with the Secretary of State of the State of Delaware, approved the terms of proposed amendments to our Amended and Restated Bylaws, as summarized in Proposal No. 5, in order to permit stockholders who hold, in the aggregate, at least 25% of our outstanding common stock to call a special meeting of stockholders, which shall become effective upon the Proposed Charter Amendment becoming effective. At the Annual Meeting, we are recommending that our stockholders approve the Proposed Charter Amendment, in order to allow stockholders who hold, in the aggregate, at least 25% of our outstanding common stock to call a special meeting of stockholders.

A 25% ownership threshold provides a procedural safeguard against abuse, corporate waste and investors with short-term goals. A lower 15% ownership threshold will risk giving a stockholder or small group of stockholders a disproportionate amount of influence over our affairs.

Our Special Meeting Right as set forth in Proposal No. 5 strikes the appropriate balance between ensuring that stockholders have the ability to call a special meeting to act on extraordinary and urgent matters, while at the same time protecting against a misuse of this right by one stockholder or a small number of stockholders whose interests may not be aligned with the remaining 85% of our stockholders.

Failure to aggregate sufficient stock ownership to reach the 25% ownership threshold would be a strong indicator that sufficient interest among the majority of stockholders does not exist to warrant calling a special meeting. Lowering this threshold risks giving a single stockholder or a very small group of stockholders a disproportionate amount of influence over our affairs. Convening a special meeting of stockholders imposes significant costs, both administrative and operational.

Our Board members, management and employees must devote a significant amount of time and attention to preparing for a special meeting, which distracts them from their primary focus of operating our business in the best interest of stockholders in order to maximize long-term financial returns. In addition, with each special meeting, we must incur significant expenses in order to prepare the disclosures required for such meeting, print and distribute materials, solicit proxies and tabulate votes. As a result, special meetings of stockholders should be limited to circumstances where a substantial number of stockholders believe a matter is sufficiently urgent and extraordinary to justify calling a special meeting.

Our Special Meeting Right also serves as a protective mechanism against undue influence of investors with short-term goals. A 25% special meeting threshold ensures that a special meeting may only be called by a stockholder or group of stockholders with a substantial and long-term stake in our Company. The Special Meeting Right appropriately safeguards stockholder interests and prevents corporate waste, while at the same time ensuring that stockholders can call special meetings when appropriate.

Our Board weighed these competing considerations and determined that the proposed 25% ownership threshold in our Proposed Charter Amendment, combined with other procedural requirements set forth in the Proposed Bylaws Amendment, strike the appropriate balance between enhancing stockholder rights and protecting stockholder interests.

We are committed to strong and effective corporate governance policies and practices and provide sufficient avenues for stockholders to meaningfully engage in Company affairs.

Our existing governance policies and practices provide stockholders with numerous avenues to address and discuss our business and governance policies with the Board and ensure that our Board acts independently and maintains accountability to our stockholders. This includes the following:

- Seven of our eight director nominees are independent, the one exception being our CEO, Dr. McHutchison;
- William R. Ringo, Jr., an independent director, serves as Chair of the Board and regularly presides over executive sessions of the Board without the CEO being present;
- The Chair of the Board is designated solely by the independent directors of the Board;
- All four Board committees are composed solely of independent directors;
- We provide for the annual election of all of our directors and do not have a staggered Board;
- We conduct annual Board and committee assessments;
- We provide for proxy access, allowing a stockholder or group of up to 20 stockholders continuously owning an aggregate of 3% or more of our outstanding common stock for at least three years to nominate and include in our proxy materials director nominees constituting up to the greater of 20% of the number of directors then in office or two nominees, provided the stockholders and nominees otherwise satisfy the requirements of our bylaws;
- In addition to proxy access, our stockholders have the ability to (1) recommend director candidates to the Nominating and Governance Committee for evaluation under the same criteria used for director candidates recommended by sources other than our stockholders and (2) propose any business to be considered by the stockholders at the Annual Meeting or nominate director candidates other than through (A) a proposal in the proxy statement pursuant to Securities and Exchange Commission regulations or (B) proxy access, upon timely written notice setting forth the specified information described in our bylaws concerning the proposed business or nominee; and
- We do not have a stockholder rights plan, also known as a poison pill.

In addition, we strive to maintain an open dialogue with our stockholders and believe investor input enables the Board to more effectively evaluate our governance practices. Given these existing policies and practices and the Special Meeting Right, the Board believes that the approval of this proposal will not make a meaningful difference in our stockholders' ability to engage with the Board or influence our business or governance policies but will risk giving a small group of stockholders a disproportionate amount of influence over our affairs.

For the above reasons, the Board does not believe that it is in the best interests of the Company or its stockholders to adopt the Stockholder Proposal.

Vote Required and Board of Directors' Recommendation

Assuming a quorum is present, to be approved, a majority of the shares of common stock held by holders present in person or represented by proxy at the Annual Meeting and entitled to vote on Proposal No. 6 must be voted "FOR" approval of stockholder proposal requesting the Board to take steps necessary to give stockholders holding at least 15% of our outstanding common stock the right to request special stockholder meetings, if properly presented. Abstentions will be deemed a vote against Proposal No. 6. Broker non-votes will not be considered toward vote totals on Proposal No. 6.

THE BOARD OF DIRECTORS UNANIMOUSLY URGES STOCKHOLDERS TO VOTE "AGAINST" THE STOCKHOLDER PROPOSAL TO PERMIT STOCKHOLDERS WHO HOLD IN THE AGGREGATE AT LEAST 15% OF THE VOTING POWER OF THE OUTSTANDING SHARES OF THE COMPANY TO CALL A SPECIAL MEETING OF STOCKHOLDERS.

EXECUTIVE OFFICERS

As of April 13, 2020, our executive officers are: John G. McHutchison, A.O., M.D., our Chief Executive Officer and President; Thomas J. Russo, CFA, our Chief Financial Officer; Luisa M. Stamm, M.D., Ph.D., our Chief Medical Officer; Richard J. Colunno, Ph.D., our Executive Vice President and Chief Scientific Officer of Virology Operations; Jason A. Okazaki, our Chief Legal and Business Officer; and Jacqueline S. Papkoff, Ph.D., our Senior Vice President, Chief Scientific Officer Microbiome. Information regarding each of Mr. Russo and Drs. Stamm, Colunno and Papkoff and Mr. Okazaki is below. For information on Dr. McHutchison, see “Proposal No. 1—Election of Directors—Nominees for Director.”

| Name | Age (as of 04/13/2020) | Business Experience |
|--------------------------------|---------------------------|---|
| Thomas J. Russo, CFA | 48 | Mr. Russo has served as our Chief Financial Officer since October 2019. Prior to joining us, Mr. Russo was the Vice President, Head of Commercial Finance of Gilead from July 2016 until October 2019. From October 2014 through June 2016, Mr. Russo was Gilead’s Senior Director–Commercial Operations Finance Center of Excellence, and from October 2012 until September 2014, Mr. Russo held other positions of increasing responsibility at Gilead, including Senior Director– HCV Commercial Operations and Senior Director–Commercial Planning. From 2004 through September 2012, Mr. Russo was an Equity Research Analyst–Biotechnology at Robert W. Baird & Co., Inc., where he advised institutional investors on biotechnology stocks. Mr. Russo holds a B.S. in Biological Sciences from the University of Notre Dame and an M.B.A. from The University of Chicago Booth School of Business. Mr. Russo is also a CFA charterholder. |
| Luisa M. Stamm, M.D., Ph.D. | 44 | Dr. Stamm has served as our Chief Medical Officer since November 2019. Prior to joining us, Dr. Stamm served in a series of positions of increasing responsibility in the clinical research group at Gilead from July 2013 through November 2019, culminating in her role as Executive Director, Clinical Research. Prior to joining Gilead, Dr. Stamm was an instructor at Harvard Medical School from January 2013 until July 2013. From 2009 until July 2013, Dr. Stamm was a clinical and research fellow in infectious disease at Massachusetts General Hospital. Dr. Stamm received a B.A. in Biochemistry from Harvard University and an M.D. and a Ph.D. in Biomedical Sciences from the University of California, San Francisco. |
| Richard J. Colunno, Ph.D. | 70 | Dr. Colunno is our Executive Vice President and Chief Scientific Officer of Virology Operations. Dr. Colunno joined as Chief Scientific Officer in January 2016 and became Executive Vice President and Chief Scientific Officer of Virology Operations in January 2018. Dr. Colunno has been instrumental in the discovery and development of multiple approved antiviral drugs, including Baraclude® and Reyataz®. From September 2007 to January 2016, Dr. Colunno was the Chief Science Officer of Presidio Pharmaceuticals, Inc., where he directed its hepatitis C (HCV) antiviral programs, including the discovery and development of the HCV NS5A inhibitor ravidasvir. From June 1991 to August 2007, Dr. Colunno was Vice President, Infectious Diseases Drug Discovery at Bristol-Myers Squibb Co., where he played a pivotal role in building Bristol-Myers Squibb’s antiviral franchise. From August 1982 to May 1991, he was Senior Director of Antiviral Research at Merck Research Labs. Dr. Colunno received a B.A. in Biology and Chemistry from Kansas Wesleyan University and a Ph.D. in Microbiology from the University of Kansas and has co-authored more than 160 scientific articles. |

| Name | Age (as of 04/13/2020) | Business Experience |
|------------------------------|------------------------|---|
| Jacqueline S. Papkoff, Ph.D. | 64 | Dr. Papkoff joined as Senior Vice President, Chief Scientific Officer Microbiome in April 2018. Dr. Papkoff was Senior Vice President, Research at Evelo Biosciences, Inc. from May 2016 to October 2017. From January 2013 to May 2016, Dr. Papkoff was Vice President, Immunology Scientific Innovation at Johnson & Johnson California Innovation Center as a representative of the Janssen immunology therapeutic area. From 2008 to 2012, Dr. Papkoff was an independent biotherapeutic research and development consultant to biotechnology and pharmaceutical companies. In 2006 and 2007, Dr. Papkoff was Executive Vice President Therapeutics, Chief Scientific Officer at CFD Therapeutics, Inc. From 2002 until 2006, Dr. Papkoff was initially Vice President, Discovery and later Executive Vice President, Therapeutics at diaDexus, Inc. Dr. Papkoff received a B.A. in Biology with highest honors from the University of California, Santa Cruz and received a Ph.D. in Biology from the University of California, San Diego. |
| Jason A. Okazaki | 44 | Mr. Okazaki joined as Chief Legal and Business Officer in March 2020. Prior to joining us, Mr. Okazaki served in a series of positions of increasing responsibility in Gilead's legal department from 2006 through March 2020, culminating in his role as Senior Vice President, Legal, and Assistant Secretary. While at Gilead, Mr. Okazaki advised on strategic transactions, corporate governance, SEC matters and operational contracts. He also led the Asia and Latin America legal organizations. Prior to joining Gilead, Mr. Okazaki was a senior associate at Skadden, Arps, Slate, Meagher & Flom LLP, where he represented companies in connection with mergers, acquisitions and corporate finance matters. Mr. Okazaki received a B.A. in Economics from Stanford University and a J.D. from U.C. Hastings College of the Law. |

EXECUTIVE COMPENSATION

We are a “smaller reporting company” under Item 10 of Regulation S-K promulgated under the Exchange Act. The following compensation disclosure is intended to comply with the requirements applicable to smaller reporting companies. Although the rules allow us to provide less detail about our executive compensation program, the Compensation Committee is committed to providing the information necessary to help stockholders understand its executive compensation-related decisions. Accordingly, this section includes supplemental narratives that describe the 2019 executive compensation program for our named executive officers (NEOs).

Named Executive Officers

Our NEOs for the year ended December 31, 2019 are:

| Name | Title |
|---------------------------------|--|
| John G. McHutchison, A.O., M.D. | Chief Executive Officer and President |
| Thomas J. Russo, CFA | Chief Financial Officer |
| Luisa M. Stamm, M.D., Ph.D. | Chief Medical Officer |
| Derek A. Small ⁽¹⁾ | Former Chief Executive Officer and President |

⁽¹⁾ On August 6, 2019, Mr. Small stepped down as Chief Executive Officer and President and the Board appointed Dr. McHutchison to replace Mr. Small in both roles.

Leadership Transition

As our HBV Cure program progressed toward later Phase 2 clinical studies and our Microbiome program progressed into Phase 1b clinical studies in 2019, our remaining founders, Mr. Small and Uri A. Lopatin, M.D. agreed with the Company that it was in our best interests to transition our leadership to a team with deep experience taking product candidates through later-stage clinical and registrational studies and the New Drug Application (NDA) process. In addition to Mr. Small and Dr. Lopatin transitioning their roles, our then-Chief Financial Officer and Chief Operating Officer, Graham Cooper, resigned to pursue other interests.

Chief Executive Officer

After a thorough search, the Board appointed Dr. McHutchison in August 2019 as Chief Executive Officer and President, succeeding Mr. Small. In its search, the Board sought an individual with substantial experience in drug development, valuable industry and disease-area expertise and a strong track record of leadership. Dr. McHutchison brings extensive experience to both our HBV Cure program and our Microbiome program, as he is a world-renowned hepatologist, gastroenterologist and anti-viral drug developer who previously led the research and development of five marketed therapies for chronic HBV and hepatitis C virus (HCV). Dr. McHutchison joined us from Gilead, with a market capitalization of nearly \$100 billion and 2019 sales of \$22 billion, where he served as Chief Scientific Officer and Head of Research and Development. In his nine-year tenure at Gilead, he led the successful filing of NDAs across multiple therapeutic areas, including the curative treatment regimens for chronic HCV and treatments for chronic HBV.

Our Board believed Dr. McHutchison’s broad expertise in anti-viral development and his experience building and advancing therapeutic pipelines were critical to advancing our goals for both the HBV Cure program and the Microbiome program and driving stockholder value in the future. During his brief tenure, Dr. McHutchison has already been instrumental in building a high caliber leadership team and completing a follow-on offering in December 2019 that resulted in \$134.7 million in net proceeds being raised to support our continuing development efforts.

To facilitate Dr. McHutchison’s transition, Mr. Small continued with us through December 31, 2019 as Senior Advisor to the Chief Executive Officer and continues to serve in a leadership role for our foreign subsidiaries. On January 1, 2020, Mr. Small moved to a consulting role and is available as needed to assist the company. Mr. Small will remain on the Board until the Annual Meeting, but he is not standing for reelection.

Chief Financial Officer

In October 2019, Mr. Russo joined as Chief Financial Officer, a role that had remained vacant since Mr. Cooper's resignation in April 2019. Mr. Russo joined us from Gilead, where he spent seven years in finance and commercial operations roles, including Vice President, Head of Commercial Finance, in which he supported a \$20-30 billion revenue business and a multi-billion dollar budget across North America, Europe, Asia and emerging markets. He served as a strategic partner, helping drive the planning, reporting and analysis for commercial operations, and managed a team that supported Gilead's global business. Prior to joining Gilead, Mr. Russo advised institutional investors as an Equity Research Senior Analyst covering biotechnology for Robert W. Baird & Co., Inc.

With Mr. Russo's deep knowledge of the biotechnology industry, finance, operations, global forecasting and the capital markets, our Board believed that Mr. Russo would be an important addition to the leadership team, particularly as our core inhibitors move into later stage clinical development for the treatment of HBV. Mr. Russo's experience at Gilead and in the investment community were critical to our successful securities offering in December 2019, which resulted in \$134.7 million in net proceeds to support our continuing development efforts.

Chief Medical Officer

In November 2019, Dr. Stamm joined as Chief Medical Officer, a role that had remained vacant since Dr. Lopatin stepped down in May 2019. Dr. Stamm has taken a leadership role in both the HBV Cure program and the Microbiome program. Dr. Stamm joined us from Gilead, where she was a senior member of the HCV and HIV clinical research teams with responsibility for scientific and development activities and overall research strategy. Dr. Stamm worked on the development of two HCV therapeutics that are now marketed (VOSEVI® and EPCLUSA®) and supervised Phase 1, 2 and 3 clinical studies and the filing of initial marketing applications in the United States, European Union, Canada, China and Japan.

Our Board believed Dr. Stamm's clinical training, research experience and track record in drug development made her ideally suited to lead clinical activities across both of our HBV Cure and Microbiome programs.

For more information regarding 2019 compensation paid to Dr. McHutchison, Mr. Russo and Dr. Stamm, see "Summary Compensation Table—Narrative Disclosure to Summary Compensation Table—Compensation Terms of New NEOs and One-Time Compensation Elements Related to Leadership Changes." For more information regarding compensation paid to Mr. Small in connection with his separation from the Company, see "Summary Compensation Table—Narrative Disclosure to Summary Compensation Table—Compensation Terms of New NEOs and One-Time Compensation Elements Related to Leadership Changes—Derek Small."

Executive Summary

2019 Accomplishments

Senior Leadership Team

- Strengthened leadership with appointments of Dr. McHutchison; Mr. Russo; Dr. Stamm; Steven J. Knox as SVP, Clinical Development; David R. Houck, PhD. as SVP, Product Development & Portfolio Management; and Michele Anderson, as SVP, Regulatory Affairs and Quality Assurance

Fundraising and Operational Excellence

- Raised net proceeds of approximately \$134.7 million from the sale and issuance of shares of common stock
- Ensured smooth transition to our new South San Francisco offices with minimal impact on timelines and business objectives
- Established fully operational research and development and business functions in China
- Improved corporate culture through the enhancement of corporate communication and improvement of Company alignment through regularly scheduled Company-wide townhalls and other team initiatives

HBV Cure program

- Presented interim 24-week results from two Phase 2 studies (Study 201 and Study 202) of our first-generation HBV core inhibitor (CI) product candidate, ABI-H0731 (731), at the International Liver Congress™ (ILC), the Annual Meeting of the European Association for the Study of the Liver (EASL)
 - Selected as a “Best of ILC” entry
- Presented final 24-week results from Study 201 and Study 202 at the American Association for the Study of Liver Diseases (AASLD) Annual Meeting (The Liver Meeting®)
- Presented interim long-term data from the ongoing open-label extension Phase 2 study of 731 (Study 211)
- Presented final data from Phase 1a portion of a Phase 1a/b dose-ranging clinical study of our second-generation CI candidate, ABI-H2158 (2158) at the ILC
- Presented interim data from the first, low-dose cohort of the Phase 1b portion of the Phase 1a/b dose-ranging clinical study of 2158 at The Liver Meeting®
- Presented preclinical data from our third-generation CI product candidate, ABI-H3733 (3733), at the ILC
- Completed Investigational New Drug (IND) enabling studies of 3733
- Received clinical trial approvals from China’s Center for Drug Evaluation, part of the National Medical Products Administration in China, enabling us to initiate Phase 2 and Phase 1 clinical trials of both 731 and 2158, respectively, in China

Microbiome program

- Initiated and dosed first patient in a Phase 1b clinical study for ABI-M201 (M201) for mildly to moderately active ulcerative colitis.

Say-on-Pay Vote

At our 2019 annual meeting of stockholders, over 90% of the shares voted by our stockholders were “FOR” the approval of the compensation paid to our then-NEOs in 2018. In each of our annual say-on-pay votes since 2014, our NEOs’ compensation has received the support of over 90% of the shares voted by our stockholders.

Compensation Philosophy and Overview

Our Compensation Philosophy is “Provide Competitive Overall Compensation That Attracts, Retains and Motivates Superior Performers. The Compensation Committee believes that executive compensation should be designed to promote both our short-term and long-term goals. Accordingly, an important component of the Committee’s compensation philosophy is to align the financial interests of our executive officers with those of our stockholders. To achieve these goals, our compensation program is structured to:

- **Pay for Performance:** We offer (1) targeted annual performance-based cash bonus opportunities based on individual achievement and Company-wide performance against corporate goals, which are generally measured over a 12-month period, and (2) the opportunity to share in our long-term success through equity compensation, including performance-based equity awards;
- **Attract and Retain Superior Performers:** We provide a market-competitive base salary, performance-based cash bonus opportunities, long-term equity awards and other compensation elements that are competitive with those companies that compete with us for available high caliber employees; and
- **Pay Equitably:** We believe that it is important to apply generally consistent guidelines for all of our NEOs. To deliver equitable pay, the Compensation Committee considers each NEO’s title, breadth and complexity of responsibility, criticality of the role to the organization, experience, qualifications and performance, in both an individual and team context.

In addition to striving to meet the goals above, we have instituted the following executive compensation best practices:

| What We Do | What We Don't Do |
|---|--|
| <input checked="" type="checkbox"/> Conduct an annual "Say-on-Pay" vote | <input checked="" type="checkbox"/> No guaranteed bonuses |
| <input checked="" type="checkbox"/> Annual performance-based cash bonus opportunities tied to individual and Company-wide performance | <input checked="" type="checkbox"/> No excise tax gross ups |
| <input checked="" type="checkbox"/> Equity grants with multi-year vesting requirements | <input checked="" type="checkbox"/> No special retirement plans for executives |
| <input checked="" type="checkbox"/> Time-based equity grants with minimum vesting period of one year | <input checked="" type="checkbox"/> No special health or welfare benefits |
| <input checked="" type="checkbox"/> Entirely independent Compensation Committee | <input checked="" type="checkbox"/> No hedging of our stock |
| <input checked="" type="checkbox"/> Use an independent compensation consultant | <input checked="" type="checkbox"/> No pledging of our stock without pre-approval |
| <input checked="" type="checkbox"/> Double-trigger severance and equity acceleration rights | <input checked="" type="checkbox"/> No stock option repricing without stockholder pre-approval |
| <input checked="" type="checkbox"/> Limited perquisites | |

At-Risk and Long-Term Pay

To implement its compensation philosophy, the Compensation Committee has determined that the primary elements of our employees', including our NEOs', compensation should consist of base salary, annual performance-based cash bonus and long-term equity incentive awards, which the Compensation Committee uses to create a pay mix designed to meet the goals of our compensation philosophy. The pay mix emphasizes "at-risk" compensation in the form of (1) long-term equity awards and (2) annual performance-based cash bonuses based on the achievement of (a) Board-approved Company-wide objectives weighted to reflect their relative importance to the achievement of our goals and (b) individual performance objectives, which include certain department, group and/or team objectives applicable to the participants, tailored to responsibilities of each of our employees, including our NEOs.

As discussed above, 2019 was a transition year for our senior leadership team as Dr. McHutchison, Mr. Russo and Dr. Stamm joined the team. As a result, most of the compensation paid to our NEOs—87% and 91% for Dr. McHutchison and our other newly hired NEOs, respectively—consisted of "at-risk," long-term equity awards, including the performance-based RSUs granted to Dr. McHutchison, that served the dual purposes of both aligning our NEOs' interests with those of our stockholders and serving as "make whole" compensation to replace equity compensation received from our NEOs' prior employers that was forfeited when they joined us in 2019.

Role of the Compensation Committee; Oversight of Executive Compensation

Our compensation philosophy is implemented under the supervision of the Compensation Committee. The Compensation Committee also has direct responsibility for reviewing and approving the compensation of our CEO and each of our other executive officers. To assist the Compensation Committee in determining compensation of our other executive officers, the CEO makes recommendations to the Compensation Committee as to specific elements (i.e., base salary, annual performance-based cash bonus and long-term equity incentive awards) of compensation. The CEO does not make recommendations with respect to his own compensation. Management, under the guidelines and policies established by the Compensation Committee, makes decisions on all aspects of compensation for non-executive officer employees.

We generally review our compensation practices on an annual basis over the course of several meetings of the Compensation Committee and the Board. The first step in the process is that the Compensation Committee, with the support of management and Radford, a part of the Rewards Solutions practice of Aon plc, which serves as the Compensation Committee's independent outside compensation consultant (Compensation Consultant), reviews trends in biotechnology compensation practices and approves the list of peer companies used in this analysis. The peer group process is detailed below in "—Peer Group Process."

Our CEO, General Counsel and SVP, Human Resources and Organization Development, in addition to the Compensation Consultant, regularly attend portions of the Compensation Committee meetings to provide analysis, information and management's recommendations on various human resources and compensation matters. Members of management generally do not participate in the executive sessions of the Compensation Committee unless invited by the Compensation Committee to provide specific information during these closed sessions. The CEO is not present for any deliberation on, or votes related to, his compensation.

The Compensation Consultant

The Compensation Committee initially retained Radford in 2015. The Compensation Consultant's fees are paid by the Company but approved by the Compensation Committee. In connection with its retention for the 2019 compensation cycle, the Compensation Consultant conducted analysis and provided advice on, among other things, the appropriate peer group, annual performance-based cash bonuses, long-term equity incentive awards, severance arrangements, executive officers' new hire compensation packages and annual compensation for the executive officers and compensation trends in the biotechnology industry.

The Compensation Consultant reports directly to the Compensation Committee, which retains sole authority to direct the work and employ the Compensation Consultant. The Compensation Committee regularly reviews the services provided by the Compensation Consultant.

The Compensation Committee has assessed the independence of the Compensation Consultant and determined that the Compensation Consultant's work did not raise any conflicts of interest in 2019. In making this assessment, the Compensation Committee considered the independence factors enumerated in Rule 10C-1(b) under the Exchange Act, including (1) the fact that the Compensation Consultant does not provide any other services to us, (2) the level of fees received from us as a percentage of the Compensation Consultant's total revenue is less than 1%, (3) the Compensation Consultant has internal policies and procedures to prevent conflicts of interest and protect independence, (4) the individual Compensation Consultant advisers to the Compensation Committee do not own any of our stock or have any business or personal relationships with members of the Compensation Committee or our executive officers and (5) the Compensation Committee is unaware of any relationship that may exist between executive officers and the Compensation Consultant. The Compensation Committee continues to monitor the independence of the Compensation Consultant on a periodic basis.

Peer Group Process

As part of its analysis for 2019, the Compensation Consultant collected and analyzed compensation information from a comparative group of biotechnology companies, or peer group, approved by the Compensation Committee.

The list of peer companies is evaluated and approved annually by the Compensation Committee based upon input from the Compensation Consultant and management to ensure that our peer group (1) includes companies that are similar in terms of stages of development, headcount and market capitalization, (2) appropriately represents the type of companies competing with us to attract and retain talent and (3) reflects our current and future business objectives and strategy. In October 2018, with assistance from the Compensation Consultant and management, the Compensation Committee re-evaluated the peer group used for 2018 compensation and approved a peer group consisting of biopharmaceutical companies with the following characteristics:

- Varying stages of development ranging from Phase 1 through Phase 3 clinical development, which was consistent with the prior year;
- 0.3 to 3.0x our headcount, with generally fewer than 300 employees, which was generally consistent with the prior year except that the cap was raised to 300 employees based upon our then-current headcount; and
- 0.3 to 3.0x our market capitalization, with market capitalizations generally between \$300 million and \$3.0 billion, which was adjusted based upon our then-current market capitalization.

Due to the above criteria, a number of companies were either added to or removed from the peer group during the 2019 revisions due to M&A activity, out of scope market capitalization, headcount or stage of development. Based on these criteria, the Compensation Committee approved the revised peer group (the 2019 Peer Group) set forth below and used the 2019 Peer Group as one of multiple datapoints used in determining 2019 compensation.

| | | |
|----------------------------------|--------------------------------|----------------------------|
| Achillion Pharmaceuticals, Inc. | Dicerna Pharmaceuticals, Inc.* | REGENXBIO, Inc. |
| Aimunne Therapeutics, Inc.* | Editas Medicine, Inc. | Sangamo Therapeutics, Inc. |
| Arbutus Biopharma Corp. | Enanta Pharmaceuticals, Inc.* | Selecta Biosciences, Inc. |
| Arrowhead Pharmaceuticals, Inc.* | Epizyme, Inc.* | Seres Therapeutics, Inc. |
| Audentes Therapeutics, Inc. | Five Prime Therapeutics, Inc. | Wave Life Sciences Ltd. |
| Bellicum Pharmaceuticals, Inc. | Iovance Biotherapeutics, Inc. | Zogenix, Inc.* |
| CymaBay Therapeutics, Inc.* | Mirati Therapeutics, Inc. | |
| CytomX Therapeutics, Inc. | MyoKardia, Inc.* | |

* Company added to 2019 Peer Group.

As of October 2018, when the Compensation Consultant completed its work developing recommendations for the 2019 Peer Group, the 50th percentile of market capitalization and headcount of the 2019 Peer Group were \$1.3 billion and 107 employees, respectively. Meanwhile, our market capitalization and headcount were approximately \$980 million (based upon a 30-day average market capitalization) and 95 employees, respectively, as compared to a market capitalization of approximately \$470 million (based upon a 30-day average market-cap) and 81 employees, respectively, when the 2018 Peer Group was selected.

After the Compensation Committee approves the list of peer companies, management and the Compensation Consultant present the Compensation Committee with recommendations regarding proposed adjustments to compensation elements and a variety of supporting data, including comparative compensation information from the approved peer group. The Compensation Committee generally believes that to achieve our overall compensation-related goals our compensation elements of base salary, annual performance-based bonus opportunities and long-term equity incentive compensation should target the median of our peers, but the Compensation Committee may, in its discretion, set an individual NEO's compensation above or below this level, based on that individual's experience, criticality, amount of responsibility and either individual or Company-wide performance. Such recommendations are presented individually for each NEO. These recommendations are discussed with and without management present and are also discussed with the Compensation Consultant. The Compensation Committee then determines what, if any, adjustments to the compensation elements are appropriate for executive officers other than the CEO. For 2019 compensation, in part because all of the NEOs (other than Mr. Small) were newly hired employees, in determining the new hire compensation package, the Compensation Committee used multiple reference points in determining the NEOs' compensation, including, among others, each individual's criticality and scope of responsibilities, prior experience and training, prior compensation packages for such individuals, other competitive market-based compensation data for similar positions in our industry and the 2019 Peer Group to inform its decision-making regarding both the elements of compensation (i.e., base salary, annual performance-based cash bonuses and long-term equity incentive awards) and total compensation.

Summary Compensation Table

The following table shows the total compensation earned by the NEOs in 2019 and 2018, as applicable.

| Name and Principal Position | Year | Salary (\$) | Bonus (\$) | Stock Awards (\$) ⁽¹⁾ | Option Awards (\$) ⁽¹⁾ | Non-Equity Incentive Plan Compensation (\$) ⁽²⁾ | All Other Compensation (\$) ⁽³⁾ | Total (\$) |
|---|------|--------------|--------------|----------------------------------|-----------------------------------|--|--|------------|
| John G. McHutchison, A.O., M.D. (4)(5) Chief Executive Officer and President | 2019 | 324,615 | 300,000 (6) | 2,079,000 | 4,033,599 | 263,000 | 7,000 | 7,007,214 |
| Thomas J. Russo, CFA (7) Chief Financial Officer | 2019 | 77,372 | 100,000 (8) | — | 1,922,079 | 32,000 | — | 2,131,451 |
| Luisa M. Stamm, M.D., Ph.D. (9) Chief Medical Officer | 2019 | 66,202 | 110,000 (10) | 193,320 | 1,755,806 | — | 1,144 | 2,126,472 |
| Derek A. Small(5)(11) Former Chief Executive Officer and President | 2019 | 557,375 (12) | — | 639,925 | 932,831 (13) | 325,000 | 579,200 | 3,034,331 |
| | 2018 | 516,667 (12) | — | 1,597,050 | 2,258,020 | 279,000 | 95,303 | 4,746,040 |

- (1) The reported amounts represent the grant date fair value of the award, computed in accordance with FASB ASC Topic 718 disregarding any estimated forfeitures related to service-based vesting. Assumptions used in the calculation of these amounts are included in Note 7 of the consolidated financial statements included in the Annual Report on Form 10-K for the year ended December 31, 2019.
- (2) Non-equity incentive plan compensation represents amounts paid as annual performance-based cash bonuses. Annual performance-based cash bonuses are paid in the first quarter of the following year based on the achievement of Company-wide and individual performance goals and other factors deemed relevant by the Compensation Committee for the year indicated.
- (3) "All Other Compensation" includes: 401(k) matching contributions made by the Company and, for Mr. Small (a) a high deductible health savings account contribution and (b) severance payments in accordance with his employment agreement and conditioned upon his execution of the separation agreement and general release of claims entered into with him in connection with his stepping down as Chief Executive Officer and President. These amounts are detailed in the table below.

| Name | Year | HSA Contribution (\$) | 401(k) Match (\$) | Severance (\$) | Total All Other Compensation (\$) |
|-----------------|------|-----------------------|-------------------|----------------|-----------------------------------|
| Dr. McHutchison | 2019 | — | 7,000 | — | 7,000 |
| Mr. Russo | 2019 | — | — | — | — |
| Dr. Stamm | 2019 | — | 1,144 | — | 1,144 |
| Mr. Small | 2019 | 6,000 | 11,200 | 562,000 | 579,200 |

- (4) On August 6, 2019, Dr. McHutchison became an employee of the Company. His annualized base salary for 2019 was \$800,000.
- (5) Neither Dr. McHutchison nor Mr. Small is compensated for his service as a director of the Company.
- (6) Represents a sign-on bonus paid in connection with Dr. McHutchison's acceptance of our offer of employment pursuant to the terms of his employment agreement. The sign-on bonus is subject to a declining repayment schedule if Dr. McHutchison's employment is terminated under certain circumstances within 18 months of his start date.

- (7) On October 28, 2019, Mr. Russo became an employee of the Company. His annualized base salary for 2019 was \$425,000.
- (8) Represents a sign-on bonus paid in connection with Mr. Russo's acceptance of our offer of employment pursuant to the terms of his employment agreement. The sign-on bonus is subject to repayment if Mr. Russo's employment is terminated under certain circumstances within 12 months of his start date.
- (9) On November 6, 2019, Dr. Stamm became an employee of the Company. Her annualized base salary for 2019 was \$425,000.
- (10) Includes (a) a \$100,000 sign-on bonus paid in connection with Dr. Stamm's acceptance of our offer of employment pursuant to the terms of her employment agreement and (b) a \$10,000 discretionary bonus paid to reward Dr. Stamm for her 2019 performance. While Dr. Stamm was not eligible for a performance-based cash bonus under our non-equity incentive plan due to her November start date, based upon Dr. Stamm's exceptional service during 2019 and contributions to the development team, the Compensation Committee awarded her a \$10,000 discretionary bonus. Dr. Stamm's sign-on bonus is subject to repayment if Dr. Stamm's employment is terminated under certain circumstances within 12 months of her start date.
- (11) On August 6, 2019, Mr. Small stepped down as Chief Executive Officer and President. Mr. Small continued as an employee in the role of Senior Advisor to the Chief Executive Officer until December 31, 2019. Mr. Small received \$562,000 in severance pay pursuant to the terms of his employment agreement, which are payable in installments over 12 months and which is reflected in the "All Other Compensation" column. In his role as Senior Advisor to the Chief Executive Officer, Mr. Small worked to ensure a smooth transition of his duties and relationships to Dr. McHutchison and continued to provide on-going services in connection with our international operations. In consideration for agreeing to perform services through the end of the year, the separation agreement also provided that Mr. Small would be eligible to receive his 2019 bonus, subject to the Company's achievement of its corporate performance objectives.
- (12) These amounts do not match the table under "—Narrative Disclosure to Summary Compensation Table—Base Salary," because our NEOs' salary increases come into effect partway into the fiscal year.
- (13) Pursuant to the terms of Mr. Small's employment agreement, all equity awards held by Mr. Small that would have vested within the 12 months following his separation accelerated and became vested upon the termination of his employment and the exercise periods for all vested stock options issued prior to 2018 were extended to the end of the term of the applicable stock option. Pursuant to the terms of the separation agreement between Mr. Small and the Company, the post-termination exercise periods for all vested stock options issued in 2018 or later were limited until the later of (a) the first anniversary of the cessation of continuous service and (b) the second anniversary of his departure from the Board. The amount reported includes \$59,717, which is the incremental fair value of the modified stock option on the modification date.

Narrative Disclosure to Summary Compensation Table

The three principal components of our executive compensation program are base salary, annual performance-based cash bonus and long-term equity incentive awards. Our Compensation Committee believes that each component of executive compensation must be evaluated and determined with reference to competitive market data, individual and Company-wide performance, our recruiting and retention goals, internal equity and consistency, and other information it deems relevant. The Compensation Committee believes that in the biopharmaceutical/biotechnology industry, stock option and/or other equity awards are a primary motivator in attracting and retaining executives, in addition to salary and cash incentive bonuses.

In addition, significant portions of each of our NEOs' 2019 compensation were the result of the leadership transition that took place.

The primary components of our compensation packages and one-time compensation elements related to our 2019 leadership changes are described in more detail below.

Base Salary

Base salaries provide financial stability and security to our NEOs by providing a fixed amount of cash for performing job responsibilities. Our NEOs' base salaries are established based on each individual's position, criticality and scope of responsibilities, prior experience and training, then-current compensation levels and competitive market-based compensation data we review for similar positions in our industry. Base salaries are reviewed periodically and may be increased for merit reasons based on the executive's performance, for retention reasons or if the base salary is not competitive with salaries paid by comparative companies for similar positions. Additionally, we may adjust base salaries throughout the year for promotions or other changes in the scope or breadth of an executive's role or responsibilities. We may also adjust base salaries downward based on a review of base salaries among our peer group. The NEOs' annualized base salaries for 2018 and 2019, effective as of March 1 of each year or the date of hire of the NEO, as applicable, were as follows:

| NEO | 2018 | 2019 | Percentage Increase |
|------------------------------------|-------------|-------------|----------------------------|
| John G. McHutchison, A.O., M.D.(1) | — | \$ 800,000 | — |
| Thomas J. Russo, CFA(2) | — | 425,000 | — |
| Luisa M. Stamm, M.D., Ph.D.(3) | — | 425,000 | — |
| Derek A. Small(4) | \$ 525,000 | 562,000 | 7.0% |

- (1) Dr. McHutchison became our Chief Executive Officer and President effective August 6, 2019.
- (2) Mr. Russo became our Chief Financial Officer effective October 28, 2019.
- (3) Dr. Stamm became our Chief Medical Officer effective November 6, 2019.
- (4) Mr. Small stepped down as our Chief Executive Officer and President effective August 6, 2019 but continued as an employee in the role of Senior Advisor to the Chief Executive Officer until December 31, 2019.

The Compensation Committee approved Mr. Small's 7% base salary increase in 2019 based on a number of different factors, including to reward him for our overall strong performance in 2018, including, among other accomplishments, completion of an additional Phase 1a and Phase 1b study of 731 and reporting results at major scientific conferences, selection of our 731 presentation as among the "Best of AASLD 2018," receipt of Fast Track designation from the U.S. Food and Drug Administration for 731, initiation of (a) two Phase 2 clinical studies for 731 and (b) a Phase 1a/b dose-ranging clinical study of 2158, selection of 3733 as our third-generation CI product candidate, the filing of an IND application for M201 and to better align his compensation with CEOs of companies comprising our 2019 Peer Group.

Annual Performance-Based Cash Bonus

Our NEOs are eligible to earn annual performance-based cash bonuses to reward strong performance and to retain our NEOs in a competitive labor market. These bonuses are intended to reward our NEOs for achieving or exceeding our shorter-term corporate goals, which are designed to be measured over a calendar year, and to provide our NEOs with additional incentive to achieve these goals. Each of our NEOs is eligible for a target bonus, which is set as a percentage of annual base salary. The Compensation Committee determines these target bonus percentages based on the range of target bonus percentages for similar positions in our peer group, and our Compensation Committee periodically reviews and evaluates our NEOs' target bonus percentages as compared to our peers.

Annual performance-based cash bonuses are earned based on the achievement of significant Company goals, with specific goals tailored to the NEOs' areas of responsibility. The performance goals generally are determined by our Compensation Committee in the first quarter of the calendar year and approved by the Board, but the actual bonus amounts are determined in the first quarter of the following year based on achievement of the pre-determined Company-wide and individual performance goals. The Board or the Compensation Committee may increase or decrease an executive's bonus payment (above or below the target percentage) based on its assessment of our performance and each executive's individual performance during a given year. For 2019, annual bonuses were based on achievement of goals related to development of our HBV Cure and Microbiome programs, including research and development, financial operations/investor relations and business development goals, including third-party collaborations. These included:

Research and Clinical Development Goals (Target Percentage of 70%)

- Completing enrollment and reporting results on both Phase 2a 731 clinical studies;
- Completing the Phase 1a portion of the 2158 Phase 1a/b dose-ranging clinical study;
- Initiating our first clinical study in China; and
- Initiating a Phase 1b clinical trial for M201 and dosing the first patients in that trial.

Finance and Operations Goals (Target Percentage of 30%)

- Ensuring inflow of greater than \$100 million of capital through the financial capital marketplace through our securities offering in December 2019, which resulted in net proceeds of \$134.7 million;
- Attracting new key personnel, including Dr. McHutchison, Mr. Russo, Dr. Stamm, Mr. Knox, Dr. Houck and Ms. Anderson, and retaining key executives, including Jacqueline S. Papkoff, Ph.D. and Richard J. Colonno, Ph.D.;
- Ensuring a smooth transition to our new corporate headquarters in South San Francisco with minimal impact on timelines and business objectives; and
- Improving corporate culture, including by enhancing corporate communication and furthering company alignment through regularly scheduled Company-wide townhalls and other team initiatives.

After receiving and considering management's analysis and recommendations, the Compensation Committee determined that the percentage achievement of the 2019 corporate objectives was 105%. This determination of above-target achievement for our 2019 corporate objectives as a whole was driven by the achievement of a number of corporate goals above their specified targets.

In determining individual performance-based bonus cash payouts, each NEO's potential performance-based cash bonus was weighted differently, depending on their respective areas of responsibility and contributions to our Company-wide goals and were prorated based upon their start dates. The performance-based cash bonuses for Dr. McHutchison and Mr. Small were based exclusively on achievement of the Company-wide goals. Mr. Russo's performance-based cash bonus was weighted 75% on achievement of the Company-wide goals and 25% on individual performance. Mr. Russo's individual performance was evaluated based on his efforts during and the success of our securities offering in December 2019, which resulted in net proceeds of \$134.7 million and extended our cash runway. Dr. Stamm was not eligible to receive an annual performance-based cash bonus for the year ended December 31, 2019, because her employment commenced after October 31, 2019.

| NEO | 2018 Target Bonus | | 2018 Actual Bonus | | 2019 Target Bonus | | 2019 Actual Bonus | |
|------------------------------------|---------------------------|------------|-------------------|----------------------------|---------------------------|------------|-------------------|----------------------------|
| | Percentage of Base Salary | Amount | Amount | Percentage of Target Bonus | Percentage of Base Salary | Amount | Amount | Percentage of Target Bonus |
| John G. McHutchison, A.O., M.D.(1) | — | — | — | — | 75% | \$ 250,000 | \$ 263,000 | 105% |
| Thomas J. Russo, CFA(2) | — | — | — | — | 40% | \$ 28,333 | \$ 32,000 | 113% |
| Luisa M. Stamm, M.D., Ph.D.(3) | — | — | — | — | — | — | — | — |
| Derek A. Small(4) | 50% | \$ 262,500 | \$ 279,000 | 106% | 55% | \$ 309,100 | \$ 325,000 | 105% |

- (1) Dr. McHutchison became our Chief Executive Officer and President effective August 6, 2019. As such, his target bonus was prorated accordingly.
- (2) Mr. Russo became our Chief Financial Officer effective October 28, 2019. As such, his target bonus was prorated accordingly.
- (3) Dr. Stamm became our Chief Medical Officer on November 6, 2019. Under our compensation policies, Dr. Stamm was not eligible for a performance-based cash bonus because her employment commenced after October 31, 2019. Dr. Stamm's employment agreement provides for a target bonus of 40% of her base salary.
- (4) Although Mr. Small no longer served as Chief Executive Officer and President following Dr. McHutchison's appointment to those positions, Mr. Small remained an employee through the remainder of 2019 in the role of Senior Advisor to the Chief Executive Officer, providing valuable insight and advice to Dr. McHutchison during the first months of his tenure and continuing to serve in a leadership role for our foreign subsidiaries. Pursuant to Mr. Small's separation agreement, he remained eligible to earn his annual bonus based upon achievement of our Company-wide goals.

Long-term Equity Incentive Awards

Our equity-based long-term incentive program is designed to align our NEOs' long-term incentives with those of our stockholders, as well as to retain and motivate them to create long-term value. We believe that long-term participation by our employees, including our NEOs, in equity-based awards is a critical factor in the achievement of long-term Company goals and business objectives. In approving equity awards, the Compensation Committee's and the Board's guiding principles are to create a program that is designed to (1) motivate management to generate significant total stockholder return as measured by sustained increases in our stock price and (2) attract and retain skilled employees. In furtherance of these objectives, equity awards granted to NEOs and other employees are a critical component of our compensation practices. Our annual grants generally consist of a mix of stock options and time-based RSUs. We believe stock options provide meaningful incentives to employees to achieve increases in the value of our stock over time, because employees profit from stock options only if our stock price increases relative to the stock option's exercise price. We believe that RSU grants are also effective tools to retain and motivate our employees, including our NEOs, to achieve longer-term financial goals that we expect to lead to increased value to our stockholders while resulting in less dilution to our stockholders than stock options.

Awards to our executive officers other than our CEO are recommended by the CEO, considering input from the Compensation Consultant and approved by the Compensation Committee. Grants of awards to our CEO are discussed and determined by the Compensation Committee, in consultation with the Compensation Consultant, without the CEO being present.

The Compensation Committee considers the value of existing long-term equity incentive awards, internal pay equity considerations and individual and Company-wide performance when determining the size of annual equity grants. Annual stock option and RSU awards vest over four years, subject to continued service. In each case, we believe the applicable vesting schedule encourages long-term employment with Assembly, while allowing our NEOs to realize compensation in line with the value that they have created for our stockholders. After considering these factors, in March 2019, our Compensation Committee approved the stock option and RSU grants to Mr. Small. These annual grants are summarized in the table below.

| NEO | Options to Purchase Common Stock | | Restricted Stock Units | |
|------------------------------------|-------------------------------------|-----------------------------|------------------------|-----------------------------|
| | Number of Shares | Grant Date Fair Value(1) | Number of Shares | Grant Date Fair Value(1) |
| John G. McHutchison, A.O., M.D.(2) | — | — | — | — |
| Thomas J. Russo, CFA(2) | — | — | — | — |
| Luisa M. Stamm, M.D., Ph.D.(2) | — | — | — | — |
| Derek A. Small | 65,000 | \$ 873,114 | 32,500 | \$ 639,925 |

(1) The reported amounts represent the grant date fair value of the award, computed in accordance with FASB ASC Topic 718 disregarding any estimated forfeitures related to service-based vesting. Assumptions used in the calculation of these amounts are included in Note 7 of the consolidated financial statements included in the Annual Report on Form 10-K for the year ended December 31, 2019.

(2) Dr. McHutchison, Mr. Russo and Dr. Stamm joined us in August, October and November 2019, respectively. As such, they did not receive 2019 annual equity grants.

Compensation Terms of New NEOs and One-Time Compensation Elements Related to Leadership Changes

Having found a candidate of Dr. McHutchison's caliber to lead us during the critical next phase of our evolution, the Board sought to determine and negotiate the terms of employment with Dr. McHutchison. The Board considered the current status of our HBV Cure program and our Microbiome program and the corresponding need for additional capital to support those programs, as well as compensation foregone at prior employer, in approving the components of his compensation package, including annual base salary, target annual performance-based cash bonus, annual equity grants, inducement equity grants and sign-on bonus. The Board also accounted for the difficulty not only in identifying an individual with our desired skills and experience, but also retaining the person throughout the process of developing the lead candidates into commercial products. Accordingly, the Board, with the assistance of the Compensation Consultant, developed a compensation package that considered pay structures for CEOs at peer companies and included pay that depends on long-term Company performance as well as the opportunity to accumulate a significant ownership interest in the Company upon the creation of sustained shareholder value.

In finalizing Dr. McHutchison's compensation, the Compensation Committee focused on his significant prior experience and achievements in virology and gastroenterology; criticality of the CEO role; his prior salary, bonus and equity that he would be leaving behind; and his potential to create long-term growth and value for the Company.

In connection with Dr. McHutchison joining us as our Chief Executive Officer and President in August 2019, Mr. Russo joining us as our Chief Financial Officer in October 2019 and Dr. Stamm joining us as our Chief Medical Officer in November 2019, each were offered a total compensation package that included a sign-on bonus, base salary and inducement equity grants. Each also was given a target for their performance-based cash bonus in an amount reflected as a percentage of his or her base salary.

We sought market-based input from the Compensation Consultant in connection with determining appropriate values of each component of these new hire compensation packages and considered multiple reference points, analyses, data and information prepared by our Compensation Consultant in setting the terms. We also accounted for prior cash compensation and equity left behind, in each case, using a combination of a sign-on bonus and inducement equity grants as partial “make whole” compensation in connection with their transition to our team. In addition, we accounted for individual factors and other benefits forfeited from prior employment when preparing to make employment offers to Dr. McHutchison, Mr. Russo and Dr. Stamm.

The table below summarizes our newly hired NEO target annual pay and new hire and one-time “make whole” payments.

| Name | Annual Compensation Structure | | New Hire and One-Time “Make Whole” Payments | |
|-----------------|-------------------------------|---------------------|---|--------------|
| | Base Salary | Annual Bonus Target | Long-Term Incentive | Cash Payment |
| Dr. McHutchison | \$ 800,000 | 75% | \$ 6,112,599 | \$ 300,000 |
| Mr. Russo | 425,000 | 40% | 1,922,079 | 100,000 |
| Dr. Stamm | 425,000 | 40% | 1,949,126 | 100,000 |

In Dr. McHutchison’s case, we gave significant weight to his status as a world-renowned hepatologist, gastroenterologist and anti-viral drug developer who previously led the research and development of five marketed therapies for chronic HBV and chronic HCV, his broad expertise in anti-viral development and his experience building and advancing therapeutic pipelines, which skills are essential to advancing our goals for both the HBV Cure program and the Microbiome program. During his brief tenure, Dr. McHutchison has already been instrumental in building a high caliber leadership team and completing a securities offering in December 2019 that resulted in \$134.7 million in net proceeds being raised to support our continuing development efforts. In addition to his significant prior experience and achievements, we focused on his criticality to the role, prior salary, bonus and equity that he would be leaving behind as well as his potential to create long-term growth and value for the Company.

In Mr. Russo’s case, we gave significant weight to his deep knowledge of the biotechnology industry, finance, operations and global forecasting. Mr. Russo’s experience as an equity analyst advising institutional investors on biotechnology stocks was also an important factor, because (1) our stockholder base is currently largely made up of institutional investors; (2) we expect to continue raising capital as our product candidates progress through clinical studies, and we expect institutional investors to be significant participants in those offerings; and (3) the criticality of the position due to the fact that we had been without a Chief Financial Officer since April 2019.

In Dr. Stamm’s case, we gave significant weight to her clinical training, research experience and track record in drug development, her ability to lead clinical activities across both of our HBV Cure and Microbiome programs and the criticality of the position due to the fact that we had been without an employee serving in the role of Chief Medical Officer since May 2019.

Sign-on Bonuses

Each of our newly hired NEOs received a sign-on bonus in connection with joining us. While these sign-on bonuses serve the dual ancillary purposes of providing additional monetary incentive to join our team and incentivizing our NEOs to remain employed by us due to full or partial repayment to us in certain circumstances, their primary purpose is to provide compensation to our new NEOs to compensate for a portion of the value that they left behind when they left their prior employers.

Dr. McHutchison received a sign-on bonus of \$300,000. The sign-on bonus is subject to a declining repayment schedule if Dr. McHutchison’s employment is terminated under certain circumstances within 18 months of his start date.

Mr. Russo and Dr. Stamm each received sign-on bonuses of \$100,000. Both Mr. Russo and Dr. Stamm are obligated to repay their sign-on bonuses if their respective employment is terminated under certain circumstances within 12 months of their respective start dates.

Base Salaries and Performance-Based Cash Bonus Targets

Dr. McHutchison's initial annual base salary was \$800,000, and his annual performance-based cash incentive bonus was initially targeted at 75% of his base salary. Mr. Russo's initial annual base salary was \$425,000, and his annual performance-based cash incentive bonus was targeted at 40% of his base salary. Dr. Stamm's initial annual base salary was \$425,000, and her annual performance-based cash incentive bonus was targeted at 40% of her base salary.

CEO Performance-Based RSU Grant; Inducement Grants

To align Dr. McHutchison's interests with those of our stockholders over the long term, in September 2019 (and included in the inducement award table below), Dr. McHutchison received a performance-based grant of 100,000 RSUs pursuant to the terms of his employment agreement. In addition to Dr. McHutchison's continued service, the performance-based RSUs vest and can only be earned if certain milestones related to our HBV Cure program and our Microbiome program are achieved and if certain market-based performance metrics are met (in each case within specified time periods, but in no event prior to the first anniversary of the date of grant and no later than the third anniversary of the date of grant). The performance-based RSUs only vest if the Compensation Committee determines that the applicable milestone has been met. Performance-based equity awards further align Dr. McHutchison's interests with those of our stockholders in that the performance-based RSUs only vest if the performance metrics are satisfied.

The inducement grants for Dr. McHutchison, Mr. Russo and Dr. Stamm of stock options and RSUs in August, October and November 2019, respectively, are summarized in the table below.

| NEO | Options to Purchase Common Stock | | Restricted Stock Units | |
|---------------------------------|-------------------------------------|-----------------------------|------------------------|-----------------------------|
| | Number of Shares | Grant Date Fair Value(1) | Number of Shares | Grant Date Fair Value(1) |
| John G. McHutchison, A.O., M.D. | 500,000 (2) | \$ 4,033,599 | 100,000 (3) | \$ 1,186,000 |
| <i>Performance-based RSUs</i> | — | — | 100,000 (4) | 893,000 |
| Thomas J. Russo, CFA | 185,000 (5) | 1,922,079 | — | — |
| Luisa M. Stamm, M.D., Ph.D. | 165,000 (5) | 1,755,806 | 12,000 (6) | 193,320 |

- (1) The reported amounts represent the grant date fair value of the award, computed in accordance with FASB ASC Topic 718 disregarding any estimated forfeitures related to service-based vesting. Assumptions used in the calculation of these amounts are included in Note 7 of the consolidated financial statements included in the Annual Report on Form 10-K for the year ended December 31, 2019.
- (2) Represents stock options that vest over three years with approximately one-third vesting on the first anniversary of Dr. McHutchison's start date and then in approximately equal monthly installments thereafter for twenty-four months.
- (3) Represents time-based RSUs that vest in three approximately equal installments on the first, second and third anniversaries of Dr. McHutchison's start date.
- (4) Represents performance-based RSUs that only vest if certain milestones related to our HBV Cure program and our Microbiome program are achieved and if certain market-based performance metrics are met (in each case within specified time periods, but in no event prior to the first anniversary of the date of grant or after the third anniversary of the date of grant). As of December 31, 2019, none of the performance-based RSUs have vested.
- (5) Represents stock options granted that vest over four years with approximately one-fourth vesting on the first anniversary of the applicable start date and then in approximately equal monthly installments thereafter for thirty-six months.
- (6) Represents time-based RSUs that vest on the first anniversary on the first anniversary of Dr. Stamm's start date.

We believe that these vesting schedules encourage long-term employment with us and allow each of Dr. McHutchison, Mr. Russo and Dr. Stamm to realize compensation in line with the value that we expect them to create for our stockholders.

Derek Small

In connection with Dr. McHutchison's appointment as our Chief Executive Officer and President, we announced that Mr. Small would remain an employee through the remainder of 2019 as role of Senior Advisor to the Chief Executive Officer, providing valuable insight and advice to Dr. McHutchison during the first months of his tenure. Mr. Small also continued to serve in a leadership role for our foreign subsidiaries.

Effective August 2019, in connection with his stepping down as Chief Executive Officer and President, we entered into a separation agreement and general release of claims with Mr. Small. Following the termination of his employment on December 31, 2019, he became entitled to receive the following benefits, which, other than as noted below, were the same as those that we were already obligated to provide to Mr. Small under the terms of his employment agreement:

- continued payment of his final base salary, at an annualized rate of \$562,000, for 12 months following his separation of service;
- immediate vesting in full of all equity awards then held by Mr. Small that would have become vested during the 12 months following the termination of his employment;
- extension of the post-termination exercise period for all vested stock options granted and then held by Mr. Small to the end of their term (generally ten years from their grant date) as provided under the employment agreement; provided, that per the separation agreement, the post termination exercise period for vested stock options granted in 2018 and 2019 were limited until the later of (a) the first anniversary of the termination of his continuous service to the Company and (b) two years following Mr. Small's departure from the Board; and
- if Mr. Small properly elected COBRA, payment by us of his COBRA premiums for 18 months following termination of employment or until Mr. Small becomes eligible to receive benefits under another employer's health insurance. The 18-month COBRA payments under the separation agreement exceeded the 12-month premium payments he was previously entitled to under his existing employment agreement.

Mr. Small's employment agreement included non-solicitation and non-competition covenants that applied during his employment and continue until December 31, 2020. During this entire non-solicitation and non-competition period, Mr. Small will continue to assist Dr. McHutchison in his transition and provide us with consulting services, including performing strategic advisory services and other projects as requested from time to time including support for the Company's international operations. Mr. Small will provide these services for no more than ten hours per week. As compensation under his consulting agreement, on January 2, 2020, Mr. Small was granted 125,000 RSUs, which vest over 12 months, assuming continuous services under the consulting agreement through each vesting date.

Other Compensation

In 2019, we maintained broad-based benefits and perquisites that are provided to all eligible employees on the same terms, including 401(k) match, health insurance, life and disability insurance, dental insurance, sick leave and non-accrual vacation time.

Employment Arrangements

As of December 31, 2019, all of our NEOs served pursuant to employment agreements. These agreements all share the following characteristics:

- Upon a change of control, double-trigger severance and equity acceleration rights;
- No guaranteed bonuses;
- No excise tax gross-ups; and
- No special health or welfare benefits.

In August 2019, we entered into an employment agreement with Dr. McHutchison. The employment agreement provides for an at-will employment arrangement. Dr. McHutchison's employment agreement provides for an initial annual base salary of \$800,000 and an annual performance-based incentive cash bonus in an amount initially targeted at 75% of Dr. McHutchison's base salary. In February 2020, Dr. McHutchison's annual base salary was increased to \$820,000, and his target bonus opportunity remained unchanged.

As an additional inducement under the employment agreement, we agreed to pay Dr. McHutchison a sign-on bonus in the gross amount of \$300,000, payable in a lump sum within 30 days of his start date. Dr. McHutchison's sign-on bonus is subject to a declining repayment schedule if his employment is terminated under certain circumstances within 18 months of his start date.

We agreed to use our best efforts to cause Dr. McHutchison to be elected as a voting member of the Board throughout his employment and include him in the slate for election as a director at every stockholders' meeting. Dr. McHutchison agreed to accept such election and to serve as a member of the Board without any additional compensation while he serves as our Chief Executive Officer.

If Dr. McHutchison's employment is terminated due to his death other than during the period from one month prior to and through 12 months following, a change in control (as defined in his employment agreement), then we will pay to his estate his then-current base salary for a period of 12 months following such termination. However, if at the time of the Dr. McHutchison's death, we provide or cause to be provided life insurance benefits for Dr. McHutchison at our sole expense, our obligation under the preceding sentence will be reduced to the extent of such life insurance coverage and will be fully satisfied if we maintain life insurance benefits for Dr. McHutchison equal to or greater than his then-current annualized base salary.

If Dr. McHutchison's employment is terminated by us due to his disability (as defined in his employment agreement) or without cause (as defined in his employment agreement) or by Dr. McHutchison for good reason (as defined in his employment agreement) or as a result of his death, in each case during the period from one month prior to and through 12 months following, a change of control (as defined in his employment agreement), and subject to Dr. McHutchison's execution and non-revocation of a general release of claims, we will provide Dr. McHutchison the following benefits: (1) a lump sum payment equal to 18 months of his then-current base salary; (2) an amount equal to 1.5 times his full target annual bonus for the year in which the termination occurred; (3) immediate vesting in full of all equity awards (including equity awards that vest based on performance but only to the extent accelerated vesting is provided in the agreements governing such equity awards); provided, however that (a) in the event that such termination occurs during the one month prior to a change of control, any equity-based compensation outstanding as of the termination will not accelerate but will remain outstanding and eligible to vest immediately prior to the consummation of the change of control and (b) in the event that such termination occurs prior to a change of control and such change of control is not consummated on or prior to the date one month after such termination, no vesting will occur and any equity awards outstanding as of the termination will vest, if at all, and terminate in accordance with, and to the extent provided in the non-change of control separation provisions and the equity award agreements; (4) extension of the exercise period for all vested stock options held by Dr. McHutchison to the end of their term; and (5) if Dr. McHutchison properly elects COBRA, reimbursement for the portion of the COBRA premiums that we would have paid had he remained employed for 18 months following termination or the end of his COBRA continuation period, whichever is earlier.

If Dr. McHutchison's employment is terminated by us as a result of his disability, by us without cause or by Dr. McHutchison for good reason, and such termination does not occur during the one month prior to or within 12 months following, a change of control, and subject to Dr. McHutchison's execution and non-revocation of a general release of claims, we will provide him the following benefits: (1) continued payment of his then-current base salary for 12 months following date of termination of employment; (2) his annual performance bonus, if any, for the year in which termination occurs in an amount equal to the amount Dr. McHutchison would have earned based on our performance if he was employed for the full year, pro-rated based on the number of days employed for the year of termination; (3) all equity awards that would have time vested during the 12 months following the termination date shall accelerate and vest; (4) extension of the exercise period for all vested stock options held by Dr. McHutchison as of the termination date until the earlier of the first anniversary of the employment termination date and the termination date of the vested stock options; and (5) if Dr. McHutchison properly elects COBRA, reimbursement for the portion of the COBRA premiums that we would have paid had he remained employed for 12 months following termination or the end of his COBRA continuation period, whichever is earlier. The benefits described in this paragraph are in lieu of, and not in addition to, the benefits described in the prior preceding paragraph.

If the payments or benefits payable to Dr. McHutchison in connection with a change in control would be subject to the excise tax on golden parachutes imposed under Section 4999 of the Code, then those payments or benefits will be reduced if such reduction would result in a higher net after-tax benefit to Dr. McHutchison.

Thomas J. Russo, CFA

In September 2019, we entered into an employment agreement with Mr. Russo, which became effective in October 2019. Mr. Russo's employment agreement provides for an initial annual base salary of \$425,000 and an annual performance-based incentive cash bonus in an amount initially targeted at 40% of Mr. Russo's base salary. In February 2020, Mr. Russo's annual base salary was increased to \$430,000, and his target bonus opportunity remained unchanged.

As an additional inducement under the employment agreement, we agreed to pay Mr. Russo a sign-on bonus in the gross amount of \$100,000, payable in a lump sum within 30 days of his start date. Mr. Russo's sign-on bonus is subject to repayment if his employment is terminated by us for cause (as defined in the employment agreement) or he terminates his employment other than for good reason (as defined in the employment agreement) or due to his death or disability (as defined in the employment agreement) within 12 months of his start date.

If Mr. Russo's employment is terminated by us as a result of his disability or without cause or by Mr. Russo for good reason within 12 months immediately following a change of control (as defined in his employment agreement), provided that Mr. Russo signs and does not revoke a general release of claims against us, we will provide Mr. Russo the following benefits: (1) a lump sum payment equal to 12 months of his then-current base salary; (2) an amount equal to his full target annual bonus for the year in which the termination occurred; (3) immediate vesting in full of all equity awards held by Mr. Russo that are subject to time-based vesting; and (4) if Mr. Russo properly elects COBRA, reimbursement of the portion of the COBRA premiums that we would have paid had he remained employed for 12 months following termination or the end of his COBRA continuation period, whichever is earlier; provided, however, our obligation to pay such premiums will terminate earlier if he becomes eligible for insurance benefits from another employer during such period.

If Mr. Russo's employment is terminated as a result of his disability, by us without cause or by Mr. Russo for good reason, and such termination does not occur within 12 months following a change of control and provided that Mr. Russo signs and does not revoke a general release of claims against us, we will provide him the following benefits: (1) continued payment of his then-current base salary for 12 months following date of termination of employment, and (2) if Mr. Russo properly elects COBRA, reimbursement of the portion of the COBRA premiums that we would have paid had he remained employed for 12 months following termination or the end of his COBRA continuation period, whichever is earlier; provided, however, our obligation to pay such premiums will terminate earlier if he becomes eligible for insurance benefits from another employer during such period. Such benefits are in lieu of, and not in addition to, the benefits described in the preceding paragraph.

If the payments or benefits payable to Mr. Russo in connection with a change in control would be subject to the excise tax on golden parachutes imposed under Section 4999 of the Code, then those payments or benefits will be reduced if such reduction would result in a higher net after-tax benefit to Mr. Russo.

Luisa M. Stamm, M.D., Ph.D.

In October 2019, we entered into an employment agreement with Dr. Stamm, which became effective in November 2019. Dr. Stamm's employment agreement provides for an initial annual base salary of \$425,000 and an annual performance-based incentive cash bonus in an amount initially targeted at 40% of Dr. Stamm's base salary.

As an additional inducement under the employment agreement, we agreed to pay Dr. Stamm a sign-on bonus in the gross amount of \$100,000, payable in a lump sum within 30 days of her start date. Dr. Stamm's sign-on bonus is subject to repayment if her employment is terminated by us for cause (as defined in the employment agreement) or she terminates her employment other than for good reason (as defined in the employment agreement) or due to her death or disability (as defined in the employment agreement) within 12 months.

If Dr. Stamm's employment is terminated by us as a result of her disability or without cause or by Dr. Stamm for good reason within 12 months immediately following a change of control, provided that Dr. Stamm signs and does not revoke a general release of claims against us, we will provide Dr. Stamm the following benefits: (1) a lump sum payment equal to 12 months of her then-current base salary; (2) an amount equal to her full target annual bonus for the year in which the termination occurred; (3) immediate vesting in full of all equity awards held by Dr. Stamm that are subject to time-based vesting; and (4) if Dr. Stamm properly elects COBRA, reimbursement of the portion of the COBRA premiums that we would have paid had she remained employed for 12 months following termination or the end of her COBRA continuation period, whichever is earlier; provided, however, our obligation to pay such premiums will terminate earlier if she becomes eligible for insurance benefits from another employer during such period.

If Dr. Stamm's employment is terminated as a result of her disability, by us without cause or by Dr. Stamm for good reason, and such termination does not occur within 12 months following a change of control and provided that Dr. Stamm signs and does not revoke a general release of claims against us, we will provide her the following benefits: (1) continued payment of her then-current base salary for 12 months following date of termination of employment, and (2) if Dr. Stamm properly elects COBRA, reimbursement of the portion of COBRA premiums that we would have paid had she remained employed for 12 months following termination or the end of her COBRA continuation period, whichever is earlier; provided, however, our obligation to pay such premiums will terminate earlier if she becomes eligible for insurance benefits from another employer during such period. Such benefits are in lieu of, and not in addition to, the benefits described in the preceding paragraph.

If the payments or benefits payable to Dr. Stamm in connection with a change in control would be subject to the excise tax on golden parachutes imposed under Section 4999 of the Code, then those payments or benefits will be reduced if such reduction would result in a higher net after-tax benefit to Dr. Stamm.

Derek A. Small

In connection with the Merger in July 2014, we entered into an employment agreement with Mr. Small, which was amended in October 2018. Mr. Small's employment agreement provided for an at-will employment arrangement. Mr. Small's base salary in 2019 was \$562,000 (effective as of March 1) and his annual performance-based cash bonus was targeted at 55% of his base salary.

Effective August 2019, in connection with his stepping down as Chief Executive Officer and President, we entered into a separation agreement and general release of claims with Mr. Small. For a summary of the compensation Mr. Small received under his employment agreement and the separation agreement and general release of claims, see "Compensation Terms of New NEOs and One-Time Compensation Elements Related to Leadership Changes —Derek Small".

Other Executive Compensation Policies

Deductibility of Executive Compensation

Generally, Section 162(m) of the Code disallows a federal income tax deduction for public corporations of remuneration in excess of \$1 million paid for any fiscal year to "covered employees" of the corporation. With respect to taxable years before January 1, 2018, remuneration in excess of \$1 million was exempt from this deduction limit if it qualified as "performance-based compensation" within the meaning of Section 162(m). Through 2017, the Compensation Committee endeavored to structure compensation to maintain deductibility under Section 162(m) of the Code to the extent practicable while maintaining the ability to provide a competitive compensation program for our named executive officers.

The Tax Cuts and Jobs Act of 2017, effective for taxable years beginning after December 31, 2017, (1) expanded the scope of Section 162(m) such that all named executive officers are "covered employees" and anyone who was a named executive officer in any year after 2016 will remain a covered employees for as long as he or she (or his or her beneficiaries) receive compensation from the Company and (2) eliminated the exemption to the deduction limit for commission-based compensation and performance-based compensation except with respect to certain grandfathered arrangements in effect as of November 2, 2017 that are not subsequently materially modified. Accordingly, compensation paid to our named executive officers in excess of \$1 million is not deductible unless it qualifies for the transition relief applicable to certain arrangements in place as of November 2, 2017, as described above.

The Compensation Committee believes that stockholder interests are best served if the Committee retains maximum flexibility to design executive compensation programs that meet stated business objectives. For these reasons, the Compensation Committee, while considering tax deductibility as a factor in determining executive compensation, may not limit such compensation to those levels that will be deductible, particularly considering the expansion of the covered employee group and the elimination of the exception for performance-based compensation.

Sections 280G and 4999 of the Code

Sections 280G and 4999 of the Code provide that executive officers and directors who hold significant equity interests and certain other service providers may be subject to significant additional taxes if they receive payments or benefits in connection with a change in control that exceeds certain prescribed limits, and that we (or a successor) may forfeit a deduction on the amounts subject to this additional tax. We have not agreed to provide any executive officer with a “gross-up” or other reimbursement payment for any tax liability that the executive officer might owe because of the application of Sections 280G or 4999 of the Code.

Hedging and Pledging Policy

Under our Special Trading Procedures for Insiders, which was adopted as an addendum to our Statement of Company Policy on Insider Trading and Disclosure, directors and executive officers are prohibited from selling our securities “short” at any time. In addition, unless the transaction has been approved by the Audit Committee, directors and executive officers may not at any time pledge our stock as collateral for a loan. None of our NEOs have pledged our stock. In addition, the Special Trading Procedures for Insiders prohibits directors and executive officers from (1) buying or selling puts, calls or similar instruments on our securities and (2) engaging in any other hedging transactions with respect to our securities. Directors and executive officers may not hold our stock in a margin account.

Compensation Risk Assessment

We believe that our executive compensation policies and programs do not encourage excessive or unnecessary risk taking. This is primarily because our compensation programs are designed to encourage our executive officers and other employees to remain focused on both short-term and long-term strategic goals. As a result, we do not believe that our compensation programs are reasonably likely to have a material adverse effect on us.

Clawback

The Compensation Committee has considered implementing a clawback policy. To date, we have no approved products on the market and have generated no product sales. As a result, our compensation-related goals are not tied to financial metrics and would not be affected by a restatement of our financial statements. Given this and in light of the fact that the SEC has not yet issued final regulations regarding clawback policies under the Dodd-Frank Wall Street Reform and Consumer Protection Act, the Compensation Committee determined not to adopt a clawback policy at this time.

Stock Ownership Guidelines

The Compensation Committee explored implementing stock ownership guidelines for executive officers and non-employee directors in 2018, but ultimately concluded that at that time, all of our then-current executive officers and non-employee directors held sufficient equity interests such that any guidelines that would have been implemented would already be met. As a result, the Compensation Committee determined that it was not necessary to adopt any formal stock ownership guidelines at that time to protect the interests of the stockholders or to further align the interests of executive officers and non-employee directors with those of our stockholders. Due to the number our newly hired senior leadership team members, the Compensation Committee expects to review its position regarding stock ownership guidelines over the next 12 months.

Outstanding Equity Awards at December 31, 2019

The following table contains certain information concerning outstanding equity awards held by the NEOs as of December 31, 2019.

| Name | Option Awards | | | | Stock Awards | | | |
|---------------------------------|---|---|----------------------------|------------------------|---|--|---|--|
| | Number of Securities Underlying Unexercised Options (#) Exercisable | Number of Securities Underlying Unexercised Options (#) Unexercisable | Option Exercise Price (\$) | Option Expiration Date | Number of Shares or Units of Stock That Have Not Vested (#) | Market Value of Shares or Units of Stock That Have Not Vested (\$) | Equity Incentive Plan Awards: Number of Unearned Shares, Units or Other Rights That Have Not Vested (#) | Equity Incentive Plan Awards: Market or Payout Value of Unearned Shares, Units or Other Rights That Have Not Vested (\$) |
| John G. McHutchison, A.O., M.D. | — | 500,000 (1) | 11.86 | 08/06/2029 | — | — | — | — |
| | — | — | — | — | 100,000 (2) | 2,046,000 | — | — |
| | — | — | — | — | — | — | 100,000 (3) | 2,046,000 |
| Thomas J. Russo, CFA | — | 185,000 (4) | 15.69 | 10/28/2029 | — | — | — | — |
| Luisa M. Stamm, M.D., Ph.D. | — | 165,000 (4) | 16.11 | 11/06/2029 | — | — | — | — |
| | — | — | — | — | 12,000 (5) | 245,520 | — | — |
| Derek A. Small | 466,238 | — | 2.22 | 05/15/2024 | — | — | — | — |
| | 40,000 | — | 25.34 | 03/29/2027 | — | — | — | — |
| | 44,687 | 20,313 (6) | 49.14 | 03/29/2028 | — | — | — | — |
| | 28,437 | 36,563 (6) | 19.69 | 03/29/2029 | — | — | — | — |
| | — | — | — | — | 16,250 (7) | 332,475 | — | — |
| | — | — | — | — | 24,375 (8) | 498,713 | — | — |

- (1) These options vest and become exercisable one-third on the first anniversary of the grant date and the remainder over the next twenty-four months in approximately equal monthly installments provided Dr. McHutchison continues to be employed with us through the applicable vesting date.
- (2) The RSUs vest in three approximately equal installments on August 6, 2020, August 6, 2021 and August 6, 2022, provided Dr. McHutchison continues to be employed with us through the applicable vesting date.
- (3) Reflects performance-based RSUs granted on September 28, 2019 that vest only upon the occurrence of certain milestones related to our HBV Cure program and our Microbiome program and if certain market-based performance metrics are met. As of December 31, 2019, none of the performance-based RSUs have vested.
- (4) These options vest and become exercisable 25% on the first anniversary of the grant date and the remainder over the next 36 months in approximately equal monthly installments provided that the executive officer continues to be employed with us through the applicable vesting date.
- (5) These RSUs vest, assuming continuous service, in one installment on the first anniversary of the grant date.
- (6) These options were scheduled to vest and become exercisable 25% on the first anniversary of the grant date and the remainder over the next 36 months in approximately equal monthly installments. A portion of these options were accelerated pursuant to the terms of Mr. Small's separation agreement. The remaining options under these stock option grants vest in accordance with their terms, provided Mr. Small continues to perform services for us through the applicable vesting dates.
- (7) These RSUs were scheduled to vest in four equal installments on March 29, 2019, March 29, 2020, March 29, 2021 and March 29, 2022. A portion of these RSUs were accelerated pursuant to the terms of Mr. Small's separation agreement. The remaining RSUs vest in accordance with their terms, provided Mr. Small continues to perform services for us through the applicable vesting dates.
- (8) These RSUs were scheduled to vest in four equal installments on March 29, 2020, March 29, 2021, March 29, 2022 and March 29, 2023. A portion of these RSUs were accelerated pursuant to the terms of Mr. Small's separation agreement. The remaining RSUs vest in accordance with their terms, provided Mr. Small continues to perform services for us through the applicable vesting dates.

CERTAIN RELATIONSHIPS AND RELATED PARTY TRANSACTIONS

The written charter of our Audit Committee authorizes, and the Nasdaq listing rules require, our Audit Committee to review and approve related party transactions. In reviewing related party transactions, our Audit Committee applies the basic standard that transactions with affiliates should be made on terms no less favorable to us than could have been obtained from unaffiliated parties. Therefore, the Audit Committee reviews the benefits of the transactions, terms of the transactions and the terms available from unrelated third parties, as applicable. All transactions other than compensatory arrangements between us and our officers, directors, principal stockholders and their affiliates will be approved or ratified by our Audit Committee or a majority of the disinterested directors and will continue to be on terms no less favorable to us than could be obtained from unaffiliated third parties.

Other than the compensation agreements and other arrangements described under “Executive Compensation—Employment Arrangements—Summary Compensation Table—Narrative Disclosure to Summary Compensation Table—Employment Arrangements,” since January 1, 2018, there has not been and there is not currently proposed, any transaction or series of similar transactions to which we were, or will be, a party in which the amount involved exceeded, or will exceed, \$120,000 and in which any director, executive officer, holder of five percent or more of any class of our capital stock or any member of the immediate family of, or entities affiliated with, any of the foregoing persons, had, or will have, a direct or indirect material interest.

SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT

The following table sets forth certain information regarding the ownership of shares of our common stock based on 32,707,348 shares outstanding as of April 13, 2020 (the Table Date) by (1) each person known by us to beneficially own more than 5% of the outstanding shares of common stock, (2) each of our directors and our director nominee and (3) each of our NEOs and (4) all of our directors and current executive officers as a group.

This table is based upon information supplied by our directors, our director nominee and NEOs and from Schedules 13G filed with the SEC by our 5% stockholders. Unless otherwise indicated in the footnotes to this table and subject to community property laws where applicable, each of the stockholders named in this table has sole voting and investment power with respect to the shares indicated as beneficially owned by them, subject to community property laws, where applicable. Share ownership in each case includes (1) shares issuable upon exercise of options and warrants that may be exercised within 60 days after the Table Date and (2) RSUs held by the individual that are scheduled to vest and settle within 60 days after the Table Date for purposes of computing the percentage of common stock owned by such person, but not for purposes of computing the percentage owned by any other person. Unless otherwise noted, the address for each person listed below is c/o Assembly Biosciences, Inc., 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080. Applicable percentages are based on 32,707,348 shares outstanding on the Table Date.

There are no arrangements, known to Assembly, including any pledge by any person of securities of Assembly, the operation of which may at a subsequent date result in a change in control of Assembly.

| Name of Beneficial Owner | Shares Beneficially Owned | Percentage Owned (%) |
|---|---------------------------|----------------------|
| 5% Stockholders: | | |
| Jennison Associates LLC and affiliates ⁽¹⁾ 466 Lexington Avenue New York, NY 10017 | 2,614,206 | 8.0% |
| EcoR1 Capital, LLC ⁽²⁾ 409 Illinois Street San Francisco, CA 94158 | 2,388,268 | 7.3% |
| BlackRock Inc. ⁽³⁾ 55 East 52nd Street New York, NY 10055 | 1,987,218 | 6.1% |
| Consonance Capital Management LP and affiliates ⁽⁴⁾ 1370 Avenue of the Americas Floor 33 New York, NY 10019 | 1,878,395 | 5.7% |
| Directors, Director Nominee, Named Executive Officers and Executive Officers: | | |
| Anthony E. Altig ⁽⁵⁾ | 117,000 | * |
| Mark Auerbach ⁽⁶⁾ | 109,000 | * |
| Richard D. DiMarchi, Ph.D. ⁽⁷⁾ | 428,240 | 1.3% |
| Myron Z. Holubiak ⁽⁶⁾ | 109,000 | * |
| Helen S. Kim ⁽⁶⁾ | 30,833 | * |
| Susan Mahony, Ph.D. ⁽⁶⁾ | 30,834 | * |
| Alan J. Lewis, Ph.D. ⁽⁶⁾ | 65,000 | * |
| William R. Ringo, Jr. ⁽⁸⁾ | 111,465 | * |
| Derek A. Small ⁽⁹⁾ | 1,242,528 | 3.8% |
| John G. McHutchison, A.O., M.D. ⁽¹⁰⁾ | — | — |
| Thomas J. Russo, CFA ⁽¹¹⁾ | — | — |
| Luisa M. Stamm, M.D., Ph.D. ⁽¹²⁾ | — | — |
| All directors and current executive officers as a group (16 persons) ⁽¹³⁾ | 2,323,498 | 7.1% |

* Less than 1%.

- (1) Based on the information contained in the Schedule 13G/A filed with the SEC on February 3, 2020 by Prudential Financial, Inc. (the Prudential 13G/A) and the Schedule 13G/A filed with the SEC on February 4, 2020 by Jennison Associates, LLC (the Jennison 13G/A). According to the Prudential 13G/A, as of December 31, 2019, Prudential Financial, Inc. holds sole voting and dispositive power over 1,470 shares of common stock, shared voting and dispositive power over 2,612,736 shares of common stock, and through its subsidiaries, including indirect ownership of 100% of the equity interest in Jennison Associates, LLC, Prudential Financial, Inc. may be deemed to be the beneficial owner of an aggregate of 2,614,206 shares of common stock, of which 2,346,510 shares are held by Jennison Associates, LLC. According to the Jennison 13G/A, as of December 31, 2019, Jennison Associates, LLC has sole voting power over 2,346,510 of the shares of common stock and shared dispositive power over 2,346,510 of the shares of common stock.
- (2) Based on the information contained in the Schedule 13G filed with the SEC on December 23, 2019 by EcoR1 Capital, LLC, Oleg Nodelman, and EcoR1 Capital Fund Qualified, L.P. (EcoR1 Qualified Fund), as of December 23, 2019, all three reporting persons hold shared voting and dispositive power over the shares of common stock. EcoR1 Qualified Fund may be deemed to beneficially own 1,987,970 shares of common stock. EcoR1 Capital, LLC, as the general partner of EcoR1 Qualified Fund, may be deemed to beneficially own 2,388,268 shares of common stock, including the 1,987,970 beneficially owned by EcoR1 Qualified Fund. Oleg Nodelman, as the control person of EcoR1 Capital, LLC may be deemed to beneficially own the 2,388,268 shares of common stock, including 1,987,970 deemed beneficially owned by EcoR1 Qualified Fund. According to the Schedule 13G, EcoR1 Qualified Fund is not a member of a group and expressly disclaims membership in a group. In addition, EcoR1 Qualified Fund disclaims that it is a beneficial owner of any stock covered by the Schedule 13G. Each filer also disclaims beneficial ownership of the stock except to the extent of that person's pecuniary interest therein.
- (3) Based on the information contained in the Schedule 13G/A filed with the SEC on February 5, 2020 by BlackRock, Inc. (BlackRock), a parent holding company or control person, as of December 31, 2019, BlackRock beneficially owns 1,987,218 shares of common stock. BlackRock has sole voting power over 1,931,197 shares of common stock and sole dispositive power over 1,987,218 shares of common stock. Various persons have the right to receive or the power to direct the receipt of dividends from, or the proceeds from the sale of the common stock. No one person's interest in the common stock is more than five percent of the total outstanding common shares. Subsidiaries holding shares of common stock are as follows: BlackRock Advisors, LLC, BlackRock Investment Management (UK) Limited, BlackRock Asset Management Canada Limited, BlackRock (Netherlands) B.V., BlackRock Fund Advisors, BlackRock Asset Management Ireland Limited, BlackRock Institutional Trust Company, National Association, BlackRock Financial Management, Inc., BlackRock Japan Co., Ltd., BlackRock Asset Management Schweiz AG and BlackRock Investment Management, LLC.
- (4) Based on the information contained in the Schedule 13G filed with the SEC on February 14, 2020 by Consonance Capital Management LP, Consonance Capital Opportunity Fund Management LP, Consonance Capman GP LLC and Mitchell Blutt. Consonance Capital Master Account LP (Consonance Master) directly holds 1,381,832 shares of common stock (the Master Account Shares). Consonance Capital Management LP (the Adviser) is the investment adviser of Consonance Master, and pursuant to an investment advisory agreement, the Adviser exercises voting and investment power over the Master Account Shares held by Consonance Master. Consonance Capman GP LLC (Capman) is the general partner of the Adviser and Mitchell Blutt, as the Manager and Member of Capman and Chief Executive Officer of the Adviser, may be deemed to control Capman and the Adviser. Each of the Adviser, Capman and Mr. Blutt may be deemed to beneficially own the Master Account Shares, but neither the filing of the Schedule 13G nor any of its contents shall be deemed to constitute an admission that any of the Adviser, Capman or Mr. Blutt is the beneficial owner of the Master Account Shares for purposes of Section 13(d) of the Exchange Act or for any other purpose. Consonance Capital Opportunity Master Fund, LP (Consonance Opportunity Master) directly holds 293,024 shares of common stock (the Opportunity Master Account Shares). The Adviser is the investment adviser of Consonance Opportunity Master, and pursuant to an investment advisory agreement, the Adviser exercises voting and investment power over the Opportunity Master Account Shares held by Consonance Opportunity Master. Capman is the general partner of the Adviser and Mitchell Blutt, as the Manager and Member of Capman and Chief Executive Officer of the Adviser, may be deemed to control Capman and the Adviser. Each of the Adviser, Capman and Mr. Blutt may be deemed to beneficially own the Opportunity Master Account Shares, but neither the filing of the Schedule 13G nor any of its contents shall be deemed to constitute an

admission that any of the Adviser, Capman or Mr. Blutt is the beneficial owner of the Opportunity Master Account Shares for purposes of Section 13(d) of the Exchange Act or for any other purpose. A managed account managed by Consonance Capital Opportunity Fund Management LP (Consonance Opportunity) directly holds 203,539 shares of common stock (the Managed Account Shares). Capman is the general partner of Consonance Opportunity and Mitchell Blutt, as the Manager and Member of Capman, may be deemed to control Capman and Consonance Opportunity. Each of Consonance Opportunity, Capman and Mr. Blutt may be deemed to beneficially own the Managed Account Shares, but neither the filing of the Schedule 13G nor any of its contents shall be deemed to constitute an admission that any of Consonance Opportunity, Capman or Mr. Blutt is the beneficial owner of the Managed Account Shares for purposes of Section 13(d) of the Exchange Act or for any other purpose.

- (5) Includes 8,000 shares of common stock and 109,000 shares of common stock that Mr. Altig has the right to acquire from us within 60 days after the Table Date pursuant to the exercise of stock options.
- (6) Includes shares of common stock that the individual has the right to acquire from us within 60 days after the Table Date pursuant to the exercise of stock options.
- (7) Includes 319,240 shares of common stock and 109,000 shares of common stock that Dr. DiMarchi has the right to acquire from us within 60 days after the Table Date pursuant to the exercise of stock options.
- (8) Includes 17,465 shares of common stock and 94,000 shares of common stock that Mr. Ringo has the right to acquire from us within 60 days after the Table Date pursuant to the exercise of stock options.
- (9) Includes (a) 663,166 shares of common stock and (b) 579,362 shares of common stock that Mr. Small has the right to acquire from us within 60 days after the Table Date pursuant to the exercise of stock options. Excludes 52,083 RSUs that are vested but not scheduled to settle within 60 days of the Table Date and 113,542 RSUs held by Mr. Small that are not scheduled to vest within 60 days after the Table Date.
- (10) Dr. McHutchison does not beneficially own any shares of common stock. Excludes 200,000 RSUs held by Dr. McHutchison that are not scheduled to vest within 60 days of the Table Date.
- (11) Mr. Russo does not beneficially own any shares of common stock. Excludes 43,383 RSUs held by Mr. Russo that are not scheduled to vest within 60 days of the Table Date.
- (12) Dr. Stamm does not beneficially own any shares of common stock. Excludes 12,000 RSUs held by Dr. Stamm that are not scheduled to vest within 60 days of the Table Date.
- (13) Includes the shares of common stock described in footnotes (5) through (12).

DEADLINE FOR STOCKHOLDER PROPOSALS FOR THE 2021 ANNUAL MEETING OF STOCKHOLDERS

Any stockholder who meets the requirements of the proxy rules under the Exchange Act may submit proposals to the Board to be included in next year's proxy statement and on our proxy card for the 2021 Annual Meeting of Stockholders. Such proposals must comply with the requirements of Rule 14a-8 under the Exchange Act. To be considered for inclusion in next year's proxy materials, any proposals must be submitted in writing by December 28, 2020, to our Corporate Secretary at 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080; provided, however, that if our 2021 Annual Meeting of Stockholders is held before May 12, 2021 or after July 11, 2021, then the deadline is a reasonable amount of time prior to the date we begin to print and send our proxy statement for the 2021 Annual Meeting of Stockholders.

Subject to compliance with applicable requirements of state law and the Exchange Act, our Amended and Restated Bylaws also provide for separate notice procedures to propose business to be considered by stockholders at a meeting, provided that such proposal would not be included in next year's proxy materials. Such proposals must comply with the requirements, including without limitation, the separate notice procedures, of our Amended and Restated Bylaws. If you wish to submit such a proposal, written notice must be received by the Corporate Secretary no later than the close of business not more than 90 days before or less than 60 days before the date of the meeting, in the case of the 2021 Annual Meeting of Stockholders or any other annual meeting, or by the tenth business day following the day on which public announcement of the date of the meeting is first made, in the case of a special meeting.

Our Amended and Restated Bylaws permit a stockholder, or a group of up to 20 eligible stockholders, that has owned at least 3% of our outstanding common stock for at least three years to nominate and include in our proxy statement candidates for the Board, subject to certain requirements. Any such nomination must be received at the address above no earlier than the close of business on November 28, 2020 and no later than the close of business on December 28, 2020; provided, however, that if our 2021 Annual Meeting of Stockholders is held before May 12, 2021 or after July 11, 2021, then the deadline is the close of business on the date that is 180 days prior to the 2021 Annual Meeting of Stockholders or the tenth day following the date that the 2021 Annual Meeting of Stockholders is first publicly disclosed. Any such notice must meet the other requirements set forth in our Amended and Restated Bylaws, which are publicly available on the SEC's website.

Our Amended and Restated Bylaws also provide for separate notice procedures to recommend a person for nomination as a director, provided that such nominee would not be included in next year's proxy materials. Such proposals must comply with the requirements, including without limitation, the separate notice procedures, of our Amended and Restated Bylaws. If you wish to nominate a director, written notice must be received by the Corporate Secretary no later than the close of business not more than 90 days before or less than 60 days before the date of the annual meeting, in the case of the 2021 Annual Meeting of Stockholders or any other annual meeting, or not later than the tenth day following the day on which public announcement of the date of the meeting is first made in the event that less than 70 days' notice or prior public disclosure of the date of the annual meeting is given or made to stockholders.

DELIVERY OF DOCUMENTS TO STOCKHOLDERS SHARING AN ADDRESS

The SEC has adopted rules that permit companies to deliver a single Proxy Availability Notice or a single copy of proxy materials to multiple stockholders sharing an address unless a company has received contrary instructions from one or more of the stockholders at that address. Upon request, we will promptly deliver a separate Proxy Availability Notice or separate copy of proxy materials to one or more stockholders at a shared address to which a single Proxy Availability Notice or a single copy of proxy materials was delivered. Stockholders may request a separate Proxy Availability Notice or separate copy of proxy materials by contacting our Corporate Secretary either by calling +1.833.509.4583 or by mailing a request to 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080. Stockholders at a shared address who receive multiple Proxy Availability Notices or multiple copies of proxy materials may request to receive a single Proxy Availability Notice or a single copy of proxy materials in the future in the same manner as described above.

OTHER MATTERS

The Board knows of no other business to be brought before the meeting, but intends that, as to any such other business, the shares will be voted pursuant to the proxy in accordance with the best judgment of the person or persons acting thereunder.

Proposed Amendment No. 3 to Assembly Biosciences, Inc. 2018 Stock Incentive Plan**AMENDMENT NO. 3****TO****ASSEMBLY BIOSCIENCES, INC.
2018 STOCK INCENTIVE PLAN**

Assembly Biosciences, Inc., a Delaware corporation (the “Company”) adopted the 2018 Stock Incentive Plan on May 30, 2018, which was amended by Amendment No. 1 to Assembly Biosciences, Inc. 2018 Stock Incentive Plan effective as of May 17, 2019 and by Omnibus Amendment to Assembly Biosciences, Inc. Stock Plans effective as of March 11, 2020 (as amended from time to time, the “Plan”).

Prior to this Amendment No. 3 to the Plan, the number of shares of Common Stock, par value \$0.001 per share, reserved under the Plan was 3,000,000.

The Board of Directors of the Company (the “Board”) may, with stockholder approval, amend the Plan to increase the number of authorized shares reserved for issuance under the Plan.

The Board has determined that it is advantageous to the Company and necessary to attract and retain the best available personnel to amend the Plan to increase the number of shares reserved for issuance under the Plan.

Now, therefore, the Plan is hereby amended as follows:

1. Sections 3(a) of the Plan shall be amended as follows:

“(a) Subject to the provisions of Sections 3(b) and 12 below, the maximum aggregate number of Shares which may be issued pursuant to all Awards (including Incentive Stock Options) is Four Million Six Hundred Thousand (4,600,000) Shares. The Shares granted under the Plan may be authorized, but unissued, or reacquired Common Stock.

Except as expressly set forth in this Amendment No. 3, all other terms and conditions set forth in the Plan shall remain in full force and effect. Each capitalized term used and not defined herein shall have the meaning set forth in the Plan.

Subject to approval of the stockholders, this Amendment No. 3 has been adopted by the Board of Directors of the Company as of March 11, 2020.

This Amendment No. 3 will be submitted to the stockholders of the Company for approval at the annual stockholders meeting to be held on June 11, 2020 and will become effective upon receipt of approval by the stockholders.

Assembly Biosciences, Inc. 2018 Stock Incentive Plan, Incorporating Proposed Amendment

ASSEMBLY BIOSCIENCES, INC.

2018 STOCK INCENTIVE PLAN

1. **Purposes of the Plan.** The purposes of this Plan are to attract and retain the best available personnel, to provide additional incentives to Employees, Directors and Consultants and to promote the success of the Company's business.
2. **Definitions.** The following definitions shall apply as used herein and in the individual Award Agreements except as defined otherwise in an individual Award Agreement. In the event a term is separately defined in an individual Award Agreement, such definition shall supersede the definition contained in this Section 2.
 - (a) **"Administrator"** means the Board or any of the Committees appointed to administer the Plan.
 - (b) **"Affiliate"** and **"Associate"** shall have the respective meanings ascribed to such terms in Rule 12b-2 promulgated under the Exchange Act.
 - (c) **"Applicable Laws"** means the legal requirements relating to the Plan and the Awards under applicable provisions of federal and state securities laws, the corporate laws of California and, to the extent other than California, the corporate law of the state of the Company's incorporation, the Code, the rules of any applicable stock exchange or national market system, and the rules of any non-U.S. jurisdiction applicable to Awards granted to residents therein.
 - (d) **"Assumed"** means that pursuant to a Corporate Transaction either (i) the Award is expressly affirmed by the Company or (ii) the contractual obligations represented by the Award are expressly assumed (and not simply by operation of law) by the successor entity or its Parent in connection with the Corporate Transaction with appropriate adjustments to the number and type of securities of the successor entity or its Parent subject to the Award and the exercise or purchase price thereof which at least preserves the compensation element of the Award existing at the time of the Corporate Transaction as determined in accordance with the instruments evidencing the agreement to assume the Award.
 - (e) **"Award"** means the grant of an Option, SAR, Dividend Equivalent Right, Restricted Stock, Restricted Stock Unit, Unrestricted Stock or other right or benefit under the Plan.
 - (f) **"Award Agreement"** means the written agreement evidencing the grant of an Award executed by the Company and the Grantee, including any amendments thereto.
 - (g) **"Board"** means the Board of Directors of the Company.
 - (h) **"Cause"** means, with respect to the termination by the Company or a Related Entity of the Grantee's Continuous Service, that such termination is for "Cause" as such term (or word of like import) is expressly defined in a then-effective written agreement between the Grantee and the Company or such Related Entity, or in the absence of such then-effective written agreement and definition, is based on, in the determination of the Administrator, the Grantee's: (i) performance of any act or failure to perform any act in bad faith and to the detriment of the Company or a Related Entity; (ii) dishonesty, intentional misconduct or material breach of any agreement with the Company or a Related Entity; or (iii) commission of a crime involving dishonesty, breach of trust, or physical or emotional harm to any person; provided, however, that with regard to any agreement that defines "Cause" on the occurrence of or in connection with a Corporate Transaction, such definition of "Cause" shall not apply until a Corporate Transaction actually occurs.
 - (i) **"Code"** means the Internal Revenue Code of 1986, as amended, or any successor statute.

(j) “**Committee**” means any committee composed of members of the Board appointed by the Board to administer the Plan.

(k) “**Common Stock**” means the Company’s Common Stock, par value \$0.001 per share.

(l) “**Company**” means Assembly Biosciences, Inc., a Delaware corporation, formerly known as Ventrus Biosciences, Inc., or any successor entity that adopts the Plan in connection with a Corporate Transaction.

(m) “**Consultant**” means any natural person (other than an Employee or a Director, solely with respect to rendering services in such person’s capacity as a Director) who provides bona fide services to the Company or any Related Entity, within the meaning of Form S-8 promulgated under the Securities Act of 1933, as amended, and provided, further, that a Consultant will include only those persons to whom the issuance of Shares may be registered under Form S-8 promulgated under the Securities Act of 1933, as amended.

(n) “**Continuous Service**” means that the provision of services to the Company or a Related Entity in any capacity of Employee, Director or Consultant is not interrupted or terminated. In jurisdictions requiring notice in advance of an effective termination as an Employee, Director or Consultant, Continuous Service shall be deemed terminated upon the actual cessation of providing services to the Company or a Related Entity notwithstanding any required notice period that must be fulfilled before a termination as an Employee, Director or Consultant can be effective under Applicable Laws. A Grantee’s Continuous Service shall be deemed to have terminated either upon an actual termination of Continuous Service or upon the entity for which the Grantee provides services ceasing to be a Related Entity. Continuous Service shall not be considered interrupted in the case of (i) any approved leave of absence, (ii) transfers among the Company, any Related Entity, or any successor in any capacity of Employee, Director or Consultant, or (iii) any change in status as long as the individual remains in the service of the Company or a Related Entity in any capacity of Employee, Director or Consultant (except as otherwise provided in the Award Agreement). An approved leave of absence shall include sick leave, military leave, or any other authorized personal leave. For purposes of each Incentive Stock Option granted under the Plan, if such leave exceeds three (3) months, and reemployment upon expiration of such leave is not guaranteed by statute or contract, then the Incentive Stock Option shall be treated as a Non-Qualified Stock Option on the day three (3) months and one (1) day following the expiration of such three (3) month period.

(o) “**Corporate Transaction**” means any of the following transactions, provided, however, that the Administrator shall determine under parts (iv) and (v) whether multiple transactions are related, and its determination shall be final, binding and conclusive:

(i) a merger or consolidation in which the Company is not the surviving entity, except for a transaction the principal purpose of which is to change the state in which the Company is incorporated;

(ii) the sale, transfer or other disposition of all or substantially all of the assets of the Company;

(iii) the complete liquidation or dissolution of the Company;

(iv) any reverse merger or series of related transactions culminating in a reverse merger (including, but not limited to, a tender offer followed by a reverse merger) in which the Company is the surviving entity but (A) the shares of Common Stock outstanding immediately prior to such merger are converted or exchanged by virtue of the merger into other property, whether in the form of securities, cash or otherwise, or (B) in which securities possessing more than fifty percent (50%) of the total combined voting power of the Company’s outstanding securities are transferred to a person or persons different from those who held such securities immediately prior to such merger or the initial transaction culminating in such merger; or

(v) acquisition in a single or series of related transactions by any person or related group of persons (other than the Company or by a Company-sponsored employee benefit plan) of beneficial ownership (within the meaning of Rule 13d-3 of the Exchange Act) of securities possessing more than fifty percent (50%) of the total combined voting power of the Company's outstanding securities.

(q) “**Director**” means a member of the Board or the board of directors of any Related Entity.

(r) “**Disability**” shall have the meaning set forth in the long-term disability policy of the Company or the Related Entity to which the Grantee provides services regardless of whether the Grantee is covered by such policy. If the Company or the Related Entity to which the Grantee provides service does not have a long-term disability plan in place, “Disability” means that a Grantee is unable to carry out the responsibilities and functions of the position held by the Grantee by reason of any medically determinable physical or mental impairment for a period of not less than ninety (90) consecutive days. A Grantee will not be considered to have incurred a Disability unless he or she furnishes proof of such impairment sufficient to satisfy the Administrator in its discretion.

(s) “**Disqualifying Disposition**” means any disposition (including any sale) of Common Stock received upon exercise of an Incentive Stock Option before either (i) two (2) years after the date the Employee was granted the Incentive Stock Option, or (ii) one (1) year after the date the Employee acquired Common Stock by exercising the Incentive Stock Option. If the Employee has died before such stock is sold, these holding period requirements do not apply and no Disqualifying Disposition can occur thereafter.

(t) “**Dividend Equivalent Right**” means a right entitling the Grantee to compensation measured by dividends paid with respect to Common Stock.

(u) “**Employee**” means any person, including an Officer or Director, who is in the employ of the Company or any Related Entity, subject to the control and direction of the Company or any Related Entity as to both the work to be performed and the manner and method of performance. The payment of a director's fee by the Company or a Related Entity shall not be sufficient to constitute “employment” by the Company.

(v) “**Exchange Act**” means the Securities Exchange Act of 1934, as amended.

(w) “**Fair Market Value**” means, as of any date, the value of Common Stock determined as follows.

(i) If the Common Stock is listed on one or more established stock exchanges or national market systems, including without limitation The NASDAQ Global Select Market, The NASDAQ Global Market or The NASDAQ Capital Market of The NASDAQ Stock Market LLC, its Fair Market Value shall be the closing sales price for such stock (or the closing bid, if no sales were reported) as quoted on the principal exchange or system on which the Common Stock is listed (as determined by the Administrator) on the date of determination (or, if no closing sales price or closing bid was reported on that date, as applicable, on the last trading date such closing sales price or closing bid was reported), as reported in The Wall Street Journal or such other source as the Administrator deems reliable;

(ii) If the Common Stock is regularly quoted on an automated quotation system (including the OTC Bulletin Board) or by a recognized securities dealer, its Fair Market Value shall be the closing sales price for such stock as quoted on such system or by such securities dealer on the date of determination, but if selling prices are not reported, the Fair Market Value of a share of Common Stock shall be the mean between the high bid and low asked prices for the Common Stock on the date of determination (or, if no such prices were reported on that date, on the last date such prices were reported), as reported in The Wall Street Journal or such other source as the Administrator deems reliable; or

(iii) In the absence of an established market for the Common Stock of the type described in (i) and (ii), above, the Fair Market Value thereof shall be determined by the Administrator in a manner in compliance with Section 409A of the Code, and in the case of an Incentive Stock Option, in a manner in compliance with Section 422 of the Code.

(x) “**Grantee**” means an Employee, Director or Consultant who receives an Award under the Plan.

(y) “**Incentive Stock Option**” means an Option designated and qualified as an incentive stock option within the meaning of Section 422 of the Code.

(z) “**Non-Qualified Stock Option**” means an Option that is not an Incentive Stock Option.

(aa) “**Officer**” means a person who is an officer of the Company or a Related Entity within the meaning of Section 16 of the Exchange Act and the rules and regulations promulgated thereunder.

(bb) “**Option**” means an option to purchase Shares pursuant to an Award Agreement granted under the Plan.

(cc) “**Parent**” means a “parent corporation,” whether now or hereafter existing, as defined in Section 424(e) of the Code.

(dd) “**Plan**” means this Assembly Biosciences, Inc. 2018 Stock Incentive Plan.

(ee) “**Post-Termination Exercise Period**” means the period specified in the Award Agreement of not less than thirty (30) days commencing on the date of termination (other than termination by the Company or any Related Entity for Cause) of the Grantee’s Continuous Service, or such longer period as may be applicable upon death or Disability.

(ff) “**Related Entity**” means any Parent or Subsidiary of the Company.

(gg) “**Replaced**” means that pursuant to a Corporate Transaction the Award is replaced with a comparable stock award or a cash incentive program of the Company, the successor entity (if applicable) or Parent of either of them which preserves the compensation element of such Award existing at the time of the Corporate Transaction and provides for subsequent payout in accordance with the same (or a more favorable) vesting schedule applicable to such Award. The determination of Award comparability shall be made by the Administrator and its determination shall be final, binding and conclusive.

(hh) “**Restricted Stock**” means Shares issued under the Plan to the Grantee for such consideration, if any, and subject to such restrictions on transfer, rights of first refusal, repurchase provisions, forfeiture provisions, and other terms and conditions as established by the Administrator.

(ii) “**Restricted Stock Units**” means an Award which may be earned in whole or in part upon the passage of time or the attainment of performance criteria established by the Administrator and which may be settled for cash, Shares or other securities or a combination of cash, Shares or other securities as established by the Administrator.

(jj) “**Rule 16b-3**” means Rule 16b-3 promulgated under the Exchange Act or any successor thereto.

(kk) “**SAR**” means a stock appreciation right entitling the Grantee to Shares or cash compensation, as established by the Administrator, measured by appreciation in the value of Common Stock.

(ll) “**Share**” means a share of the Common Stock.

(mm) “**Subsidiary**” means a “subsidiary corporation,” whether now or hereafter existing, as defined in Section 424(f) of the Code.

(nn) “**Unrestricted Stock**” means an award of Shares free from any risks of forfeiture.

3. Stock Subject to the Plan.

(a) Subject to the provisions of Sections 3(b) and 12 below, the maximum aggregate number of Shares which may be issued pursuant to all Awards (including Incentive Stock Options) is ~~Three Million (3,000,000)~~ **Four Million Six Hundred Thousand (4,600,000)** Shares. The Shares granted under the Plan may be authorized, but unissued, or reacquired Common Stock.

(b) Any Shares covered by an Award (or portion of an Award) which is forfeited, canceled or expires (whether voluntarily or involuntarily) shall be deemed not to have been issued for purposes of determining the maximum aggregate number of Shares which may be issued under the Plan, except that the maximum aggregate number of Shares which may be issued pursuant to the exercise of Incentive Stock Options shall not exceed the number specified in Section 3(a). Shares that actually have been issued under the Plan pursuant to an Award shall not be returned to the Plan and shall not become available for future issuance under the Plan, except that if Options or other Awards granted under this Plan are forfeited or repurchased by the Company, such Shares shall become available for future grant under the Plan. In the event any Option or other Award granted under the Plan is exercised through the tendering of shares of Common Stock (either actually or through attestation) or withholding shares of Common Stock, or in the event tax withholding obligations are satisfied by tendering or withholding shares of Common Stock, any shares of Common Stock so tendered or withheld shall not again be available for awards under the Plan. Shares of Common Stock subject to an SAR granted pursuant to Section 6(k) of this Plan that are not issued in connection with cash or stock settlement of the exercise of the SAR shall not again be available for award under the Plan. Shares of Common Stock reacquired by the Company on the open market or otherwise using cash proceeds from the exercise of Options shall not be available for awards under the Plan.

(c) Notwithstanding anything to the contrary in this Plan, the value of all Awards awarded under this Plan and all other cash compensation paid by the Company to any non-employee Director in any calendar year shall not exceed \$1,000,000. For the purpose of this limitation, the value of any Award shall be its grant date fair value, as determined in accordance with ASC 718 or successor provision but excluding the impact of estimated forfeitures related to service-based vesting provisions.

4. Administration of the Plan.

(a) Plan Administrator.

(i) Administration with Respect to Directors and Officers. With respect to grants of Awards to Directors or Employees who are also Officers or Directors of the Company, the Plan shall be administered by (A) the Board or (B) a Committee designated by the Board, which Committee shall be constituted in such a manner as to satisfy the Applicable Laws and to permit such grants and related transactions under the Plan to be exempt from Section 16(b) of the Exchange Act in accordance with Rule 16b-3. Once appointed, such Committee shall continue to serve in its designated capacity until otherwise directed by the Board.

(ii) Administration With Respect to Consultants and Other Employees. With respect to grants of Awards to Employees or Consultants who are neither Directors nor Officers of the Company, the Plan shall be administered by (A) the Board or (B) a Committee designated by the Board, which Committee shall be constituted in such a manner as to satisfy the Applicable Laws. Once appointed, such Committee shall continue to serve in its designated capacity until otherwise directed by the Board.

(b) Multiple Administrative Bodies. The Plan may be administered by different bodies with respect to Directors, Officers, Consultants, and Employees who are neither Directors nor Officers.

(c) Powers of the Administrator. Subject to Applicable Laws and the provisions of the Plan (including any other powers given to the Administrator hereunder), and except as otherwise provided by the Board, the Administrator shall have the authority, in its discretion:

- hereunder;
- (i) to select the Employees, Directors and Consultants to whom Awards may be granted from time to time
 - (ii) to determine whether and to what extent Awards are granted hereunder;
 - (iii) to determine the number of Shares or the amount of other consideration to be covered by each Award granted hereunder;
 - (iv) to approve forms of Award Agreements for use under the Plan;
 - (v) to determine the type, terms and conditions of any Award granted hereunder;
 - (vi) to establish additional terms, conditions, rules or procedures to accommodate the rules or laws of applicable non-U.S. jurisdictions and to afford Grantees favorable treatment under such rules or laws; provided, however, that no Award shall be granted under any such additional terms, conditions, rules or procedures with terms or conditions which are inconsistent with the provisions of the Plan;
 - (vii) to amend the terms of any outstanding Award granted under the Plan, provided that any amendment that would adversely affect the Grantee's rights under an outstanding Award shall not be made without the Grantee's written consent; provided, however, that an amendment or modification that may cause an Incentive Stock Option to become a Non-Qualified Stock Option shall not be treated as adversely affecting the rights of the Grantee;
 - (viii) to construe and interpret the terms of the Plan and Awards, including without limitation, any notice of award or Award Agreement, granted pursuant to the Plan;
 - (ix) to institute an option exchange program; and
 - (x) to take such other action, not inconsistent with the terms of the Plan, as the Administrator deems appropriate.

The express grant in the Plan of any specific power to the Administrator shall not be construed as limiting any power or authority of the Administrator; provided that the Administrator may not exercise any right or power reserved to the Board. Any decision made, or action taken, by the Administrator or in connection with the administration of this Plan shall be final, conclusive and binding on all persons having an interest in the Plan.

(d) Indemnification. In addition to such other rights of indemnification as they may have as members of the Board or as Officers or Employees of the Company or a Related Entity, members of the Board and any Officers or Employees of the Company or a Related Entity to whom authority to act for the Board, the Administrator or the Company is delegated shall be defended and indemnified by the Company to the extent permitted by law on an after-tax basis against all reasonable expenses, including attorneys' fees, actually and necessarily incurred in connection with the defense of any claim, investigation, action, suit or proceeding, or in connection with any appeal therein, to which they or any of them may be a party by reason of any action taken or failure to act under or in connection with the Plan, or any Award granted hereunder, and against all amounts paid by them in settlement thereof (provided such settlement is approved by the Company) or paid by them in satisfaction of a judgment in any such claim, investigation, action, suit or proceeding, except in relation to matters as to which it shall be adjudged in such claim, investigation, action, suit or proceeding that such person is liable for gross negligence, bad faith or intentional misconduct; provided, however, that within thirty (30) days after the institution of such claim, investigation, action, suit or proceeding, such person shall offer to the Company, in writing, the opportunity at the Company's expense to defend the same.

5. Eligibility. Awards other than Incentive Stock Options may be granted to Employees, Directors and Consultants of the Company and any Related Entity. Incentive Stock Options may be granted only to Employees of the Company or a Parent or a Subsidiary of the Company. An Employee, Director or Consultant who has been granted an Award may, if otherwise eligible, be granted additional Awards. Awards may be granted to such Employees, Directors or Consultants who are residing in non-U.S. jurisdictions as the Administrator may determine from time to time.

6. Terms and Conditions of Awards.

(a) Types of Awards. The Administrator is authorized under the Plan to award any type of arrangement to an Employee, Director or Consultant that is not inconsistent with the provisions of the Plan and that by its terms involves or might involve the issuance of (i) Shares, (ii) cash or (iii) an Option, an SAR, or similar right with a fixed or variable price related to the Fair Market Value of the Shares and with an exercise or conversion privilege related to the passage of time, the occurrence of one or more events, or the satisfaction of performance criteria or other conditions. Such awards include, without limitation, Options, SARs, sales or bonuses of Restricted Stock, Restricted Stock Units, Unrestricted Stock or Dividend Equivalent Rights, and an Award may consist of one (1) such security or benefit, or two (2) or more of them in any combination or alternative. Unrestricted Stock may be granted in respect of past services or other valid consideration, or in lieu of cash compensation due to the grantee.

(b) Designation of Award. Each Award shall be designated in the Award Agreement. In the case of an Option, the Option shall be designated as either an Incentive Stock Option or a Non-Qualified Stock Option. However, notwithstanding such designation, an Option will qualify as an Incentive Stock Option under the Code only to the extent the \$100,000 dollar limitation of Section 422(d) of the Code is not exceeded. The \$100,000 limitation of Section 422(d) of the Code is calculated based on the aggregate Fair Market Value of the Shares subject to Options designated as Incentive Stock Options which become exercisable for the first time by a Grantee during any calendar year (under all plans of the Company or any Parent or Subsidiary of the Company). For purposes of this calculation, Incentive Stock Options shall be taken into account in the order in which they were granted, and the Fair Market Value of the Shares shall be determined as of the grant date of the relevant Option.

(c) Conditions of Award. Subject to the terms of the Plan, the Administrator shall determine the provisions, terms, and conditions of each Award including, but not limited to, the Award vesting schedule, repurchase provisions, rights of first refusal, forfeiture provisions, form of payment (cash, Shares, or other consideration) upon settlement of the Award, payment contingencies, and satisfaction of any performance criteria. The performance criteria established by the Administrator may be based on any one of, or combination of, increase in share price, earnings per share, total stockholder return, return on equity, return on assets, return on investment, net operating income, cash flow, revenue, economic value added, initiation or completion of clinical trials, results of clinical trials, regulatory approval, regulatory submissions, drug development or commercialization milestones, collaboration milestones or strategic partnerships. Partial achievement of the specified criteria may result in a payment or vesting corresponding to the degree of achievement as specified in the Award Agreement.

(d) Acquisitions and Other Transactions. The Administrator may issue Awards under the Plan in settlement, assumption or substitution for, outstanding awards or obligations to grant future awards in connection with the Company or a Related Entity acquiring another entity, an interest in another entity or an additional interest in a Related Entity whether by merger, stock purchase, asset purchase or other form of transaction.

(e) Deferral of Award Payment. The Administrator may establish one or more programs under the Plan to permit selected Grantees the opportunity to elect to defer receipt of consideration upon exercise of an Award, satisfaction of performance criteria, or other event that absent the election would entitle the Grantee to payment or receipt of Shares or other consideration under an Award. The Administrator may establish the election procedures, the timing of such elections, the mechanisms for payments of, and accrual of interest or other earnings, if any, on amounts, Shares or other consideration so deferred, and such other terms, conditions, rules and procedures that the Administrator deems advisable for the administration of any such deferral program.

(f) Separate Programs. The Administrator may establish one or more separate programs under the Plan for the purpose of issuing particular forms of Awards to one or more classes of Grantees on such terms and conditions as determined by the Administrator from time to time.

(g) Early Exercise. The Award Agreement may, but need not, include a provision whereby the Grantee may elect at any time while an Employee, Director or Consultant to exercise any part or all of the Award prior to full vesting of the Award. Any unvested Shares received pursuant to such exercise may be subject to a repurchase right in favor of the Company or a Related Entity or to any other restriction the Administrator determines to be appropriate.

(h) Term of Option or SAR. The term of each Option or SAR shall be the term stated in the Award Agreement, provided, however, that the term shall be no more than ten (10) years from the date of grant thereof. However, in the case of an Incentive Stock Option granted to a Grantee who, at the time the Option is granted, owns stock representing more than ten percent (10%) of the voting power of all classes of stock of the Company or any Parent or Subsidiary of the Company, the term of the Incentive Stock Option shall be five (5) years from the date of grant thereof or such shorter term as may be provided in the Award Agreement.

(i) Transferability of Awards. Unless the Administrator provides otherwise, in its sole discretion, no Award may be sold, pledged, assigned, hypothecated, transferred, or disposed of in any manner other than by will or by the laws of descent or distribution and may be exercised, during the lifetime of the Grantee, only by the Grantee. Notwithstanding the foregoing, the Grantee may designate one or more beneficiaries of the Grantee's Award in the event of the Grantee's death on a beneficiary designation form provided by the Administrator.

(j) Time of Granting Awards. The date of grant of an Award shall for all purposes be the date on which the Administrator makes the determination to grant such Award, or such other later date as is determined by the Administrator.

(k) Stock Appreciation Rights. An SAR may be granted (i) with respect to any Option granted under this Plan, either concurrently with the grant of such Option or at such later time as determined by the Administrator (as to all or any portion of the shares of Common Stock subject to the Option), or (ii) alone, without reference to any related Option. Each SAR granted by the Administrator under this Plan shall be subject to the following terms and conditions. Each SAR granted to any participant shall relate to such number of shares of Common Stock as shall be determined by the Administrator, subject to adjustment as provided in Section 12. In the case of an SAR granted with respect to an Option, the number of shares of Common Stock to which the SAR pertains shall be reduced in the same proportion that the holder of the Option exercises the related Option. The exercise price of an SAR will be determined by the Administrator, in its discretion, at the date of grant but may not be less than one hundred percent (100%) of the Fair Market Value of the shares of Common Stock subject thereto on the date of grant. Subject to the right of the Administrator to deliver cash in lieu of shares of Common Stock (which, as it pertains to Officers and Directors of the Company, shall comply with all requirements of the Exchange Act), the number of shares of Common Stock which shall be issuable upon the exercise of an SAR shall be determined by dividing:

(i) the number of shares of Common Stock as to which the SAR is exercised multiplied by the amount of the appreciation in such shares (for this purpose, the "appreciation" shall be the amount by which the Fair Market Value of the shares of Common Stock subject to the SAR on the exercise date exceeds (1) in the case of an SAR related to an Option, the exercise price of the shares of Common Stock under the Option or (2) in the case of an SAR granted alone, without reference to a related Option, an amount which shall be determined by the Administrator at the time of grant, subject to adjustment under Section 12); by

(ii) the Fair Market Value of a share of Common Stock on the exercise date.

In lieu of issuing shares of Common Stock upon the exercise of an SAR, the Administrator may elect to pay the holder of the SAR cash equal to the Fair Market Value on the exercise date of any or all of the shares which would otherwise be issuable. No fractional shares of Common Stock shall be issued upon the exercise of an SAR; instead, the holder of the SAR shall be entitled to receive a cash adjustment equal to the same fraction of the Fair Market

Value of a share of Common Stock on the exercise date or to purchase the portion necessary to make a whole share at its Fair Market Value on the date of exercise. The exercise of an SAR related to an Option shall be permitted only to the extent that the Option is exercisable under Section 10 on the date of surrender. Any Incentive Stock Option surrendered pursuant to the provisions of this Section 6(k) shall be deemed to have been converted into a Non-Qualified Stock Option immediately prior to such surrender.

(l) Compliance with Section 409A of the Code. Notwithstanding anything to the contrary set forth herein, any Award that is not exempt from the requirements of Section 409A of the Code shall contain such provisions so that such Award will comply with the requirements of Section 409A of the Code. Such restrictions, if any, shall be determined by the Administrator and contained in the Award Agreement evidencing such Award.

(m) Minimum Vesting. Awards granted to Employees under the Plan that are subject to time vesting shall not vest or become exercisable until at least one year after the date of grant, except in the case of death, Disability, retirement, separation of service or a Corporate Transaction. Awards granted to Directors under the Plan that are subject to time vesting shall not vest or become exercisable until at least the earlier of (i) one year after the date of grant or (ii) the next annual meeting of stockholders, except in the case of death, Disability or a Corporate Transaction.

7. Award Exercise or Purchase Price, Consideration and Taxes.

(a) Exercise or Purchase Price. The exercise or purchase price, if any, for an Award shall be as follows.

(i) In the case of an Incentive Stock Option:

(1) granted to an Employee who, at the time of the grant of such Incentive Stock Option owns stock representing more than ten percent (10%) of the voting power of all classes of stock of the Company or any Parent or Subsidiary of the Company, the per Share exercise price shall be not less than one hundred ten percent (110%) of the Fair Market Value per Share on the date of grant; or

(2) granted to any Employee other than an Employee described in the preceding paragraph, the per Share exercise price shall be not less than one hundred percent (100%) of the Fair Market Value per Share on the date of grant.

(ii) In the case of a Non-Qualified Stock Option, the per Share exercise price shall be not less than one-hundred percent (100%) of the Fair Market Value per Share on the date of grant.

(iii) In the case of other Awards, such price as is determined by the Administrator.

(iv) Notwithstanding the foregoing provisions of this Section 7(a), in the case of an Award issued pursuant to Section 6(d), above, the exercise or purchase price for the Award shall be determined in accordance with the provisions of the relevant instrument evidencing the agreement to issue such Award.

(b) Consideration. Subject to Applicable Laws, the consideration to be paid for the Shares to be issued upon exercise or purchase of an Option or upon the issuance of another Award, including the method of payment, shall be determined by the Administrator. In addition to any other types of consideration the Administrator may determine, the Administrator is authorized to accept as consideration for Shares issued under the Plan the following:

(i) cash;

(ii) check;

(iii) delivery of Grantee's promissory note with such recourse, interest, security, and redemption provisions as the Administrator determines as appropriate (but only to the extent that the acceptance or terms of the promissory note would not violate an Applicable Law); provided, however, that interest shall compound at least annually and shall be charged at the minimum rate of interest necessary to avoid (i) the imputation of interest income to the Company and compensation income to the Grantee under any applicable provisions of the Code, and (B) the classification of the Award as a liability for financial accounting purposes;

(iv) surrender of Shares or delivery of a properly executed form of attestation of ownership of Shares as the Administrator may require which have a Fair Market Value on the date of surrender or attestation equal to the aggregate exercise price of the Shares as to which said Award shall be exercised;

(v) payment through a broker-dealer sale and remittance procedure pursuant to which the Grantee (A) shall provide written instructions to a Company designated brokerage firm to effect the immediate sale of some or all of the purchased Shares and remit to the Company sufficient funds to cover the aggregate exercise price payable for the purchased Shares and (B) shall provide written directives to the Company to deliver the certificates (or other evidence satisfactory to the Company to the extent that the Shares are uncertificated) for the purchased Shares directly to such brokerage firm in order to complete the sale transaction;

(vi) with respect to Non-Qualified Options, payment through a “net exercise” such that, without the payment of any funds, the Grantee may exercise the Option and receive the net number of Shares equal to (i) the number of Shares as to which the Option is being exercised, multiplied by (ii) a fraction, the numerator of which is the Fair Market Value per Share (on such date as is determined by the Administrator) less the Exercise Price per Share, and the denominator of which is such Fair Market Value per Share; or

(vii) past or future services actually or to be rendered to the Company or a Related Entity; or

(viii) any combination of the foregoing methods of payment.

The Administrator may at any time or from time to time, by adoption of or by amendment to the standard forms of Award Agreement described in Section 4(c)(iv), or by other means, grant Awards which do not permit all of the foregoing forms of consideration to be used in payment for the Shares or which otherwise restrict one or more forms of consideration.

8. Notice to Company of Disqualifying Disposition. Each Employee who receives an Incentive Stock Option must agree to notify the Company in writing immediately after the Employee makes a Disqualifying Disposition of any Common Stock acquired pursuant to the exercise of an Incentive Stock Option.

9. Withholding of Additional Income Taxes.

(a) Upon the exercise of a Non-Qualified Stock Option or SAR, the grant of any other Award for less than the Fair Market Value of the Common Stock, the grant of Unrestricted Stock or the vesting of restricted Common Stock acquired on the exercise of an Award hereunder, the Company, in accordance with Section 3402(a) of the Code and any applicable state statute or regulation, may require the Grantee to pay to the Company additional withholding taxes in respect of the amount that is considered compensation includable in such person’s gross income. With respect to (i) the exercise of an Option, (ii) the grant of Unrestricted Stock, (iii) the grant of any other Award for less than its Fair Market Value, (iv) the vesting of restricted Common Stock acquired by exercising an Award, or (v) the exercise of an SAR, the Committee in its discretion may condition such event on the payment by the Grantee of any such additional withholding taxes.

(b) At the sole and absolute discretion of the Administrator, the holder of Awards may pay all or any part of the total estimated federal and state income tax liability arising out of the exercise or receipt of such Awards or the vesting of restricted Common Stock acquired on the exercise of an Award hereunder (each of the foregoing, a “**Tax Event**”) by tendering already-owned shares of Common Stock or by directing the Company to withhold shares of Common Stock otherwise to be transferred to the Grantee as a result of the exercise or receipt thereof in an amount equal to the estimated federal and state income tax liability arising out of such event, provided that no more Shares may be withheld than are necessary to satisfy the Grantee’s withholding obligation with respect to the exercise of Awards; provided, however, that the amount withheld does not exceed the maximum statutory tax rate or such lesser amount as is necessary to avoid liability accounting treatment for Awards granted under the Plan. In such event, the Grantee must, however, notify the Administrator of his or her desire to pay all or any part of the total estimated federal and state income tax liability arising out of a Tax Event by tendering already-owned shares of Common Stock or having shares of Common Stock withheld prior to the date that the amount of federal or state income tax to be withheld is to be determined. For purposes of this Section 9, shares of Common Stock shall be valued at their Fair Market Value on the date that the amount of the tax withholdings is to be determined.

10. Exercise of Award.

(a) Procedure for Exercise; Rights as a Stockholder.

(i) Any Award granted hereunder shall be exercisable at such times and under such conditions as determined by the Administrator under the terms of the Plan and specified in the Award Agreement.

(ii) An Award shall be deemed to be exercised when written notice of such exercise has been given to the Company in accordance with the terms of the Award by the person entitled to exercise the Award and full payment for the Shares with respect to which the Award is exercised has been made, including, to the extent selected, use of the broker-dealer sale and remittance procedure to pay the purchase price as provided in Section 7(b)(v).

(b) Exercise of Award Following Termination of Continuous Service. In the event of termination of a Grantee's Continuous Service for any reason other than Disability or death (but not in the event of a Grantee's change of status from Employee to Consultant or from Consultant to Employee), such Grantee may, but only during the Post-Termination Exercise Period (but in no event later than the expiration date of the term of such Award as set forth in the Award Agreement), exercise the portion of the Grantee's Award that was vested at the date of such termination or such other portion of the Grantee's Award as may be determined by the Administrator. The Grantee's Award Agreement may provide that upon the termination of the Grantee's Continuous Service for Cause, the Grantee's right to exercise the Award shall terminate concurrently with the termination of Grantee's Continuous Service. In the event of a Grantee's change of status from Employee to Consultant, an Employee's Incentive Stock Option shall convert automatically to a Non-Qualified Stock Option on the day three (3) months and one (1) day following such change of status. To the extent that the Grantee's Award was unvested at the date of termination, or if the Grantee does not exercise the vested portion of the Grantee's Award within the Post-Termination Exercise Period, the Award shall terminate.

(c) Disability of Grantee. In the event of termination of a Grantee's Continuous Service as a result of his or her Disability, such Grantee may, but only within twelve (12) months from the date of such termination (or such longer period as specified in the Award Agreement but in no event later than the expiration date of the term of such Award as set forth in the Award Agreement), exercise the portion of the Grantee's Award that was vested at the date of such termination; provided, however, that if such Disability is not a "disability" as such term is defined in Section 22(e)(3) of the Code, in the case of an Incentive Stock Option such Incentive Stock Option shall automatically convert to a Non-Qualified Stock Option on the day three (3) months and one (1) day following such termination. To the extent that the Grantee's Award was unvested at the date of termination, or if Grantee does not exercise the vested portion of the Grantee's Award within the time specified herein, the Award shall terminate.

(d) Death of Grantee. In the event of a termination of the Grantee's Continuous Service as a result of his or her death, or in the event of the death of the Grantee during the Post-Termination Exercise Period or during the twelve (12) month period following the Grantee's termination of Continuous Service as a result of his or her Disability, the Grantee's estate or a person who acquired the right to exercise the Award by bequest or inheritance may exercise the portion of the Grantee's Award that was vested as of the date of termination, within twelve (12) months from the date of death (or such longer period as specified in the Award Agreement but in no event later than the expiration of the term of such Award as set forth in the Award Agreement). To the extent that, at the time of death, the Grantee's Award was unvested, or if the Grantee's estate or a person who acquired the right to exercise the Award by bequest or inheritance does not exercise the vested portion of the Grantee's Award within the time specified herein, the Award shall terminate.

(e) Extension if Exercise Prevented by Law. Notwithstanding the foregoing, if the exercise of an Award within the applicable time periods set forth in this Section 10 is prevented by the provisions of Section 11 below, the Award shall remain exercisable until one (1) month after the date the Grantee is notified by the Company that the Award is exercisable, but in any event no later than the expiration of the term of such Award as set forth in the Award Agreement.

11. Conditions Upon Issuance of Shares.

(a) If at any time the Administrator determines that the delivery of Shares pursuant to the exercise, vesting or any other provision of an Award is or may be unlawful under Applicable Laws, the vesting or right to exercise an Award or to otherwise receive Shares pursuant to the terms of an Award shall be suspended until the Administrator determines that such delivery is lawful and shall be further subject to the approval of counsel for the Company with respect to such compliance. The Company shall have no obligation to effect any registration or qualification of the Shares under federal or state laws.

(b) As a condition to the exercise of an Award, the Company may require the person exercising such Award to represent and warrant at the time of any such exercise that the Shares are being purchased only for investment and without any present intention to sell or distribute such Shares if, in the opinion of counsel for the Company, such a representation is required by any Applicable Laws.

12. Adjustments. Subject to any required action by the stockholders of the Company, the number of Shares covered by each outstanding Award, and the number of Shares which have been authorized for issuance under the Plan but as to which no Awards have yet been granted or which have been returned to the Plan, the exercise or purchase price of each such outstanding Award, as well as any other terms that the Administrator determines require adjustment shall be proportionately adjusted for (i) any increase or decrease in the number of issued Shares resulting from a stock split, reverse stock split, stock dividend, combination or reclassification of the Shares, or similar transaction affecting the Shares, (ii) any other increase or decrease in the number of issued Shares effected without receipt of consideration by the Company, or (iii) any other transaction with respect to the Company's Common Stock including a corporate merger, consolidation, acquisition of property or stock, separation (including a spin-off or other distribution of stock or property), reorganization, liquidation (whether partial or complete) or any similar transaction; provided, however that conversion of any convertible securities of the Company shall not be deemed to have been "effected without receipt of consideration." Such adjustment shall be made by the Administrator and its determination shall be final, binding and conclusive. Except as the Administrator determines, no issuance by the Company of shares of stock of any class, or securities convertible into shares of stock of any class, shall affect, and no adjustment by reason hereof shall be made with respect to, the number or price of Shares subject to an Award. No adjustments shall be made for dividends paid in cash or in property other than Common Stock of the Company, nor shall cash dividends or dividend equivalents accrue or be paid in respect of unexercised Options or unvested Awards hereunder.

13. Corporate Transactions.

(a) Treatment of Awards in Corporate Transaction. Except as the Administrator may otherwise specify with respect to particular Awards in the relevant Award Agreement, in the case of and subject to the consummation of a Corporate Transaction, the parties to the Corporate Transaction may cause the Awards to be Assumed or Replaced by the successor entity as such parties shall agree. To the extent the parties to such Corporate Transaction do not provide for the Awards to be Assumed or Replaced upon the effective time of the Corporate Transaction, the Plan and all outstanding Awards granted under the Plan shall terminate. In such case, except as may be otherwise expressly provided in the relevant Award Agreement, all Awards with solely time-based vesting that are not vested and/or exercisable immediately prior to the effective time of the Corporate Transaction shall become fully vested and exercisable as of immediately prior to the effective time of the Corporate Transaction and all Awards with conditions and restrictions relating to the attainment of performance goals shall be deemed to vest and become nonforfeitable as of the Corporate Transaction as provided in the relevant Award Agreement or if not provided for in the relevant Award Agreement shall be deemed to vest and become nonforfeitable as of the Corporate Transaction assuming the higher of (i) achievement of all relevant performance goals at the "target" level (prorated based upon the length of time within the performance period that has elapsed prior the Corporate Transaction or partial achievement of the performance goals), or (ii) actual achievement of all relevant performance goals as of the date of such Corporate Transaction. In the event of such termination of the Awards, the Company shall have the option (in its sole discretion) to (1) make or provide for a payment, in cash or in kind, to the Grantees holding Options and SARs, in exchange for the cancellation thereof, in an amount equal to the difference between (A) the Sale Price multiplied by the number of Shares subject to outstanding Options and SARs and (B) the aggregate exercise price of all such outstanding Options and SARs (provided that, in the case of an Option or SAR with an exercise price equal to or more than the Sale Price, such Option or SAR shall be cancelled for no consideration); or (2) permit each Grantee, within a specified period of time prior to the consummation of the

Corporate Transaction as determined by the Administrator, to exercise all outstanding Options and SARs (to the extent then exercisable including due to acceleration as contemplated by this Section 13(a) if the Awards are not Assumed or Replaced) held by such Grantee as of immediately prior to the effective time of the Corporate Transaction. In the event of a termination of Awards pursuant to this Section 13(a), the Company shall also have the option (in its sole discretion) to make or provide for a payment, in cash or in kind, to the Grantees holding other Awards in an amount equal to the Sale Price multiplied by the number of vested Shares under such Awards. For purposes of this Section 13(a), "Sale Price" means the value as determined by the Administrator of the consideration payable, or otherwise to be received by stockholders, per Share pursuant to a Corporate Transaction.

(b) Acceleration of Award Upon Corporate Transaction. The Administrator shall have the authority, exercisable either in advance of any actual or anticipated Corporate Transaction or at the time of an actual Corporate Transaction and exercisable at the time of the grant of an Award under the Plan or any time while an Award remains outstanding, to provide for the full or partial automatic vesting and exercisability of one or more outstanding unvested Awards under the Plan and the release from restrictions on transfer and repurchase or forfeiture rights of such Awards in connection with a Corporate Transaction on such terms and conditions as the Administrator may specify. The Administrator also shall have the authority to condition any such Award vesting and exercisability or release from such limitations upon the subsequent termination of the Continuous Service of the Grantee within a specified period following the effective date of the Corporate Transaction. The Administrator may provide that any Awards so vested or released from such limitations in connection with a Corporate Transaction shall remain fully exercisable until the expiration or sooner termination of the Award.

(c) Effect of Acceleration on Incentive Stock Options. Any Incentive Stock Option accelerated under this Section 13 in connection with a Corporate Transaction shall remain exercisable as an Incentive Stock Option under the Code only to the extent the \$100,000 dollar limitation of Section 422(d) of the Code is not exceeded.

14. Effective Date and Term of Plan. The Plan shall become effective upon the earlier to occur of its adoption by the Board or its approval by the stockholders of the Company. It shall continue in effect for a term of ten (10) years from the date of stockholder approval unless sooner terminated, provided that no incentive stock options may be granted under the Plan after April 5, 2028. Subject to Applicable Laws, Awards may be granted under the Plan upon Board approval, contingent on stockholder approval.

15. Amendment, Suspension or Termination of the Plan.

(a) The Board may at any time amend, suspend or terminate the Plan in any respect, except that it may not, without the approval of the stockholders obtained within twelve (12) months before or after the Board adopts a resolution authorizing any of the following actions, do any of the following:

- (i) increase the total number of shares that may be issued under the Plan (except by adjustment pursuant to Section 12);
- (ii) modify the provisions of Section 6 regarding eligibility for grants of ISOs may not be modified;
- (iii) the provisions of Section 7(a) regarding the exercise price at which shares may be offered pursuant to Options may not be modified (except by adjustment pursuant to Section 12);
- (iv) extend the expiration date of the Plan; and
- (v) except as provided in Section 12 (including, without limitation, any stock dividend, stock split, extraordinary cash dividend, recapitalization, reorganization, merger, consolidation, split-up, spin-off, combination, or exchange of shares), the Company may not amend an Award granted under the Plan to reduce its exercise price per share, cancel and regrant new Awards with lower prices per share than the original prices per share of the cancelled Awards, or cancel any Awards in exchange for cash or the grant of replacement Awards with an exercise price that is less than the exercise price of the original Awards, essentially having the effect of a repricing, without approval by the Company's stockholders.

(b) No Award may be granted during any suspension of the Plan or after termination of the Plan.

(c) No suspension or termination of the Plan (including termination of the Plan under Section 15, above) shall adversely affect any rights under Awards already granted to a Grantee without his or her consent.

16. Reservation of Shares.

(a) The Company, during the term of the Plan, will at all times reserve and keep available such number of Shares as shall be sufficient to satisfy the requirements of the Plan.

(b) The inability of the Company to obtain authority from any regulatory body having jurisdiction, which authority is deemed by the Company's counsel to be necessary to the lawful issuance and sale of any Shares hereunder, shall relieve the Company of any liability in respect of the failure to issue or sell such Shares as to which such requisite authority shall not have been obtained.

17. No Effect on Terms of Employment/Consulting Relationship. The Plan shall not confer upon any Grantee any right with respect to the Grantee's Continuous Service, nor shall it interfere in any way with his or her right or the right of the Company or a Related Entity to terminate the Grantee's Continuous Service at any time, with or without Cause, and with or without notice. The ability of the Company or any Related Entity to terminate the employment of a Grantee who is employed at will is in no way affected by its determination that the Grantee's Continuous Service has been terminated for Cause for the purposes of this Plan.

18. No Effect on Retirement and Other Benefit Plans. Except as specifically provided in a retirement or other benefit plan of the Company or a Related Entity, Awards shall not be deemed compensation for purposes of computing benefits or contributions under any retirement plan of the Company or a Related Entity, and shall not affect any benefits under any other benefit plan of any kind or any benefit plan subsequently instituted under which the availability or amount of benefits is related to level of compensation. The Plan is not a "Retirement Plan" or "Welfare Plan" under the Employee Retirement Income Security Act of 1974, as amended.

19. Stockholder Approval. Continuance of the Plan shall be subject to approval by the stockholders of the Company within twelve (12) months before or after the date the Plan is adopted by the Board. Such stockholder approval shall be obtained in the degree and manner required under Applicable Laws. Any Award exercised before stockholder approval is obtained shall be rescinded if stockholder approval is not obtained within the time prescribed, and Shares issued on the exercise of any such Award shall not be counted in determining whether stockholder approval is obtained.

20. Electronic Delivery. The Administrator may, in its sole discretion, decide to deliver any documents related to any Award granted under the Plan through an online or electronic system established and maintained by the Company or another third party designated by the Company or to request a Grantee's consent to participate in the Plan by electronic means. Each Grantee hereunder consents to receive such documents by electronic delivery and agrees to participate in the Plan through an online or electronic system established and maintained by the Company or another third party designated by the Company, and such consent shall remain in effect throughout Grantee's term of employment or service with the Company and any Related Entity and thereafter until withdrawn in writing by Grantee.

21. Data Privacy. The Administrator may, in its sole discretion, decide to collect, use and transfer, in electronic or other form, personal data as described in this Plan or any Award for the exclusive purpose of implementing, administering and managing participation in the Plan. Each Grantee hereunder acknowledges that the Company holds certain personal information about Grantee, including, but not limited to, name, home address and telephone number, date of birth, social security number or other identification number, salary, nationality, job title, details of all Awards awarded, cancelled, exercised, vested or unvested, for the purpose of implementing, administering and managing the Plan (the "**Data**"). Each Grantee hereunder further acknowledges that Data may be transferred to any third parties assisting in the implementation, administration and management of the Plan and that these third parties may be located in jurisdictions that may have different data privacy laws and protections, and

Grantee authorizes such third parties to receive, possess, use, retain and transfer the Data, in electronic or other form, for the purposes of implementing, administering and managing the Plan, including any requisite transfer of such Data as may be required to a broker or other third party with whom the recipient or the Company may elect to deposit any shares of Common Stock acquired upon any Award.

22. Compliance with Section 409A. To the extent that the Administrator determines that any Award granted hereunder is subject to Section 409A of the Code, the Award Agreement evidencing such Award shall incorporate the terms and conditions necessary to avoid the consequences specified in Section 409A(a)(1) of the Code. To the extent applicable, the Plan and Award Agreements shall be interpreted in accordance with Section 409A of the Code and Department of Treasury regulations and other interpretive guidance issued thereunder, including without limitation any such regulations or other guidance that may be issued or amended after the effective date of the Plan. Notwithstanding any provision of the Plan to the contrary, in the event that following the effective date of the Plan the Administrator determines that any Award may be subject to Section 409A of the Code and related Department of Treasury guidance (including such Department of Treasury guidance as may be issued after the effective date of the Plan), the Administrator may adopt such amendments to the Plan and the applicable Award Agreement or adopt other policies and procedures (including amendments, policies and procedures with retroactive effect), or take any other actions, that the Administrator determines are necessary or appropriate to (1) exempt the Award from Section 409A of the Code and/or preserve the intended tax treatment of the benefits provided with respect to the Award, or (2) comply with the requirements of Section 409A of the Code and related Department of Treasury guidance.

23. Unfunded Obligation. Grantees shall have the status of general unsecured creditors of the Company. Any amounts payable to Grantees pursuant to the Plan shall be unfunded and unsecured obligations for all purposes, including, without limitation, Title I of the Employee Retirement Income Security Act of 1974, as amended. Neither the Company nor any Related Entity shall be required to segregate any monies from its general funds, or to create any trusts, or establish any special accounts with respect to such obligations. The Company shall retain at all times beneficial ownership of any investments, including trust investments, which the Company may make to fulfill its payment obligations hereunder. Any investments or the creation or maintenance of any trust or any Grantee account shall not create or constitute a trust or fiduciary relationship between the Administrator, the Company or any Related Entity and a Grantee, or otherwise create any vested or beneficial interest in any Grantee or the Grantee's creditors in any assets of the Company or a Related Entity. The Grantees shall have no claim against the Company or any Related Entity for any changes in the value of any assets that may be invested or reinvested by the Company with respect to the Plan.

24. Construction. Captions and titles contained herein are for convenience only and shall not affect the meaning or interpretation of any provision of the Plan. Except when otherwise indicated by the context, the singular shall include the plural and the plural shall include the singular. Use of the term "or" is not intended to be exclusive, unless the context clearly requires otherwise.

As approved by the Board of Directors on April 5, 2018

And the stockholders on May 30, 2018

Amendment No. 1 approved by the Board of Directors on March 8, 2019

And the stockholders of May 17, 2019

Omnibus Amendment approved by the Board of Directors on March 11, 2020

Amendment No. 3 approved by the Board of Directors on March 11, 2020

And the stockholders [____], 2020

**FOURTH FIFTH AMENDED AND RESTATED
CERTIFICATE OF INCORPORATION
OF
ASSEMBLY BIOSCIENCES, INC.**

(Pursuant to Sections 242 and 245 of the General Corporation Law of the State of Delaware)

Assembly Biosciences, Inc., a corporation organized and existing under and by virtue of the provisions of the General Corporation Law of the State of Delaware (the "DGCL"), certifies that:

- A. The name of the corporation is "Assembly Biosciences, Inc." (the "Corporation").
- B. The Corporation's original Certificate of Incorporation was filed with the Secretary of State of the State of Delaware on October 7, 2005, under the name South Island Biosciences, Inc., an Amended and Restated Certificate of Incorporation was filed with the Secretary of State of the State of Delaware on October 24, 2005, a second Amended and Restated Certificate of Incorporation, which included a provision to change the Corporation's name to Ventrus Biosciences, Inc., was filed with the Secretary of State of the State of Delaware on April 5, 2007 (the "Second Amended and Restated Certificate of Incorporation"), a third Amended and Restated Certificate of Incorporation was filed with the Secretary of the State of Delaware on November 10, 2010 (the "Third Amended and Restated Certificate of Incorporation") and a Certificate of Amendment of the Third Amended and Restated Certificate of Incorporation was filed with the Secretary of State of Delaware on July 10, 2014, which included a provision to change the Corporation's name to Assembly Biosciences, Inc., **a Fourth Amended and Restated Certificate of Incorporation was filed with the Secretary of the State of Delaware on May 31, 2018.**
- C. This ~~Fourth~~**Fifth** Amended and Restated Certificate of Incorporation (the "Certificate of Incorporation") was duly adopted in accordance with Sections 242 and 245 of the DGCL, and hereby amends and restates in its entirety the ~~Third~~**Fourth** Amended and Restated Certificate of Incorporation, ~~as amended~~, as follows.

ARTICLE I

The name of the corporation is "Assembly Biosciences, Inc." (the "Corporation").

ARTICLE II

The registered office of the Corporation in the State of Delaware is 251 Little Falls Drive, in the City of Wilmington, County of New Castle 19808. The name of the registered agent of the Corporation at such address is Corporation Service Company.

ARTICLE III

The nature of the business or purposes to be conducted or promoted is to engage in any lawful act or activity for which corporations may be organized under the DGCL.

ARTICLE IV

The total number of shares that the Corporation shall have authority to issue, is 105,000,000 (one hundred five million), consisting of (i) 100,000,000 (one hundred million) shares of common stock, \$0.001 par value per share, and (ii) 5,000,000 (five million) shares of preferred stock, \$0.001 par value per share.

The board of directors is authorized to issue the preferred stock, subject to limitations prescribed by law and the provisions of this Certificate of Incorporation, as shares of preferred stock in one or more series, and is authorized, by filing a certificate of designation pursuant to the applicable law of the State of Delaware, to establish from time to time the number of shares to be included in each such series, and to fix the designation, powers, preferences and rights of the shares of each such series and qualifications, limitations or restrictions thereof. The authority of the board of directors with respect to each series shall include, but not be limited to, determination of the following:

- (i) the number of shares constituting that series and the distinctive designation of that series;
- (ii) the dividend rate, if any, on the shares of that series, whether dividends shall be cumulative, and, if so, from which date or dates, and the relative rights of priority, if any, of payment of dividends on shares of that series;
- (iii) whether that series shall have voting rights or powers, in addition to the voting rights and powers provided by law, and, if so, the terms of such rights;
- (iv) whether that series shall have conversion rights, and, if so, the terms and conditions of such conversion, including provisions for adjustment of the conversion rate in such events as the board of directors shall determine;
- (v) whether or not the shares of that series shall be redeemable, and, if so, the terms and conditions of such redemption, including the dates or dates upon or after which they shall be redeemable, and the amount per share payable in case of redemption, which amount may vary under different conditions and at different redemption dates;
- (vi) whether that series shall have a sinking fund for the redemption or purchase of shares of that series, and, if so, the terms and amounts of such sinking fund;
- (vii) the rights of the shares of that series in the event of voluntary or involuntary liquidation, dissolution or winding up of the Corporation, and the relative rights of priority, if any, of payment of shares of that series; and
- (viii) any other rights, preferences and limitations of that series.

The board of directors, within the limits and restrictions stated in any resolution or resolutions of the board of directors originally fixing the number of shares constituting any series, may increase or decrease (but not below the number of shares of such series then outstanding) the number of shares of any series subsequent to the issue of shares of that series.

ARTICLE V

Subject to all the rights, powers and preferences of the preferred stock and except as otherwise required by law or provided in this Certificate of Incorporation (including in any certificate of designations of any series of preferred stock):

- (a) the holders of the common stock shall have the exclusive right to vote for the election of directors of the Corporation and on all other matters requiring stockholder action, each outstanding share entitling the holder thereof to one vote on each matter properly submitted to the stockholders of the Corporation for their vote;

(b) dividends may be declared and paid or set apart for payment upon the common stock out of any assets or funds of the Corporation legally available for the payment of dividends, but only when and as declared by the board of directors or any authorized committee thereof; and

(c) upon the voluntary or involuntary liquidation, dissolution or winding up of the Corporation, the net assets of the Corporation shall be distributed pro rata to the holders of the common stock.

ARTICLE VI

Any action required or permitted to be taken by the stockholders of the Corporation must be effected at a duly called annual or special meeting of the stockholders of the Corporation and may not be effected by any consent in writing by such stockholders.

ARTICLE VII

Except as otherwise required by statute and subject to the rights, if any, of the holders of any series of preferred stock, special meetings of the stockholders ~~may be called, at any time for any purpose or purposes, by the board of directors, or by such person or persons duly designated by the board of directors whose powers and authority, as expressly provided in a resolution of the board of directors, include the power to call such meetings, but such special meetings may not be called by any other person or persons.~~ **of the Corporation may be called, at any time for any purpose or purposes as is proper for stockholder action under the DGCL by (1) the board of directors acting pursuant to a resolution duly adopted by a majority of the board of directors then in office, (2) the Chairperson of the board of directors, (3) the Chief Executive Officer, or (4) the Chief Executive Officer or secretary of the Corporation upon the written request of stockholder(s) owning (as defined below) at least 25% (in the aggregate) of the then voting power of all shares of the Corporation entitled to vote on the matters to be brought before the proposed special meeting, in each case subject to any procedures, terms and conditions as may be further set forth in the bylaws of the Corporation from time to time. Only those matters set forth in the notice of the special meeting or brought by or at the direction of the board of directors may be considered or acted upon at a special meeting of stockholders. In the case of a special meeting of stockholders called pursuant to the foregoing clause (4), the requesting holder(s) must (i) continue to own (for the holding period set forth in the bylaws of the Corporation as in effect from time to time) shares representing at least 25% (in the aggregate) of the then voting power of all shares of the Corporation entitled to vote on the matters to be brought before the proposed special meeting, (ii) provide information in writing regarding such stockholder(s), their stock ownership and the matters that they request to bring before the proposed special meeting and (iii) comply with procedures and other terms and conditions relating to special meetings as set forth in the bylaws of the Corporation from time to time. For purposes of this Article VII, a holder shall be deemed to "own" only those shares for which it possesses both (x) full voting and investment rights pertaining to such shares, and (y) a full economic interest in (including the opportunity for profit from and the risk of loss on) such shares, which term may be further defined in the bylaws of the Corporation from time to time.**

ARTICLE VIII

8.1 **General.** The business and affairs of the Corporation shall be managed by or under the direction of the board of directors except as otherwise provided herein or required by law.

8.2 **Election of directors.** Unless and except that the bylaws of the Corporation shall so require, the election of directors need not be by written ballot.

8.3 **Vacancies.** Any director may resign at any time upon notice given in writing or electronic transmission to the Corporation. When one or more directors so resigns and the resignation is effective at a future date, a majority of the directors then in office, including those who have so resigned, shall have power to fill such vacancy or vacancies, the vote thereon to take effect when such resignation or resignations shall become effective, and each director so chosen shall hold office as provided in this paragraph in the filling of other vacancies.

Vacancies and newly created directorships resulting from any increase in the authorized number of directors elected by all of the stockholders having the right to vote as a single class may be filled by a majority of the directors then in office, although less than a quorum, or by a sole remaining director.

Whenever the holders of any class or classes of stock or series thereof are entitled to elect one or more directors by the provisions of this Certificate of Incorporation, vacancies and newly created directorships of such class or classes or series may be filled by a majority of the directors elected by such class or classes or series thereof then in office, or by a sole remaining director so elected.

Any director appointed in accordance with this Section 8.3 shall hold office for the remainder of the full term of the director in which the new directorship was created or the vacancy occurred and until such director's successor shall have been duly elected and qualified or until his or her earlier resignation, death or removal.

ARTICLE IX

To the fullest extent permitted by the DGCL as the same exists or as may hereafter be amended, no present or former director of the Corporation shall be personally liable to the Corporation or its stockholders for monetary damages for breach of fiduciary duty as a director except for liability (a) for any breach of the director's duty of loyalty to the Corporation or its stockholders, (b) for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, (c) unlawful payments of dividends or unlawful stock repurchases or redemptions under Section 174 of the DGCL or (d) for any transaction from which the director derived an improper personal benefit. If the DGCL is amended after the effective date of this Certificate of Incorporation to authorize corporate action further eliminating or limiting the personal liability of directors, then the liability of a director of the Corporation shall be eliminated or limited to the fullest extent permitted by the DGCL, as so amended. Neither any amendment nor repeal of this Article, nor the adoption of any provision of this Certificate of Incorporation inconsistent with this Article, shall eliminate or reduce the effect of this Article in respect of any matter occurring, or any cause of action, suit or claim that, but for this Article, would accrue or arise, prior to such amendment, repeal or adoption of an inconsistent provision.

ARTICLE X

The Corporation shall have the power to indemnify any person who was or is a party or is threatened to be made a party to, or testifies in, any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative in nature, by reason of the fact such person is or was a director, officer or employee or agent of the Corporation, or is or was serving at the request of the Corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, employee benefit plan, trust or other enterprise against expenses (including attorney's fees), judgments, fines and amounts paid in settlement actually and reasonably incurred by such person in connection with such action, suit or proceeding to the full extent permitted by law, and the Corporation may adopt bylaws or enter into agreements with any such person for the purpose of providing for such indemnification.

ARTICLE XI

The Corporation reserves the right at any time, and from time to time, to amend, alter, change or repeal any provision contained in this Certificate of Incorporation, and other provisions authorized by the laws of the State of Delaware at the time in force may be added or inserted, in the manner now or hereafter prescribed by law; and all rights, preferences, powers and privileges of whatsoever nature conferred upon stockholders, directors or any other persons whomsoever by and pursuant to this Certificate of Incorporation in its present form or as hereafter amended are granted subject to the rights reserved in this article.

ARTICLE XII

In furtherance and not in limitation of the powers conferred by the laws of the State of Delaware, the board of directors of the Corporation is expressly authorized to make, alter and repeal the bylaws of the Corporation.

IN WITNESS WHEREOF, the undersigned has signed this ~~Fourth~~Fifth Amended and Restated Certificate of Incorporation this ~~31st~~ day of ~~May 2018~~ _____, 202.

By:

Derek A. SmallJohn G. McHutchison, A.O., M.D.
Chief Executive Officer and President



www.assemblybio.com

ASSEMBLY BIOSCIENCES, INC.
 231 OYSTER POINT AVENUE, FOURTH FLOOR
 SOUTH SAN FRANCISCO, CA 94080

VOTE BY INTERNET - www.proxyvote.com

Use the Internet to transmit your voting instructions and for electronic delivery of information. Vote by 11:59 PM, EDT on June 10, 2020 for common stock held directly and by 11:59 PM, EDT on June 8, 2020 for common stock held in a Company-sponsored Plan. Have your proxy card in hand when you access the website and follow the instructions to obtain your records and to create an electronic voting instruction form.

ELECTRONIC DELIVERY OF FUTURE PROXY MATERIALS

If you would like to reduce the costs incurred by our company in mailing proxy materials, you can consent to receiving all future proxy statements, proxy cards and annual reports electronically via e-mail or the Internet. To sign up for electronic delivery, please follow the instructions above to vote using the Internet and, when prompted, indicate that you agree to receive or access proxy materials electronically in future years.

VOTE BY PHONE - 1-800-690-6903

Use any touch-tone telephone to transmit your voting instructions. Vote by 11:59 PM, EDT on June 10, 2020 for common stock held directly and by 11:59 PM, EDT on June 8, 2020 for common stock held in a Company-sponsored Plan. Have your proxy card in hand when you call and then follow the instructions.

VOTE BY MAIL

Mark, sign and date your proxy card and return it in the postage-paid envelope we have provided or return it to Vote Processing, c/o Broadridge, 51 Mercedes Way, Edgewood, NY 11717.

TO VOTE, MARK BLOCKS BELOW IN BLUE OR BLACK INK AS FOLLOWS:

012383-F32578

KEEP THIS PORTION FOR YOUR RECORDS
 DETACH AND RETURN THIS PORTION ONLY

THIS PROXY CARD IS VALID ONLY WHEN SIGNED AND DATED.

| ASSEMBLY BIOSCIENCES, INC. | | For All | Withhold All | For All Except | To withhold authority to vote for any individual nominee(s), mark "For All Except" and write the number(s) of the nominee(s) on the line below. |
|---|---|--------------------------|--------------------------|--------------------------|---|
| 1. Election of Directors | | | | | |
| The Board of Directors recommends you vote FOR all nominees. | | | | | |
| Nominees: | | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | _____ |
| 01 | Anthony E. Altig | 04 | Helen S. Kim | 07 | John G. McLutichson, A.O., M.D. |
| 02 | Richard D. DiMarchi, Ph.D. | 05 | Alan J. Lewis, Ph.D. | 08 | William R. Ringo, Jr. |
| 03 | Myron Z. Holzbick | 06 | Susan Mahony, Ph.D. | | |
| The Board of Directors recommends you vote FOR proposals 2, 3, 4 and 5 and AGAINST proposal 6. | | | | | |
| | | | | | For Against Abstain |
| 2. | Approval, on a non-binding advisory basis, of our named executive officers' compensation. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 3. | Ratification of the selection of Ernst & Young LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2020. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 4. | Approval of an amendment to our 2018 Stock Incentive Plan to increase the number of shares reserved for issuance thereunder by 1,600,000 shares. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 5. | Approval of an amendment and restatement of our Fourth Amended and Restated Certificate of Incorporation to enable stockholders who hold in the aggregate at least 25% of our outstanding common stock to request special stockholder meetings. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| 6. | Vote on a stockholder proposal requesting the Board of Directors to take steps necessary to give stockholders who hold at least 15% of our outstanding common stock the right to request a special stockholder meeting. | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | |
| NOTE: Your proxy holder will also vote in their discretion upon such other matters that may properly come before the meeting and any adjournment or postponement thereof. | | | | | |
| Please sign exactly as your name(s) appear(s) hereon. When signing as attorney, executor, administrator, or other fiduciary, please give full title as such. Joint owners should each sign personally. All holders must sign. If a corporation or partnership, please sign in full corporate or partnership name by authorized officer. | | | | | |
| <input type="text"/> | | <input type="text"/> | | <input type="text"/> | |
| Signature (PLEASE SIGN WITHIN BOX) | | Date | | Signature (Joint Owners) | |
| <input type="text"/> | | <input type="text"/> | | <input type="text"/> | |
| Date | | Date | | Date | |

Important Notice Regarding the Availability of Proxy Materials for the Stockholder Meeting:
The Notice of Assembly Biosciences, Inc.'s 2020 Annual Meeting of Stockholders and Proxy Statement and Annual Report for the fiscal year ended December 31, 2019 are available at www.proxyvote.com.

D12386-P32578

**ASSEMBLY BIOSCIENCES, INC.
Annual Meeting of Stockholders
June 11, 2020 8:00 AM PDT
This proxy is solicited by the Board of Directors**

The Stockholder(s) hereby appoint(s) John G. McHutchison, A.O., M.D. and Thomas J. Russo, CFA, or either of them, as proxies, each with the power to appoint his substitute, and hereby authorize(s) each of them to represent and to vote, as designated on the reverse side of this ballot, all of the shares of common stock of ASSEMBLY BIOSCIENCES, INC. that the Stockholder(s) is/are entitled to vote at the Annual Meeting of Stockholders to be held at 8:00 A.M. PDT on June 11, 2020 at 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080, and any adjournment or postponement thereof.*

This proxy, when properly executed, will be voted in the manner directed herein. If no such direction is made, this proxy will be voted in accordance with the Board of Directors' recommendations.

*Due to the ongoing public health impact of the coronavirus and the related COVID-19 pandemic, we are planning for the possibility that the Annual Meeting of Stockholders may be held solely by means of remote communication (i.e., a virtual-only stockholder meeting). If we take this step, we will announce the decision to do so in advance, and details regarding how to participate will be set forth in a press release issued by the Company and available at investor.assemblybio.com.

Continued and to be signed on reverse side.