



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

**NOTICE OF 2021 ANNUAL MEETING OF STOCKHOLDERS  
To Be Held Thursday, May 20, 2021**

April 7, 2021

**Dear Stockholders:**

You are cordially invited to attend the 2021 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 on Thursday, May 20, 2021 at 8:00 a.m. Pacific Daylight Time (PDT) solely by remote communication (i.e., a virtual-only stockholder meeting) at [www.virtualshareholdermeeting.com/ASMB2021](http://www.virtualshareholdermeeting.com/ASMB2021) to protect the safety, health and well-being of our stockholders, directors, employees and the public during the ongoing COVID-19 pandemic. 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, 2021;
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 2,000,000 shares;
5. To amend and restate the 2018 Employee Stock Purchase Plan to increase the number of shares reserved for issuance thereunder by 900,000 shares and increase the maximum number of shares purchasable under the plan to 2,500 per offering period; and
6. 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 March 23, 2021 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 attend the virtual Annual Meeting and vote during the meeting.

To ensure your representation at the Annual Meeting, you are requested to submit your vote as instructed in the Notice of Internet 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 6, 2021 to submit your vote by mail. If you attend and vote at the Annual Meeting your proxy will not be used.

**Important Notice Regarding the Availability of Proxy Materials for the Annual Meeting to be held solely by remote communication at [www.virtualshareholdermeeting.com/ASMB2021](http://www.virtualshareholdermeeting.com/ASMB2021) on Thursday, May 20, 2021 at 8:00 a.m. PDT.**

**The proxy statement and the Annual Report for the fiscal year ended December 31, 2020 are available at: [www.proxyvote.com](http://www.proxyvote.com).**

We hope that you will attend the virtual Annual Meeting, 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 faint, larger signature.

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

**You are cordially invited to attend the Annual Meeting by remote communication. Whether or not you expect to attend the Annual Meeting, please vote over the Internet using your 16-digit control number as instructed in your Notice of Internet Availability of Proxy Materials or proxy card or vote by mail by requesting a printed copy of the proxy card. Even if you have voted by proxy, you may still vote at the Annual Meeting if you attend by remote communication. Please note, however, that if you hold your shares through a broker or nominee and you wish to vote at the Annual Meeting, you must obtain your control number from your broker or nominee to vote.**



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

**PROXY STATEMENT  
FOR THE 2021 ANNUAL MEETING OF STOCKHOLDERS**

**MAY 20, 2021**

**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 2021 Annual Meeting of Stockholders (the Annual Meeting) to be held on Thursday, May 20, 2021 at 8:00 a.m. Pacific Daylight Time (PDT) solely by remote communication (i.e., a virtual-only stockholder meeting) at [www.virtualshareholdermeeting.com/ASMB2021](http://www.virtualshareholdermeeting.com/ASMB2021) to protect the safety, health and well-being of our stockholders, directors, employees and the public during the ongoing COVID-19 pandemic. Any adjournments or postponements of the meeting also will be held by remote communication at the same location.

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 Notice of Internet Availability of Proxy Materials (the Proxy Availability Notice) described below to submit your proxy 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 7, 2021 to our stockholders of record and beneficial owners as of March 23, 2021, 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, 2020 are being distributed and made available on or about April 7, 2021. 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 also will 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.

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## 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 11)</i> The Board and its 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 27)</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 &amp; Young LLP as Independent Auditors (page 31)</i> The Board and its Audit Committee believe that the continued retention of Ernst & Young LLP to serve as the Independent Auditors for the fiscal year ending December 31, 2021 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 2,000,000 Shares (page 32)</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 2,000,000 shares.	<input checked="" type="checkbox"/>	FOR
<i>Proposal No. 5 – Amendment and Restatement of the 2018 Employee Stock Purchase Plan to Increase Number of Reserved Shares by 900,000 shares and Increase the Maximum Number of Shares Purchasable Under the Plan to 2,500 Per Offering (page 43)</i> The Board believes that it is in the best interest of the Company to amend and restate the 2018 Employee Stock Purchase Plan.	<input checked="" type="checkbox"/>	FOR

## 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 18 describes our governance framework, which includes the following highlights:

- |  |  |
|--|--|
| <i>Board Independence</i>              | <ul style="list-style-type: none"><li>• Seven of our eight Board nominees are independent.</li><li>• Dr. McHutchison, our Chief Executive Officer and President, is the only management nominee to the Board.</li><li>• The independent directors hold regular executive sessions, and any independent director may raise matters for discussion at these executive sessions.</li></ul>  |
| <i>Independent Chair</i>               | <ul style="list-style-type: none"><li>• The Chair of the Board is independent.</li></ul>   |
| <i>Board Composition</i>               | <ul style="list-style-type: none"><li>• The Board fixed the number of directors at eight prior to the Annual Meeting.</li><li>• We regularly assess our Board performance and can adjust the number of directors according to our needs.</li><li>• Our directors possess a diverse mix of skills, experience and backgrounds.</li></ul>  |
| <i>Accountability to Stockholders</i>  | <ul style="list-style-type: none"><li>• <i>Proxy Access.</i> 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.</li><li>• <i>Stockholders' Right to Call Special Meetings.</i> Our Fifth Amended and Restated Certificate of Incorporation (the Certificate of Incorporation) and Bylaws allow stockholders who hold in the aggregate at least 25% of our outstanding common stock to request special stockholders' meetings, provided they otherwise satisfy the requirements of our Bylaws.</li><li>• <i>Annual Election of Directors.</i> Our Certificate of Incorporation provides for the annual election of all directors.</li><li>• <i>Majority Voting Standard in Uncontested Director Elections.</i> Directors must receive more "for" votes than "against" votes to be elected in uncontested director elections.</li><li>• <i>No Poison Pill.</i> We do not have a poison pill.</li></ul> |
| <i>Independent Board Committees</i>    | <ul style="list-style-type: none"><li>• The Audit, Compensation and Nominating and Governance committees are composed entirely of independent directors, and each of the standing committees has a charter that is reviewed reassessed annually and posted on our website.</li><li>• Our Board and each committee may engage independent advisors at its sole discretion.</li></ul>  |
| <i>Risk Oversight</i>                  | <ul style="list-style-type: none"><li>• 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.</li></ul>  |
| <i>Board/Committee Self-evaluation</i> | <ul style="list-style-type: none"><li>• We have an annual self-evaluation process for the Board.</li><li>• We have an annual self-evaluation process for each standing committee of the Board.</li></ul>   |
| <i>Ethics/Corporate Responsibility</i> | <ul style="list-style-type: none"><li>• All of our directors and executive officers are required to abide by our Code of Conduct.</li><li>• Our Board has adopted Corporate Governance Guidelines to assist in the exercise of its responsibilities.</li></ul>   |

## 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:

	<b>Plan/Compensation</b>	<b>Purpose</b>	<b>Relevant Performance Metric</b>	<b>Fixed or Variable?</b>
<b>Annual/Short Term Incentives</b>	<i>Base Salary</i>	Provide 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
<b>Long-Term Incentive</b>	<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 Notice of Internet 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 7, 2021 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 7, 2021 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. 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](http://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](http://www.proxyvote.com) regardless of which account they are registered or held in.

### **How do I attend the Annual Meeting?**

You will not be able to attend the Annual Meeting in person at a physical location because it is being held in a virtual only format due to the COVID-19 pandemic. However, the Annual Meeting will provide stockholders of record as of the close of business on March 23, 2021, the ability to participate, vote their shares and ask questions during the meeting by audio webcast. To be admitted to the virtual-only Annual Meeting, you should visit [www.virtualshareholdermeeting.com/ASMB2021](http://www.virtualshareholdermeeting.com/ASMB2021) and enter the 16-digit control number found on your Proxy Availability Notice.

Additional details on attending and participating in the virtual-only Annual Meeting:

- Access the meeting platform beginning at 7:45 a.m. PDT on May 20, 2021.
- Vote during the Annual Meeting by following the instructions available on the meeting website during the meeting.
- Submit a question during the meeting by visiting [www.virtualshareholdermeeting.com/ASMB2021](http://www.virtualshareholdermeeting.com/ASMB2021), entering your 16-digit control number and submitting the question in the “Ask a Question” field.
- If you encounter any difficulties while accessing the virtual-only meeting, contact the technical support number that will be posted on the Virtual Shareholder Meeting log-in page. Technical support will be available beginning at 7:30 a.m. PDT on May 20, 2021 and will remain available until the Annual Meeting has ended.
- A list of stockholders entitled to vote will be available for inspection by stockholders of record for any legally valid purpose related to the Annual Meeting during the Annual Meeting by following the link provided when you log in to [www.virtualshareholdermeeting.com/ASMB2021](http://www.virtualshareholdermeeting.com/ASMB2021) and for a period of ten days prior to the Annual Meeting by sending a request to [corpsecretary@assemblybio.com](mailto:corpsecretary@assemblybio.com).

Whether or not you attend the Annual Meeting, we urge you to vote and submit your proxy in advance of the meeting by one of the methods described in this proxy statement.

### **Who can vote at the Annual Meeting?**

Only stockholders of record at the close of business on March 23, 2021 will be entitled to vote at the Annual Meeting. On the record date, there were 40,059,122 shares of common stock outstanding and entitled to vote.

#### *Stockholder of Record: Shares Registered in Your Name*

If on March 23, 2021, your shares were registered directly in your name with our transfer agent, American Stock Transfer & Trust Company, LLC, then you are a stockholder of record. As a stockholder of record, you may vote while attending 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 March 23, 2021, 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 and should follow the instructions provided by your broker, bank or other agent to vote your shares. You are also invited to attend the Annual Meeting.

### **What am I voting on?**

There are five 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, 2021;
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 2,000,000 shares; and
5. Approval of an amended and restated 2018 Employee Stock Purchase Plan (the 2018 ESPP) to increase the number of shares reserved for issuance thereunder by 900,000 shares and increase the maximum number of shares purchasable under the plan to 2,500 per offering period.

### **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?**

For each of the matters, including each of our nominees to the Board, 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 at the Annual Meeting, vote by proxy over the Internet, vote by proxy over the telephone or vote by proxy using a proxy card that we have provided or will provide upon request. 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 and vote at the meeting even if you have already voted by proxy.

- To vote at the meeting, attend the Annual Meeting, and follow the instructions available on the meeting website during the meeting.
- To vote over the Internet, go to [www.proxyvote.com](http://www.proxyvote.com) to complete an electronic proxy card. 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 May 19, 2021 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. EDT on May 19, 2021 to be counted.
- 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 May 19, 2021 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 at the Annual Meeting, contact your broker, bank or other nominee to obtain your control number and follow the instructions on the meeting website.
- To vote over the Internet, go to [www.proxyvote.com](http://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 May 19, 2021 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 May 19, 2021 to be counted.
- 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 May 19, 2021 to be counted.

**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.**

**How many votes do I have?**

You have one vote for each share of common stock you owned as of March 23, 2021 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, mail (by requesting a paper proxy card or voting instruction card), and during 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 grant a subsequent proxy by telephone or over the Internet.
- You may submit another properly completed proxy card with a later date.
- 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 and vote at the Annual Meeting. Simply attending the meeting will not, by itself, revoke your proxy.

Your most recent vote (prior to the deadline) by Internet, telephone or proxy card or vote at the Annual Meeting 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 over the Internet or by telephone.
- You may attend and vote at the Annual Meeting by obtaining your control number 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 or vote at the Annual Meeting 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.

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 and Proposal No. 5—Approval of an amendment and restatement of the 2018 Employee Stock Purchase Plan. Therefore, it is critical that you indicate your vote on these proposals if you want your vote to be counted.

### **How are votes counted?**

Votes will be counted by the inspector of elections appointed for the meeting.

With respect to the election of directors, you may vote “FOR” or “AGAINST” each of the nominees, or you may abstain from voting for one or more nominees. Neither abstentions nor broker non-votes will have any effect on the election of the nominees, but broker non-votes will be counted to determine whether a quorum is present at the Annual Meeting.

With respect to the other proposals, you may vote “FOR” or “AGAINST” or you may abstain from voting. Neither abstentions nor broker non-votes will have any effect on the votes for these proposals but broker non-votes will be counted to determine whether a quorum is present at the Annual Meeting.

### **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, 2021;
- “FOR” the approval of an amendment to the 2018 Plan to increase the number of shares reserved for issuance thereunder by 2,000,000 shares;
- “FOR” approval of an amendment and restatement of the 2018 ESPP to increase the number of shares reserved for issuance thereunder by 900,000 shares and increase the maximum number of shares purchasable under the plan to 2,500 per offering; 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 virtual Annual Meeting or represented by proxy. On the record date, there were 40,059,122 shares of common stock outstanding and entitled to vote. As a result, the holders of 20,029,562 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 May 19, 2021 or if you vote 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 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 Directors	Majority of Votes Cast	No
No. 2	Advisory Vote on Named Executive Officers' Compensation	Majority of Votes Cast	No
No. 3	Ratification of the Selection of Ernst & Young LLP as Independent Registered Public Accounting Firm for 2021	Majority of Votes Cast	Yes
No. 4	Amendment of the 2018 Plan to Increase the Number of Shares Reserved for Issuance Thereunder by 2,000,000 Shares	Majority of Votes Cast	No
No. 5	Amendment and Restatement of the 2018 ESPP to increase the number of shares reserved for issuance thereunder by 900,000 shares and increase the maximum number of shares purchasable under the plan to 2,500 per offering period	Majority of Votes Cast	No

### *Election of Directors*

Directors will be elected by the affirmative vote of the majority of the votes cast (meaning the number of shares voted "FOR" a nominee must exceed the number of shares voted "AGAINST" that nominee). If any nominee for director receives a greater number of votes "AGAINST" his or her election than votes "FOR" such election, our Corporate Governance Guidelines require that person to promptly tender his or her written resignation to the Chair of the Board within five days following the certification of the vote. Abstentions and broker non-votes are not considered votes cast for the election of directors and will have no effect on the election of nominees.

### *Other Proposals*

Adoption of Proposal No. 2, Proposal No. 3, Proposal No. 4 and Proposal No. 5 requires the affirmative vote of the majority of votes cast. Abstentions and broker non-votes are not considered votes cast and will have no effect on the vote for these proposals.

## 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, 2020 are available free of charge at [www.proxyvote.com](http://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](mailto: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, 2020 as filed with the SEC is accessible free of charge on our website. It contains audited consolidated financial statements for our fiscal years ended December 31, 2018, 2019 and 2020. The Annual Report on Form 10-K, without exhibits, is included in the 2020 Annual Report to Stockholders that is available with this proxy statement.

## **CAUTIONARY STATEMENT REGARDING FORWARD-LOOKING STATEMENTS**

This proxy statement contains forward-looking statements relating to future events that 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.

Statements that include the words may, will, would, could, should, might, believes, hopes, estimates, projects, potential, expects, plans, anticipates, intends, continues, forecast, designed, goal or the negative of those words or other comparable words, that express uncertainty, are forward-looking statements. We intend such forward-looking statements to be covered by the safe harbor provisions contained in Section 27A of the Securities Act of 1933, as amended (the Securities Act), and Section 21E of the Securities Exchange Act of 1934, as amended (the Exchange Act). Except as required by law, we assume no obligation to update publicly any forward-looking statements, whether as a result of new information, future events or otherwise.

## 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 seven directors and is expected to consist of eight directors following the election of Lisa R. Johnson-Pratt, M.D. 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, other than Dr. Johnson-Pratt, is currently a director. Each of the director nominees was previously elected by the stockholders, other than Dr. Johnson-Pratt. Directors are elected by a majority of the votes cast in the election of such director, requiring that the number of votes cast "for" a director nominee exceed the number of votes cast "against" that director nominee.

### Nominees for Director

The Nominating and Governance Committee has recommended, and the Board has approved, the nomination of each of Anthony E. Altig, Gina Consylman, Richard D. DiMarchi, Ph.D., Myron Z. Holubiak, Lisa R. Johnson-Pratt, M.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. 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. For more information regarding the experience, qualifications, attributes and skills of the director nominees, see the matrix on page 19.

<u>Name</u>	<u>Age</u>	<u>Director Since</u>	<u>Business Experience</u>
Anthony E. Altig	65	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 Verenum 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. Mr. Altig formerly served as a director and chairman of the audit committee of TearLab Corporation (formerly OccuLogix, Inc.), an eyecare technology company that was a public company until it was taken private in July 2020, and as a director of MultiCell Technologies, Inc. and Optimer Pharmaceuticals, Inc., a pharmaceutical company that 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



Name	Age	Director Since	Business Experience
Gina Consylman	49	2020	<p>conclusion of our Board that he should serve as a director due to our business and structure.</p> <p>Ms. Consylman joined our Board in October 2020. Since November 2017, Ms. Consylman has served as Senior Vice President, Chief Financial Officer of Ironwood Pharmaceuticals, Inc. (Ironwood). From September 2017 until November 2017, Ms. Consylman was Ironwood’s interim Chief Financial Officer, from August 2015 until November 2017, she served as Ironwood’s Vice President of Finance and Chief Accounting Officer and from June 2014 until July 2015, she served as Ironwood’s Vice President, Corporate Controller and Chief Accounting Officer. Prior to joining Ironwood, Ms. Consylman served as Vice President, Corporate Controller and Principal Accounting Officer of Analogic Corporation from February 2012 until June 2014. Prior to that, Ms. Consylman served in various roles of increasing responsibility at Biogen Inc. from November 2009 until February 2012, culminating in her role as Senior Director, Corporate Accounting. Prior to that, Ms. Consylman served as Corporate Controller at Varian Semiconductor Equipment Associates, Inc. Ms. Consylman serves on the board of directors and chair of the audit committee of Verastem, Inc. Ms. Consylman received her B.S. in accounting from Johnson &amp; Wales University and a M.S. in taxation from Bentley University. Ms. Consylman is a Certified Public Accountant.</p> <p>Because of these and other professional experiences, Ms. Consylman 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, Ms. Consylman’s extensive management experience and financial expertise, as well as her experience serving on the board of directors of Verastem, Inc., led to the conclusion of our Board that she should serve as a director due to our business and structure.</p>
Richard D. DiMarchi, Ph.D.	68	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 &amp; Company (Lilly), where he provided leadership for more than two</p>

Name	Age	Director Since	Business Experience
			<p>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> <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.</p>
Myron Z. Holubiak	74	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</p>

Name	Age	Director Since	Business Experience
			<p>School of Economics and the Centre for Health Economics at the University of York.</p> <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.</p>
Lisa R. Johnson-Pratt, M.D.	57	New Director Nominee	<p>Dr. Johnson-Pratt is not currently a member of our Board. Since November 2020, Dr. Johnson-Pratt has served as Senior Vice President, Commercial of Ionis Pharmaceuticals, Inc. (Ionis). Prior to that, Dr. Johnson-Pratt served as Senior Vice President of Akcea Therapeutics, Inc. (Akcea) from March 2020 until Ionis’s acquisition of Akcea, which was consummated in October 2020. Prior to that, Dr. Johnson-Pratt served as Vice President of Global Franchise Operations at GlaxoSmithKline plc (GSK) from January 2018 until July 2019, and from June 2015 until July 2019, she served as GSK’s Head, Pipeline and Oncology Commercial Strategy. From 2013 until 2015, Dr. Johnson-Pratt was the Global Marketing Director at Stiefel Laboratories, Inc. Dr. Johnson-Pratt worked for Merck &amp; Co., Inc. from 2004 until 2013, in a series of positions of increasing responsibility, culminating in her role as Business Unit Director (Mature Brands). Dr. Johnson-Pratt earned a B.S. in science from Howard University, a Diploma of Pharmaceutical Medicine from the Royal College of Physicians, and an M.D. from Howard University.</p> <p>Because of these and other professional experiences, Dr. Johnson-Pratt possesses particular knowledge and in experience with the medical and the pharmaceutical industries. Among other experiences, qualifications, attributes and skills, Dr. Johnson-Pratt’s medical training and her extensive commercial experience in the pharmaceutical industry led to the conclusion of our Board that she should be nominated to serve as a director due to our business and structure.</p>
Susan Mahony, Ph.D.	56	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</p>

Name	Age	Director Since	Business Experience
			<p>was awarded an Honorary Doctorate from Aston University, and she earned an M.B.A. from London Business School.</p> <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.</p>
John G. McHutchison, A.O., M.D.	63	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 Sciences, Inc. (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. Dr. McHutchison currently serves on the board of directors of Metacrine, Inc., a public company, and Evox Therapeutics, a private company.</p> <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.</p>

Name	Age	Director Since	Business Experience
William R. Ringo, Jr.	75	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 served as Interim Chief Executive Officer of Five Prime Therapeutics, Inc. (Five Prime) from September 2019 until April 2020. 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. 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. 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. From 1994 to 2002, he served as a director and chairman of the board for Community Health Systems, Inc. and from February 2011 until the October 2013 acquisition by Amgen, Inc., on the Onyx Pharmaceuticals, Inc. board of directors. 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, directors will be elected by the affirmative vote of the majority of the votes cast (meaning the number of shares voted “FOR” a nominee must exceed the number of shares voted “AGAINST” that nominee). All elected nominees will serve until the 2022 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. If any current director receives a greater number of votes “AGAINST” his or her election than votes “FOR” such election, our Corporate Governance Guidelines require that person to promptly tender his or her written resignation to the Chairman of the Board within five days following the certification of the vote. Abstentions and broker non-votes are not considered votes cast for the election of directors and will have no effect on the election of nominees.

### **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 at *investor.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 managed 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, 2020, the Board held six meetings and acted by unanimous written consent five times. Our independent directors met in executive sessions at which only independent directors were present at the end of all Board meetings in 2020.

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 2020 director nominee that served as a director at the time of the 2020 annual meeting of stockholders was in attendance in person other than Alan J. Lewis, Ph.D., who could not attend due to personal reasons. Ms. Consylman and Dr. Johnson-Pratt were neither nominees nor members of our Board at the time of the 2020 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 also may consider such other factors as it may deem, from time to time, to be in the best interests of our Company and our stockholders.

We seek a variety of types and degrees of knowledge, skills and experiences among our Board members. The following matrix provides information regarding our Board nominees, including select knowledge, skills, experiences and attributes possessed by our members that the Board believes are relevant to our business. The matrix is not intended to encompass all of the knowledge, skills, experiences or attributes of the nominees, and the fact that a particular knowledge, skill, experience or attribute is not listed does not mean that a nominee does not possess it. In addition, the absence of a particular knowledge, skill, experience or attribute does not mean that that particular nominee is unable to contribute to decision-making in that area.

	Altig	Consylman	DiMarchi	Holubiak	Johnson-Pratt	Mahony	McHutchison	Ringo
<b>Experience</b>								
Public Board Experience .....	•	•	•	•		•	•	•
Finance .....	•	•				•		•
Accounting .....	•	•						•
Corporate Governance.....	•	•		•			•	•
Compensation.....		•		•		•		•
Executive Experience .....	•	•	•	•	•	•	•	•
Operations .....	•	•		•	•	•	•	•
Strategic Planning ...	•	•	•	•	•	•	•	•
Pharmaceutical Industry.....	•	•	•	•	•	•	•	•
Academia.....			•				•	
<b>Demographics</b>								
<b>Race/Ethnicity</b>								
African American.....					•			
Hispanic								
Latino/a								
Asian								
White/Caucasian.....	•	•	•	•		•	•	•
<b>Gender</b>								
Male.....	•		•	•			•	•
Female .....		•			•	•		
<b>Board Tenure</b>								
Years.....	9	1	7	11	New Nominee	4	2	7
<b>Other Public Boards</b>								
Number.....	0	1	0	1	0	3	1	1

### 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, Gina Consylman, Richard D. DiMarchi, Ph.D., Myron Z. Holubiak, Lisa R. Johnson-Pratt, M.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, Ms. Consylman, Dr. DiMarchi, Mr. Holubiak, Dr. Johnson-Pratt, 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. Our Board also affirmatively determined that former directors Mark Auerbach, Helen S. Kim and Alan J. Lewis, Ph.D. did not have any relationships that would interfere with the exercise of independent judgment in carrying out their responsibilities.

### **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.

The Audit Committee is responsible for information security, with a particular focus on cybersecurity. Management provides regular briefings to the Audit Committee in the event that there are any information security breaches. The Audit Committee commissioned Ernst & Young LLP to conduct a cybersecurity assessment in 2018. The assessment led to the implementation of a variety of initiatives, including enhancement of our email security, evaluation of data protection capabilities of our information technology systems and implementation of a new cybersecurity incident response policy. Following the assessment, we also undertook a cybersecurity awareness initiative to enable our employees to identify and mitigate information security risks. The initiative is comprised of employee trainings on phishing and other malicious attacks, smart habit creation and best practices regarding file sharing, host security and email security, and we have incorporated cybersecurity training into our employee onboarding process to ensure that all new employees have the necessary skills to identify and mitigate information security risks. In addition, we recently purchased cybersecurity insurance that would defray the costs of an information security breach. We have not experienced any information security breaches since August 2018, when our email system was hacked. We became aware of the breach and closed access prior to incurring any expenses related to the attack.

### **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](http://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 2020, excluding actions taken by unanimous written consent. All incumbent directors attended 75% or more of the aggregate number of meetings of the Board and 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 2020. The Board expects to review 2021 committee assignments at its meeting immediately following the Annual Meeting.

	Independent	Audit Committee	Compensation Committee	Nominating and Governance Committee	Science and Technology Committee
Anthony E. Altig+ .....	●	●**		●	
Gina Consylman+ .....	●	●			
Richard D. DiMarchi, Ph.D. ....	●				●**
Myron Z. Holubiak .....	●		●**	●	
Susan Mahony, Ph.D. ....	●	●	●		
John G. McHutchison, A.O., M.D. ....					●
William R. Ringo, Jr.* .....	●	●	●	●**	

\* 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 oversees 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 consolidated 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 also is responsible for reviewing and approving all related person transactions, including transactions with executive officers and directors, for potential conflicts of interests.

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. Altig (Chair), Ms. Consylman, Dr. Mahony and Mr. Ringo. The Board annually reviews the Nasdaq listing rules’ definition of independence for Audit Committee members and has determined that Mr. Altig, Ms. Consylman, Dr. Mahony and Mr. 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 Mr. Altig and Ms. Consylman 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 experience of Mr. Altig and Ms. Consylman. 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 Ms. Consylman’s level of knowledge and experience based on a number of factors, including her current role as Chief Financial Officer of Ironwood Pharmaceuticals and the series of accounting and finance roles of increasing responsibility at Ironwood Pharmaceuticals, Analogic, Biogen and Varian Semiconductor Equipment Associates, her role as the Audit Committee chair at Verastem, Inc. and her experience as a certified public accountant at Ernst & Young LLP.

*Compensation Committee*

The charter for our Compensation Committee requires the committee to have not less than three independent members, subject to the Nasdaq listing rules. Our Compensation Committee currently consists of Mr. Holubiak (Chair), Dr. Mahony and Mr. Ringo. Our Board has determined that Mr. Holubiak, Dr. Mahony and Mr. Ringo 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.

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 conducts an annual performance evaluation and reports to the Board on its results.

The charter of the Compensation Committee grants the Compensation Committee full 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 independent directors, subject to the Nasdaq listing rules. Our Nominating and Governance Committee currently consists of three directors, Mr. Ringo (Chair), Mr. Altig and Mr. Holubiak. The Board has determined that each of Mr. Ringo, 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 is the responsibility of the Audit Committee.

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 2022 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.

The Nominating and Governance Committee engaged a third-party search firm 2020 in identifying and evaluating Ms. Consylman, and utilized the services of the same search firm in 2021 in identifying and evaluating Dr. Johnson-Pratt.

All of the director nominees (Anthony E. Altig, Gina Consylman, Richard D. DiMarchi, Ph.D., Myron Z. Holubiak, Lisa R. Johnson-Pratt, M.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.

The Nominating and Governance Committee also develops and oversees an annual self-evaluation process for the Board and each of its standing committees and ensures that the results of such evaluations are reported to the Board.

### *Science and Technology Committee*

Our Science and Technology Committee currently consists of Dr. DiMarchi (Chair) and Dr. McHutchison. 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](http://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. Dr. McHutchison does not receive separate compensation for service as a director because he is a Company employee.

The following table sets forth the annualized cash compensation payable to our non-employee directors in 2020.

<b>Director Position</b>	<b>Annual Cash Compensation<sup>(1)</sup></b>
All Non-Employee Directors.....	\$ 40,000
Chair of the Board .....	\$ 80,000
Audit Committee Chair .....	\$ 20,000
Audit Committee Members (other than Chair) .....	\$ 10,000
Chair of Compensation Committee .....	\$ 15,000
Compensation Committee Members (other than Chair) .....	\$ 7,500
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, 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 2020 unless otherwise noted.

Upon appointment to the Board, each new non-employee director appointed or elected 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. In March 2021, the Board set the option grant for new directors as 30,000 shares of common stock. Each year, on the date of our annual meeting of stockholders, each non-employee director that is elected receives a grant of an equity award that 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. Non-employee directors elected to serve on the Board at the 2020 annual meeting of stockholders were granted an option to purchase 10,000 shares of common stock. In March 2021, the Board set the option grant for non-employee directors elected to serve on the Board at 15,000 shares of common stock to align this grant with the 50<sup>th</sup> percentile of our peer group.

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 2020.

Name	Fees Earned or Paid in Cash (\$)	Option Awards (\$) <sup>(1)(2)</sup>	Total (\$)
Anthony E. Altig .....	60,833	149,181	210,014
Mark Auerbach .....	30,938	—	30,938
Gina Consylman.....	10,417	224,642	235,059
Richard D. DiMarchi, Ph.D. ....	50,000	149,181	199,181
Myron Z. Holubiak .....	60,000	149,181	209,181
Helen S. Kim.....	45,000	149,181	194,181
Alan J. Lewis, Ph.D. ....	55,000	149,181	204,181
Susan Mahony, Ph.D.....	55,417	149,181	204,598
William R. Ringo, Jr. ....	97,500	149,181	246,681

- (1) As of December 31, 2020, our non-employee directors held the following unexercised options to purchase shares of our common stock: Mr. Altig, 119,000 shares; Mr. Auerbach, 109,000 shares; Ms. Consylman, 20,000 shares; Dr. DiMarchi, 119,000 shares; Mr. Holubiak, 119,000 shares; Ms. Kim, 37,500 shares; Dr. Lewis, 65,000 shares; Dr. Mahony, 47,500 shares; and Mr. Ringo, 104,000 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 2020 computed in accordance with Financial Accounting Standards Boards (FASB) Accounting Standards Codification Topic 718, *Compensation—Stock Compensation* (ASC Topic 718). Assumptions used in the calculation of these amounts are included in Note 8 of the consolidated financial statements included in our Annual Report on Form 10-K for the year ended December 31, 2020.

### Stockholder Communications

Stockholders and other interested parties may communicate with the Board by writing to Jason A. Okazaki, our Chief Legal and Business Officer and Corporate Secretary, at Assembly Biosciences, Inc., 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080. Upon receipt of a stockholder communication indicating a desire to communicate with the Board, Mr. Okazaki 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 Mr. Okazaki 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 research 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.

## **Environmental, Social and Governance Focus**

Management and the Board recognize that, as we continue to grow and advance our pipeline of product candidates, it is important to also focus our corporate responsibility programs on issues that support long-term sustainability of our operations and manage relevant environmental, social and governance (ESG) risks. In 2020, we highlighted our programs, achievements and future plans on ESG issues by adding a sustainability section to our corporate website, which can be found at [www.assemblybio.com/sustainability](http://www.assemblybio.com/sustainability). The information posted on our website is not intended to be incorporated into this proxy statement.

## **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 SEC 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 99% of the votes cast on our “Say on Pay” vote were voted in favor of the proposal in 2020.

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, 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 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 2021 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 2021 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. Nevertheless, the views expressed by our 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 2022 Annual Meeting of Stockholders. The next non-binding advisory vote on the 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, the affirmative vote of the majority of the votes cast 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 and 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 for Audit Committee pre-approval of 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 our 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. There were no non-audit services provided by our independent public accounting firm for the fiscal years ended December 31, 2020 and 2019. 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, 2020 and 2019.

### Fees and Services

The following table represents aggregate fees billed to us for services related to the fiscal years ended December 31, 2020 and 2019 by Ernst & Young LLP, our independent registered public accounting firm:

Fees	2020	2019
Audit Fees <sup>(1)</sup> .....	\$ 1,702,583	\$ 1,586,312
Audit-Related Fees .....	—	—
Tax Fees <sup>(2)</sup> .....	143,582	223,376
All Other Fees <sup>(3)</sup> .....	2,340	3,485
Total.....	\$ 1,848,505	\$ 1,813,173

- (1) Audit Fees consisted of fees and expenses covering the integrated audit of our consolidated financial statements, 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 consisted 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 consisted of fees billed in the indicated year for an annual subscription to Ernst & Young LLP’s online resource library.

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 and internal control over financial reporting for the year ended December 31, 2020 with management.
2. The Audit Committee has discussed with Ernst & Young LLP, our independent registered public accounting firm, who is responsible for expressing an opinion on the conformity of our consolidated financial statements with generally accepted accounting principles in the United States and as to the effectiveness of our internal control over financial reporting, its judgments as to the quality, not just the acceptability, of our accounting principles and such other matters required to be discussed by the

applicable requirements of Auditing Standards No. 1301, “Communications with Audit Committees” issued by the Public Company Accounting Oversight Board (PCAOB).

3. The Audit Committee has received the written disclosures and the letter from Ernst & Young LLP required by PCAOB Ethics and Independence Rule 3526, “Communication with Audit Committees Concerning Independence,” regarding the independent accountant’s communications with the Audit Committee concerning independence and has discussed with Ernst & Young LLP its independence from the Company and management.
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 and management’s assessment of the effectiveness of our internal control over financial reporting be included in our Annual Report on Form 10-K for fiscal year ended December 31, 2020.

Submitted by:           The Audit Committee  
                                Anthony E. Altig, Chairman  
                                Gina Consylman  
                                Susan Mahony, Ph.D.  
                                William R. Ringo, Jr.

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

### **General**

The Audit Committee has selected Ernst & Young LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2021. 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 Audit Committee will reconsider whether to retain Ernst & Young LLP. Even if the selection is ratified, the Audit Committee, in its discretion, may direct the appointment of different independent registered public accounting firm at any time during the year if the Audit Committee 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, the affirmative vote of the majority of the votes cast 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, 2021. Abstentions and 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.**

## **PROPOSAL NO. 4: APPROVAL OF AN AMENDMENT TO THE ASSEMBLY BIOSCIENCES, INC. 2018 STOCK INCENTIVE PLAN**

### **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, Omnibus Amendment to Assembly Biosciences, Inc. Stock Plans effective as of March 11, 2020 and Amendment No. 3 to Assembly Biosciences, Inc. 2018 Stock Incentive Plan, effective as of June 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 March 23, 2021, there were stock options to acquire 6,364,800 shares of common stock and 36,485 cash settled stock appreciation rights (SARs) outstanding under our equity compensation plans. In addition, there were 495,098 shares subject to unvested restricted stock units (RSUs) with time-based vesting, 140,000 shares subject to vested RSUs that have not settled and 100,000 shares subject to unvested RSUs with performance-based vesting outstanding under our equity compensation plans. As of March 23, 2021, there were approximately 2,610,518 shares of common stock available and unallocated under our equity compensation plans, of which 45,255 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 March 23, 2020, there were approximately 2,565,263 shares of common stock available under our shareholder approved plans, of which 2,451,680 shares of common stock remain available and unallocated for issuance under the 2018 Plan.

After the record date for the Annual Meeting, on March 29, 2021, we issued an aggregate of annual performance equity awards to our employees totaling 1,267,075 shares of common stock, which consisted of stock options to acquire 1,048,250 shares of common stock, 199,875 RSUs and 18,950 cash settled SARs under our 2018 Plan. As a result, as of March 29, 2021, there are 1,184,605 shares of common stock available and unallocated for issuance under the 2018 Plan.

We also expect to issue an additional 120,000 stock options under the 2018 Plan at the Board meeting immediately following the Annual Meeting in connection with the election of seven non-employee directors, including one new Board member.

On March 18, 2021, the Board, upon the recommendation of the Compensation Committee and subject to the approval of our stockholders at the Annual Meeting, approved Amendment No. 4 to the 2018 Plan (the Amendment) to increase the number of shares reserved under the 2018 Plan from 4,600,000 to 6,600,000 (as further amended, the Amended Plan). The proposed increase of 2,000,000 shares equals approximately 5.0% of the Company's outstanding shares and equals approximately 4.7% 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 2,000,000 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 development of our lead core inhibitor

product candidate in our hepatitis B virus (HBV) program, vebicorvir (VBR), in ongoing Phase 2 clinical studies evaluating VBR in combination with other HBV therapeutics with different mechanisms of action, the continuation of Phase 2 clinical studies for our HBV program's second core inhibitor product candidate, ABI-H2158, the continuation of Phase 1a/1b clinical studies for our HBV program's third core inhibitor product candidate ABI-H3733, as well as the continued research and development efforts to nominate a fourth core inhibitor candidate and additional product candidates, including molecules that disrupt covalently closed circular DNA (cccDNA) and other small molecules targeting novel, currently undisclosed targets to add to combination treatments with our core inhibitor product candidates. 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—How We Determine Executive Compensation—Role of the Compensation Committee; Oversight of Executive Compensation—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 82% and 83% of the new hire equity awards granted to our Chief Legal and Business Officer and Chief Scientific Officer, Virology, respectively, are at-risk and will only increase in value 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 performance equity awards to employees in 2022 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 2,185,504 shares of common stock underlying equity awards granted in 2020, approximately 50% were issued to new hires, 1% were issued as retention awards

to existing employees and 4% were issued to non-employee directors. We expect our headcount to increase from 95 as of January 31, 2021 to approximately 120 by the end of 2021 as we advance our product candidates into further clinical trials and increase our discovery efforts for new product candidates. In connection with these new hires, we expect to continue our practice of providing meaningful initial equity awards, as well as making annual performance 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 2020, approximately 28% of the equity awards we issued were associated with enhancements in our senior leadership team, including the hiring of a new Chief Legal and Business Officer and Chief Scientific Officer, Virology.* In 2020, we significantly enhanced and strengthened our leadership with the appointments of Jason A. Okazaki as Chief Legal and Business Officer; William E. Delaney IV, Ph.D. as Chief Scientific Officer, Virology; Carl H. Enell, as SVP, Corporate Development; and Nicole S. White, Ph.D., as SVP, Pharmaceutical Development and Manufacturing. These key hires were critical as we progress three clinical candidates across our HBV program and work to develop and advance our core inhibitor portfolio and expand our portfolio beyond core inhibitors to include cccDNA disruptors and other small molecules targeting novel undisclosed targets.
- *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 84% 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 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, SARs 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 SARs 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 research and development activities, 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), SARs, 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 6,600,000 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 March 23, 2021, approximately 98 individuals are currently eligible to participate in the Amended Plan, which includes five executive officers, 87 full-time employees who are not executive officers and six 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 2020 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 (\$) <sup>(1)</sup>	Number of Awards (#)
John G. McHutchison, A.O., M.D. <i>Chief Executive Officer and President</i> .....	14.45	100,000	722,500	50,000
Thomas J. Russo, CFA <sup>(2)</sup> <i>Chief Financial Officer</i> .....	N/A	—	626,884	43,383
Jason A. Okazaki <sup>(3)</sup> <i>Chief Legal and Business Officer</i> .....	N/A	—	N/A	—
William E. Delaney IV, Ph.D. <sup>(3)</sup> <i>Chief Scientific Officer, Virology</i> .....	N/A	—	N/A	—
Jacqueline S. Papkoff, Ph.D. <i>Former Chief Scientific Officer, Microbiome</i> .....	14.45	34,000	245,650	17,000
All current executive officers, as a group <sup>(4)</sup> .....	14.45	100,000	1,349,384 <sup>(5)</sup>	93,383
All current directors who are not executive officers, as a group <sup>(6)</sup> .....	20.47	70,000	N/A	—
All current employees who are not executive officers, as a group <sup>(7)</sup> .....	14.78	339,625	1,720,882 <sup>(5)</sup>	118,941

- (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 8 to of the consolidated financial statements included in the Annual Report on Form 10-K for the fiscal year ended December 31, 2020.
- (2) Dr. McHutchison and Mr. Russo joined us in August and October 2019, respectively. As such, their annual equity grants in 2020 were prorated.
- (3) Mr. Okazaki and Dr. Delaney joined us in March and May 2020, respectively. As such, they did not receive 2020 annual equity grants.
- (4) Does not include grants otherwise presented in the table to Dr. Papkoff, because notwithstanding her inclusion as a named executive officer, due to the termination of her employment on January 31, 2021 in connection with the wind-down of our Microbiome program, Dr. Papkoff is not a current executive officer.
- (5) Represents the aggregate grant date fair value for the group.
- (6) Each non-employee director was granted options to purchase 10,000 shares of common stock at the Board meeting following the 2020 Annual Meeting.
- (7) Additionally, we granted 21,385 SARs under the 2018 Plan to current employees that are not executive officers during 2020.

## Equity Plans

The following table sets forth information as of December 31, 2020 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 <sup>(1)</sup> (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.....	5,515,752 <sup>(2)</sup>	\$ 14.39	2,355,332 <sup>(3)</sup>
Equity compensation plans not approved by our stockholders.....	2,067,708 <sup>(4)</sup>	\$ 18.86	24,020 <sup>(5)</sup>
Total .....	7,583,460		2,379,352

- (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: 363,161 shares subject to stock options granted under the 2010 Equity Incentive Plan (2010 Plan); 2,453,335 shares subject to outstanding awards granted under the Assembly Biosciences, Inc. Amended and Restated 2014 Stock Incentive Plan (2014 Plan), of which 2,296,823 were subject to outstanding stock options and 156,512 were subject to outstanding RSUs; 2,269,503 shares subject to outstanding awards granted under the 2018 Plan, of which 1,608,912 were subject to outstanding stock options, 624,106 were subject to outstanding RSUs and 36,485 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; 85,968 shares available for issuance under the 2014 Plan; 2,037,029 shares available for issuance under the 2018 Plan; and 232,335 shares reserved for issuance under the 2018 ESPP. As of February 22, 2021, assuming each participant purchases the maximum number of shares in the current offering period, no more than 51,000 shares are subject to purchase in the current offering, which ends on May 14, 2021.
- (4) This number includes 791,028 shares subject to outstanding awards granted under the 2017 Inducement Award Plan (2017 Inducement Plan), of which 779,778 were subject to outstanding stock options and 11,250 were subject to outstanding RSUs; 500,000 shares subject to stock options granted under the 2019 Inducement Award Plan (2019 Inducement Plan).
- (5) This number includes 700 shares available for issuance under the 2017 Inducement Plan and no shares under the 2019 Inducement Plan.

The following table sets forth aggregated information as of March 29, 2021 regarding outstanding equity awards and aggregate availability under our equity compensation plans:

Total Number of Outstanding Full-Value Awards	Total Number of Outstanding Appreciation Awards	Weighted Average Exercise Price of Outstanding Appreciation Awards	Weighted Average Term of the Outstanding Appreciation Awards	Total Number of Shares Available for Grant
691,869	7,468,485	\$13.73	7.13 years	1,343,803

After the record date for the Annual Meeting, on March 29, 2021, we issued an aggregate of annual performance equity awards to our employees totaling 1,267,075 shares of common stock, which consisted of stock options to

acquire 1,048,250 shares of or common stock, 199,875 RSUs and 18,950 cash settled SARs under our 2018 Plan. As a result, as of March 29, 2021, there are 1,184,605 shares of common stock available and unallocated for issuance under the 2018 Plan.

We also expect to issue an additional 120,000 stock options under the 2018 Plan at the Board meeting immediately following the Annual Meeting in connection with the election of seven non-employee directors, including one new Board member.

#### **Required Vote**

Assuming a quorum is present, to be approved, the affirmative vote of the majority of the votes cast on Proposal No. 4 must be voted “FOR” approval of the Amendment. Abstentions and 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 THE ASSEMBLY BIOSCIENCES, INC. AMENDED AND RESTATED 2018 EMPLOYEE STOCK PURCHASE PLAN**

### **Background**

On May 30, 2018, we adopted the Assembly Biosciences, Inc. 2018 Employee Stock Purchase Plan (the ESPP). As of March 23, 2021, there were 232,355 shares reserved for issuance under the ESPP. On March 18, 2021, the Board, upon the recommendation of the Compensation Committee and subject to the approval of our stockholders at the Annual Meeting, approved the Assembly Biosciences, Inc. Amended and Restated 2018 Employee Purchase Plan (the Amended ESPP) to increase the number of shares reserved under the ESPP from 400,000 to 1,300,000 and to increase the maximum number of shares of common stock that may be issued to any employee under the ESPP from 1,000 to 2,500 per offering period or such lesser number of shares as determined by the Administrator of the Amended ESPP from time to time. Based solely on the closing price of our common stock reported on The Nasdaq Global Select Market on March 23, 2021, the maximum aggregate market value of the 1,132,335 shares of common stock that could potentially be issued under the Amended ESPP is approximately \$5,038,891.

### **Purpose**

We believe that the adoption of the Amended ESPP will benefit us by providing employees with an expanded opportunity to acquire shares of our common stock as compared to the current terms of the ESPP. The Amended ESPP would provide employees with the opportunity to acquire a larger stake in the Company's growth, and will enable us to attract, retain and motivate valued employees.

### **Material Terms of the Amended ESPP**

The following is a brief summary of certain provisions of the Amended ESPP. A copy of the full Amended ESPP, with proposed deletions indicated by strike-out and proposed revisions to be made in the Amended ESPP indicated by bold and underline, is attached as Appendix C to this proxy statement and is incorporated herein by reference. The following description of the Amended ESPP does not purport to be complete and is qualified in its entirety by reference to Appendix C. It is our intention that the Amended ESPP qualify as an "employee stock purchase plan" under Section 423 of the Code.

*Shares Subject to the Plan.* An aggregate of 1,300,000 shares, including shares that have been issued under the ESPP as of March 23, 2021, will be reserved and available for issuance under the Amended ESPP. If our capital structure changes because of a stock dividend, stock split or similar event, the number of shares that can be issued under the Amended ESPP will be appropriately adjusted.

*Plan Administration.* The Amended ESPP will be administered by the Compensation Committee, which will have full authority to make, administer and interpret such rules and regulations regarding the Amended ESPP as it deems advisable.

*Eligibility.* All individuals classified as employees on the payroll records of the Company or its designated subsidiaries are eligible to participate in the Amended ESPP so long as the employee has been employed for at least 30 days on the first day of the applicable offering period. No person who owns or holds, or as a result of participation in the Amended ESPP would own or hold, common stock or options to purchase common stock, that together equal to 5% or more of total outstanding common stock is entitled to participate in the Amended ESPP. No employee may exercise an option granted under the Amended ESPP that permits the employee to purchase common stock having a value of more than \$25,000 (determined using the fair market value of the stock at the time such option is granted) in any calendar year.

*Participation; Payroll Deductions.* Participation in the Amended ESPP is limited to eligible employees who authorize payroll deductions equal to a whole percentage of base pay to be applied to the Amended ESPP. Employees may authorize payroll deductions, with a minimum of 1% of base pay and a maximum of 15% of base pay. As of March 23, 2021, there are approximately 89 employees who will be eligible to participate in the Amended ESPP. Once an employee becomes a participant in the Amended ESPP, that employee will automatically participate in successive offering periods, as described below, until such time as that employee withdraws from the Amended ESPP, becomes ineligible to participate in the Amended ESPP, or his or her employment ceases.



*Offering Periods.* Unless otherwise determined by the Administrator of the Amended ESPP, each offering of common stock under the Amended ESPP will be for a period of six months, which we refer to as an “offering period.” The current offering period under the ESPP ends on May 14, 2021. Subsequent offerings under the Amended ESPP will generally begin on the first business day occurring on or after each November 15 and May 15 and will end on the last business day occurring on or before the following May 14 and November 14, respectively. Shares are purchased on the last business day of each offering period, with that day being referred to as an “exercise date.” The Administrator of the Amended ESPP may establish different offering periods or exercise dates under the Amended ESPP.

*Exercise Price.* On the first day of an offering period, employees participating in that offering period will receive an option to purchase shares of our common stock. On the exercise date of each offering period, the employee is deemed to have exercised the option, at the exercise price, to the extent of accumulated payroll deductions. The option exercise price is equal to the lesser of (1) 85% the fair market value per share of our common stock on the first day of the offering period or (2) 85% of the fair market value per share of our common stock on the exercise date. The maximum number of shares of common stock that may be issued to any employee under the Amended ESPP in any offering period is 2,500 or such other lesser number of shares as determined by the Administrator of the Amended ESPP from time to time.

Subject to certain limitations, the number of shares of our common stock a participant purchases in each offering period is determined by dividing the total amount of payroll deductions withheld from the participant’s compensation during the offering period by the option exercise price. In general, if an employee is no longer a participant on an exercise date, the employee’s option will be automatically terminated, and the amount of the employee’s accumulated payroll deductions will be refunded.

*Terms of Participation.* Except as may be permitted by the Administrator of the Amended ESPP in advance of an offering, a participant may not increase or decrease the amount of his or her payroll deductions during any offering period but may increase or decrease his or her payroll deduction with respect to the next offering period by filing a new enrollment form within the period beginning 15 business days before the first day of such offering period and ending on the day prior to the first day of such offering period. A participant may withdraw from an offering period at any time without affecting his or her eligibility to participate in future offering periods. If a participant withdraws from an offering period, that participant may not again participate in the same offering period, but may enroll in subsequent offering periods. An employee’s withdrawal will be effective as of the business day following the employee’s delivery of written notice of withdrawal under the Amended ESPP.

*Term; Amendments and Termination.* The Amended ESPP will continue until terminated by the Board. The Board may, in its discretion, at any time, terminate or amend the Amended ESPP. Upon termination of the Amended ESPP, all amounts in the accounts of participating employees will be refunded.

## **New Plan Benefits**

Because participation in the Amended ESPP is voluntary, the benefits or amounts that will be received by or allocated to any individual or group of individuals under the Amended ESPP in the future are not determinable.

## **Summary of Federal Income Tax Consequences**

The following is only a summary of the effect of the U.S. income tax laws and regulations upon an employee and us with respect to an employee’s participation in the Amended ESPP. This summary does not purport to be a complete description of all federal tax implications of participation in the Amended ESPP, nor does it discuss the income tax laws of any municipality, state or foreign country in which a participant may reside or otherwise be subject to tax.

A participant in the Amended ESPP recognizes no taxable income either as a result of participation in the Amended ESPP or upon exercise of an option to purchase shares of our common stock under the terms of the Amended ESPP.

If a participant disposes of shares purchased upon exercise of an option granted under the Amended ESPP within two years from the first day of the applicable offering period or within one year from the exercise date, which we refer to as a “disqualifying disposition,” the participant will realize ordinary income in the year of that disposition equal to the amount by which the fair market value of the shares on the date the shares were purchased exceeds the

purchase price. The amount of ordinary income will be added to the participant's basis in the shares, and any additional gain or resulting loss recognized on the disposition of the shares will be a capital gain or loss. A capital gain or loss will be long-term if the participant's holding period is more than 12 months, or short-term if the participant's holding period is 12 months or less.

If the participant disposes of shares purchased upon exercise of an option granted under the Amended ESPP at least two years after the first day of the applicable offering period and at least one year after the exercise date, the participant will realize ordinary income in the year of disposition equal to the lesser of (1) 15% of the fair market value of the common stock on the first day of the offering period in which the shares were purchased and (2) the excess of the amount actually received for the common stock over the amount paid. The amount of any ordinary income will be added to the participant's basis in the shares, and any additional gain recognized upon the disposition after that basis adjustment will be a long-term capital gain. If the fair market value of the shares on the date of disposition is less than the exercise price, there will be no ordinary income and any loss recognized will be a long-term capital loss.

We are generally entitled to a tax deduction in the year of a disqualifying disposition equal to the amount of ordinary income recognized by the participant as a result of that disposition. In all other cases, we are not allowed a deduction.

### **Vote Required**

Assuming a quorum is present, to be approved, the affirmative vote of the majority of the votes cast on Proposal No. 5 must be voted "FOR" the approval of the Amended ESPP. Abstentions and broker non-votes will not be considered towards vote totals on Proposal No. 5.

### **Recommendation of the Board of Directors**

**THE BOARD OF DIRECTORS RECOMMENDS A VOTE "FOR" THE APPROVAL OF THE ASSEMBLY BIOSCIENCES, INC. AMENDED AND RESTATED 2018 EMPLOYEE STOCK PURCHASE PLAN.**

## EXECUTIVE OFFICERS

As of March 23, 2021, 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; Jason A. Okazaki, our Chief Legal and Business Officer; Luisa M. Stamm, M.D., Ph.D., our Chief Medical Officer; and William E. Delaney IV, Ph.D, our Chief Scientific Officer. Information regarding each of Mr. Russo, Mr. Okazaki, Dr. Stamm and Dr. Delaney is below. For information on Dr. McHutchison, see “Proposal No. 1—Election of Directors—Nominees for Director.”

Name	Age	Business Experience
Thomas J. Russo, CFA	49	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.
Jason A. Okazaki	45	Mr. Okazaki has served as our Chief Legal and Business Officer since March 2020. Prior to joining us, Mr. Okazaki served in a series of positions of increasing responsibility in Gilead’s legal department from 2006 until 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.
Luisa M. Stamm, M.D., Ph.D.	45	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 Gilead’s clinical research group July 2013 until 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.
William E. Delaney IV, Ph.D.	49	Dr. Delaney has served as our Chief Scientific Officer since May 2020. Prior to joining us, Dr. Delaney served in a series of positions of increasing responsibility in Gilead’s clinical virology and biology research groups from 2000 until May 2020, culminating in his role as Executive Director, Biology. Prior to joining Gilead, Dr. Delaney was a research and molecular development fellow at Victorian Infectious Diseases Reference Laboratory from 1999 until 2000. Dr. Delaney received a B.S. in Biotechnology from the University of Delaware and a Ph.D. in Cell and Molecular Biology from Penn State University, College of Medicine.

## EXECUTIVE COMPENSATION

### Compensation Discussion and Analysis

The purpose of this Compensation Discussion and Analysis is to provide our stockholders with a robust explanation of the material elements of 2020 compensation paid to our named executive officers (NEOs), including an outline how we determine executive compensation, the elements of compensation, and why we use these elements in our compensation programs. Our NEOs for the fiscal year ended December 31, 2020 are:

Name	Roles During 2020
John G. McHutchison, A.O., M.D.	Chief Executive Officer and President
Thomas J. Russo, CFA	Chief Financial Officer
Jason A. Okazaki <sup>(1)</sup>	Chief Legal and Business Officer
William E. Delaney IV, Ph.D. <sup>(2)</sup>	Chief Scientific Officer, Virology
Jacqueline S. Papkoff, Ph.D. <sup>(3)</sup>	Senior Vice President, Chief Scientific Officer, Microbiome

(1) Mr. Okazaki's employment commenced on March 26, 2020.

(2) Dr. Delaney's employment commenced on May 27, 2020.

(3) Dr. Papkoff's employment was terminated on January 31, 2021 in connection with the wind-down of our Microbiome program.

### *Executive Summary*

#### **COVID-19 Pandemic**

The COVID-19 pandemic created significant uncertainty with respect to how the company would protect the health and welfare of its employees while also continuing to achieve 2020 goals and reach performance targets that were set prior to the pandemic. Management and the Compensation Committee determined that the annual performance goals may be more challenging to attain than anticipated due to circumstances outside of our control, yet nevertheless elected not to adjust the original goals. Instead, management took a "wait and see" approach and identified creative solutions to the challenges presented by the pandemic both to achieve the organization's goals and to remain aligned with our stockholders' interests. Our Company-wide performance remained high despite challenges faced in 2020, resulting in no COVID-19-related compensation adjustments. In addition, we were able to successfully attract, incentivize and retain critical talent despite the pandemic.

#### **Update on Leadership Transition**

In late 2019, we transitioned leadership from our remaining founders to an executive team led by Dr. McHutchison as Chief Executive Officer and President; Mr. Russo as Chief Financial Officer; and Luisa M. Stamm, M.D., Ph.D. as Chief Medical Officer. As part of that transition, we moved our corporate headquarters to South San Francisco, California and began the process of closing our prior headquarters in Carmel, Indiana. As a result of this move, all remaining functions based in Indiana, including our Legal and Corporate Development functions, relocated to South San Francisco in early 2020.

#### **New Chief Legal and Business Officer**

In March 2020, Mr. Okazaki joined as Chief Legal and Business Officer to lead both our Legal and Corporate Development organizations. Mr. Okazaki joined us from Gilead, where he spent 14 years in a series of positions of increasing responsibility in Gilead's legal department, including Senior Vice President, Legal, and Assistant Secretary. In that role, he led Gilead's corporate legal function, advising on corporate governance and SEC compliance matters, as well as the Asia and Latin America legal organizations. In addition, Mr. Okazaki was a critical part of Gilead's strategic transactions between 2006 and 2020, including mergers and acquisitions, collaboration agreements and licensing transactions.

As a result of Mr. Okazaki's deep knowledge of the biotechnology industry and long tenure at Gilead, as well as his extensive experience both leading large legal organizations and negotiating and executing on corporate development

transactions, our Board believed that Mr. Okazaki was capable of elevating both our Legal and Corporate Development teams and would be a key addition to the leadership team. In particular, as our core inhibitors moved into later stage clinical development for the treatment of HBV, the Board believed that he would be able to advance and execute on research, clinical trial and commercial collaborations to accelerate our clinical development programs. Mr. Okazaki's impact was immediate, as he was instrumental to our successful execution of three separate collaboration agreements in 2020: (1) regional collaboration in China, including Hong Kong, Macau and Taiwan with BeiGene, Ltd (BeiGene), which provided us with \$40 million of nondilutive financing and expanded our commercial reach upon regulatory approval of our core inhibitor product candidates; (2) research collaboration with Door Pharmaceuticals, LLC (Door) to expand our early-stage pipeline with Door's core protein disruptor discovery efforts; and (3) clinical trial collaboration with Arbutus Biopharma Corporation (Arbutus) to evaluate vebicorvir (VBR) in triple combination studies with nucleos(t)ide analog reverse transcriptase inhibitors (NrtIs) and Arbutus's proprietary GalNAc delivered RNAi compound, AB-729.

#### New Chief Scientific Officer, Virology

In May 2020, Dr. Delaney joined as Chief Scientific Officer, Virology, to replace Richard Colonno, Ph.D., following Dr. Colonno's decision to retire from his executive role as Executive Vice President and Chief Scientific Officer, Virology and to scale back his responsibilities and serve as a part-time employee in an advisory role. Dr. Delaney also joined us from Gilead, where he served in a series of positions of increasing responsibility in Gilead's clinical virology, biology and discovery research groups since 2000, including Executive Director, Biology and head of Gilead's HBV & Herpes Discovery Biology group, leading a team of 34 biologists working on HBV, hepatitis D virus (HDV) and herpes virus. During his time at Gilead, Dr. Delaney worked on Investigational New Drug (IND) applications, new drug applications (NDAs) or post-market support for three HBV drugs and four hepatitis C virus (HCV) drugs or products.

Our Board believed that Dr. Delaney's extensive experience and track record leading scientific discovery groups, particularly his experience with HBV, HCV and HDV, made him ideally suited to lead our virology research and development team.

For more information regarding 2020 compensation paid to Mr. Okazaki and Dr. Delaney, see "Elements of Executive Compensation—Compensation Terms of New NEOs and One-Time Compensation Elements Related to Leadership Changes."

### ***2020 Accomplishments***

#### Senior Leadership Team

- Completed leadership transition with appointments of Mr. Okazaki; Dr. Delaney; Carl H. Enell as SVP, Corporate Development; and Nicole S. White, Ph.D., as SVP, Pharmaceutical Development and Manufacturing.

#### HBV Program

- Determined stopping criteria for transition of subjects off therapy in our open-label extension study that was the first of its kind, ABI-H0731-211 (Study 211), after discussions with lead investigators and review and agreement with the U.S. Food and Drug Administration (FDA).
- Reported additional interim analyses from Study 211 at the European Association for the Study of the Liver's (EASL) Digital International Liver Congress™ in an oral presentation (HBeAg negative subjects) and late-breaker poster presentation (HBeAg positive subjects).
- Transitioned Study 211 subjects who achieved the agreed-upon stopping criteria off therapy and monitored these subjects for sustained virology response (SVR).
  - Patients who stopped therapy in Study 211 did not achieve meaningful SVR rates as 39 of 41 patients had relapsed as of November 5, 2020.

- Completed an End-of-Phase 2 Meeting with National Medical Products Administration, Center for Drug Evaluation, China, in July 2020 with agreement on Phase 3 registrational program for chronic suppressive therapy (CST).
- Initiated a clinical study, ABI-0731-205, evaluating treatment intensification with VBR in patients with chronic HBV infection who are only partially virologically suppressed on NrtI therapy alone after at least a year of treatment to support a registrational program for CST.
- Delivered four presentations at the American Association for the Study of Liver Diseases (AASLD) Annual Meeting (The Liver Meeting®).
- Completed and reported detailed data on the final dose-ranging cohorts of the Phase 1b portion of the Phase 1a/1b clinical study of ABI-H2158 (2158) at EASL 2020 in a late-breaker poster presentation.
- Initiated a Phase 2 clinical study using the 300 mg dose of 2158.
- Received Fast Track Designation from the U.S. Food and Drug Administration for 2158.
- Completed Phase 1a trial of ABI-H3733 (3733) in healthy subjects.

#### Microbiome Program

- Presented preclinical data from our immune-oncology microbiome program for presentation as an e-poster at the American Association for Cancer Research 2020 Virtual Annual Meeting II
- Advanced research programs for immune-mediated and oncology indications
- Conducted a robust process to identify strategic alternatives to continue development of the Microbiome programs following the return of rights to such programs from Allergan Pharmaceuticals International Limited (Allergan) upon termination of the Research, Development, Collaboration and License Agreement (Allergan Agreement)
  - Began wind-down of Microbiome program to focus our resources and efforts on our HBV programs.

#### Corporate Development and Alliances

- Entered into a collaboration agreement with BeiGene to develop, manufacture and commercialize VBR, 2158 and 3733 in the People's Republic of China, Hong Kong, Taiwan and Macau.
- Entered into a clinical trial collaboration agreement with Arbutus to evaluate VBR in combination with AB-729 and NrtI therapy for the treatment of patients with chronic HBV infection.
- Entered into collaboration and option agreement with Door, focused on the development of a novel class of cccDNA disruptors that complement our current portfolio.

#### Fundraising and Operational Excellence

- Registered \$300 million of securities using a “shelf” registration statement, including a \$100 million sublimit of common stock to be issued through a series of “at-the-market” (ATM) offerings.
- Increased headcount by hiring over 50 new employees to support, extend and grow our clinical and preclinical pipeline product candidates.
- Continued improving corporate culture through the enhancement of corporate communication and improvement of Company alignment through regularly scheduled Company-wide townhalls and other team events and initiatives.
- Reduced employee turnover to below average market rates

## *Say-on-Pay Vote*

At our 2020 annual meeting of stockholders, over 99% of the shares voted by our stockholders were “FOR” the approval of the compensation paid to our then-NEOs in 2019. 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 Best Practices*

Our Compensation Philosophy is, “Provide Competitive Overall Compensation That Attracts, Retains and Motivates Superior Performers.” In addition to striving to adhere to this philosophy, we have instituted the following executive compensation best practices:

<u>What We Do</u>	<u>What We Don’t Do</u>
<input checked="" type="checkbox"/> Conduct an annual “Say-on-Pay” vote	<input checked="" type="checkbox"/> No guaranteed performance-based cash 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 pension, deferred compensation or 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 or pledging of our stock
<input checked="" type="checkbox"/> Use an independent compensation consultant	<input checked="" type="checkbox"/> No significant perquisites provided to our NEOs
<input checked="" type="checkbox"/> Double-trigger severance and equity acceleration rights	<input checked="" type="checkbox"/> No stock option repricing without stockholder pre-approval

## *How We Determine Executive Compensation*

### *Overview*

The Compensation Committee believes that executive compensation should be designed to promote both our short-term and long-term goals, because pharmaceutical research and development require sustained and focused effort over many years. Accordingly, it is important that the Committee’s executive compensation program both motivate our executives to meet short- and long-term goals and 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 measured over a 12-month period, and (2) the opportunity to share in our long-term success through equity compensation, including, in certain circumstances, performance-based equity awards;
- **Attract and Retain Superior Performers:** We provide market-competitive base salary, performance-based cash bonus opportunities, long-term equity awards and other compensation components and benefits 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 employees. To deliver equitable pay for our NEOs, the Compensation Committee considers each NEO’s title, role, breadth and complexity of responsibility, criticality of the role to the organization, experience, qualifications and performance, in both an individual and team context.

### *At-Risk and Long-Term Pay*

To implement our 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 bonuses 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, building upon 2019, 2020 was likewise a transition year for our senior leadership, with Mr. Okazaki and Dr. Delaney joining the team. As a result, most of the compensation paid to our newly hired NEOs—82% and 83% for Mr. Okazaki and Dr. Delaney, respectively—consisted of “at-risk,” long-term equity awards that served the dual purposes of both aligning our newly hired NEOs interests with those of our stockholders and serving as “make whole” compensation to replace equity compensation from their prior employers that was forfeited when they joined us in 2020.

### ***Role of the Compensation Committee; Oversight of Executive Compensation***

The Compensation Committee supervises the implementation of our compensation philosophy. 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 the 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 for the Compensation Committee, with the support of management and Radford, a part of the Rewards Solutions practice of Aon plc and the Compensation Committee’s independent outside compensation consultant (Compensation Consultant), to review trends in biotechnology compensation practices and to recommend the list of peer companies to be used in this compensation review process. The peer group determination process is detailed below in “—Peer Group Process.”

Our CEO, Chief Legal and Business Officer 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 Compensation Committee’s executive sessions unless invited by the Compensation Committee to provide specific information during these closed sessions. The CEO is not present for any discussion of, 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 2020 compensation cycle, the Compensation Consultant analyzed 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, 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 2020. In making this assessment, the Compensation Committee considered the independence factors enumerated in Rule 10C-1(b) under the Exchange Act, including the following factors: (1) 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 neither own any of our stock nor 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 2020, 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 September 2019, with assistance from the Compensation Consultant and management, the Compensation Committee re-evaluated the peer group used for 2019 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, based upon our then-current headcount; and
- 0.3 to 3.0x our market capitalization, with market capitalizations generally between \$100 million and \$1.0 billion, based upon our then-current market capitalization of approximately \$300 million.

Due to the above criteria, a number of companies were either added to or removed from the peer group during the 2020 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 2020 Peer Group) set forth below and used the 2020 Peer Group as one of multiple datapoints used in determining 2020 compensation.

Achillion Pharmaceuticals, Inc.	Dicerna Pharmaceuticals, Inc.	REGENXBIO Inc.
Aimunne Therapeutics, Inc.	Editas Medicine, Inc.	Rhythm Pharmaceuticals, Inc.*
Calithera Biosciences, Inc.*	Epizyme, Inc.	Sangamo Therapeutics, Inc.
ChemoCentryx, Inc.*	Five Prime Therapeutics, Inc.	Seres Therapeutics, Inc.
Chimerix, Inc.*	Inovio Pharmaceuticals, Inc.*	Spero Therapeutics, Inc.*
Concert Pharmaceuticals, Inc.*	Principia Biopharma Inc.*	Syros Pharmaceuticals*
CymaBay Therapeutics, Inc.	Protagonist Therapeutics, Inc.*	Wave Live Sciences
CytomX Therapeutics, Inc.	Prothena Corporation plc*	

\* Added to 2020 Peer Group.

Arbutus Biopharma Corporation, Arrowhead Pharmaceuticals, Inc., Audentes Therapeutics, Inc., Bellicum Pharmaceuticals, Inc., Enanta Pharmaceuticals, Inc., Iovance Biotherapeutics, Inc., Mirati Therapeutics, Inc., MyoKardia, Inc., Selecta Biosciences, Inc. and Zogenix, Inc. were each members of our 2019 Peer Group, but were removed from the 2020 Peer Group either due to the new size parameters or acquisition.

As of September 2019, when the Compensation Consultant completed its work developing recommendations for the 2020 Peer Group, the 50<sup>th</sup> percentile of market capitalization and headcount of the 2020 Peer Group were \$411.2 million and 79 employees, respectively. Meanwhile, our market capitalization and headcount were approximately \$299.7 million (based upon a 30-day average market capitalization) and 106 employees, respectively.

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. However, 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 2020 compensation, in part because two of the NEOs 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 2020 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.

### *Elements of Executive Compensation*

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 Mr. Okazaki and Dr. Delaney's 2020 compensation were the result of one-time sign-on bonuses and inducement equity grants as partial "make whole" compensation in connection with the leadership transitions that took place.

The primary components of our compensation packages and the one-time compensation elements received by our newly hired NEOs 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 their job responsibilities. Our NEOs' base salaries are established based on each NEO'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. The NEOs' annualized base salaries for 2019 and 2020, effective as of February 16 of each year or the date of hire of the NEO, as applicable, were as follows:

NEO	2019	2020	Percentage Increase
John G. McHutchison, A.O., M.D. ....	\$ 800,000	\$ 820,000	2.5%
Thomas J. Russo, CFA.....	425,000	430,000	1.2%
Jason A. Okazaki <sup>(1)</sup> .....	—	515,000	—
William E. Delaney IV, Ph.D. <sup>(2)</sup> .....	—	415,000	—
Jacqueline S. Papkoff, Ph.D.....	400,000	420,000	5.0%

(1) Mr. Okazaki became our Chief Legal and Business Officer effective March 26, 2020. For information regarding the prorated amount of this annualized total that Mr. Okazaki received in 2020, see "Summary Compensation Table."

(2) Dr. Delaney became our Chief Scientific Officer, Virology effective May 27, 2020. For information regarding the prorated amount of this annualized total that Dr. Delaney received in 2020, see "Summary Compensation Table."

The Compensation Committee approved modest base salary increases for Dr. McHutchison and Mr. Russo for 2020. In Dr. McHutchison's case, the Compensation Committee approved a 2.5% base salary increase based on a number of different factors, including, among other accomplishments, building a high caliber leadership team and

completing a follow-on securities offering in December 2019 that resulted in \$134.7 million in net proceeds being raised to support our continuing development efforts.

In Mr. Russo’s case, the Compensation Committee approved a 1.2% base salary increase based on a number of different factors, including, among other accomplishments, his efforts in connection with our successful December 2019 follow-on securities offering.

In Dr. Papkoff’s case, the Compensation Committee approved a base salary increase of 5.0%. This increase was based on her performance and the Compensation Consultant’s analysis of Dr. Papkoff’s base salary in relation to similarly situated executive officers at peer companies.

### ***Annual Performance-Based Cash Bonus***

Our NEOs are eligible to earn annual performance-based cash bonuses to reward strong performance and encourage retention in a competitive labor market. These bonuses are intended to motivate and reward our NEOs for achieving or exceeding our shorter-term corporate goals, which are designed to be measured over a calendar year. 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. None of the NEOs’ target bonus percentages, which are set forth in the table below, were changed between 2019 and 2020.

Annual performance-based cash bonuses are earned based on the achievement of significant pre-set, objective Company-wide goals, with specific goals tailored to the NEOs’ areas of responsibility. These performance goals are pre-set by our Compensation Committee in the first quarter of the applicable calendar year and approved by the Board. Actual bonus amounts earned are determined in the first quarter of the following year based on achievement of the pre-set Company-wide and individual performance goals. 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 that executive’s individual performance during a given year. For 2020, annual bonuses were based on achievement of goals related to development of our HBV and Microbiome programs, including research and development, financial operations and corporate development goals. Our 2020 corporate objectives, relative weighting and results were as follows:

<b>2020 Corporate Objectives</b>			<b>Weight</b>	<b>Status</b>
HBV	VBR	Finalize partnership for Phase 3 CST trial in China*	30%	Complete
		Complete necessary development and regulatory actions to initiate Phase 3 trials in both the United States and China*		Complete
	Next Generation Core Inhibitors	Complete 2158 Phase 1b anti-viral trial	25%	Complete
		Initiate a 2158 U.S. Phase 2 trial		Complete
		Complete 3733 Phase 1a trial		Complete
Third Mechanism of Action	Nominate fourth-generation development candidates		Partially Complete	
		Initiate Phase 2 proof-of-concept trial for third mechanism of action in combination with VBR or 2158	10%	Complete
Microbiome	M201	Complete Cohort A of ulcerative colitis study and analyze interim data readout	25%	**
	Other programs	Advance research programs for immune-mediated and oncology indications; identify external partner		**
	Alternatives	Ensure that the necessary processes are in place to implement alternative strategies		Complete
Corporate	Finance	Ensure adequate funding runway at all times	5%	Complete
		Formulate Plan for HBV Phase 3 funding*		Complete
	Management	Attract and retain key personnel	5%	Complete
		Approve senior management succession plan		Complete
		Reduce regrettable turnover to 5% or less		Complete

- \* These objectives were created and achieved prior to our February 2021 strategic decision to forego Phase 3 CST trials.
- \*\* Not completed due to December 2020 decision to wind-down Microbiome program.

#### Significant 2020 Accomplishments Beyond Board-Approved Corporate Goals

In addition to the foregoing, we had numerous critical accomplishments in 2020 beyond our Board approved corporate objectives related to further development of our core inhibitor candidates in our HBV program, expansion of our product candidate pipeline, streamlining our operations and prioritizing and focusing our resources towards advancing our HBV program, including:

- Planned a second Phase 2 proof-of-concept trial to include a third mechanism of action in connection with VBR;
- Initiated Phase 2 study of VBR in patients with partial virologic suppression to support a registrational program for CST prior to February 2021 strategic decision to forego Phase 3 CST trials;
- Identified third-party pregenomic RNA assay widely usable in determining partial virologic suppression;
- Entered into a collaboration to support discovery of novel core inhibitors;
- Established a world-class Scientific Advisory Board;
- Maintained a high level of productivity despite ongoing COVID-19 restrictions;
- Streamlined China operations; and
- Began the wind-down of the Microbiome program to focus our resources on our HBV programs.

After receiving and considering management's analysis and recommendations, the Compensation Committee determined that the percentage achievement of the 2020 Company-wide performance goals was 100%. This determination of target achievement for our 2020 corporate objectives as a whole was supported by the significant number and criticality of achievements beyond our stated 2020 corporate objectives, which far exceeded the small number of pre-set goals that were not timely achieved.

In determining individual performance-based cash bonus payouts, the NEOs' potential performance-based cash bonus were weighted differently, depending on their respective areas of responsibility and contributions to our Company-wide goals and, in the case of Mr. Okazaki and Dr. Delaney, were prorated based upon their start dates.

Dr. McHutchison's performance-based cash bonus was based exclusively on achievement of the Company-wide goals, which we outlined above. Our other NEOs' performance-based cash bonuses were 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 in connection with the formulation of a plan to fund our Phase 3 HBV development; leadership of our investor relations function, particularly given delays of both EASL and AASLD and our disappointing Study 211 results; and successful deployment of our ATM program to extend our cash runway. Mr. Okazaki's individual performance was evaluated based on his efforts in connection with the negotiation and execution of three separate collaboration agreements to support research, clinical development and commercialization, including the China collaboration, which resulted in \$40 million of nondilutive financing for the Company. Dr. Delaney's individual performance was evaluated based on his efforts in connection with restructuring, building out and expanding the capacity of our research and development organization.

Dr. Papkoff did not earn a performance-based cash bonus in 2020. Following AbbVie, Inc.'s decision to terminate the Allergan Agreement following its acquisition of Allergan, we initiated an extensive strategic process for our Microbiome program; however, ultimately management and the Board decided to wind down the program to focus on advancing our pipeline of novel core inhibitor product candidates for chronic HBV. In connection with the commencement of this strategic process, the Compensation Committee converted Dr. Papkoff's performance-based cash bonus opportunity into a retention bonus payable in 2021 upon the consummation of a strategic transaction,

including the winding down of the Microbiome program resulting in the termination of her employment, which occurred on January 31, 2021.

The following table sets forth our NEOs' 2020 target performance-based cash bonus amounts and actual performance-based cash bonuses earned.

NEO	2020 Target Bonus		2020 Actual Bonus	
	Percentage of Base Salary	Amount	Amount	Percentage of Target Bonus
John G. McHutchison, A.O., M.D. ....	75%	\$ 615,000	\$ 615,000	100%
Thomas J. Russo, CFA .....	40%	172,000	172,000	100%
Jason A. Okazaki <sup>(1)</sup> .....	50%	204,000	209,100	103%
William E. Delaney IV, Ph.D. <sup>(2)</sup> .....	40%	104,000	104,000	100%
Jacqueline S. Papkoff, Ph.D. <sup>(3)</sup> .....	—	—	—	—

- (1) Mr. Okazaki became our Chief Legal and Business Officer on March 26, 2020, and his target bonus was prorated accordingly.
- (2) Dr. Delaney became our Chief Scientific Officer, Virology on May 27, 2020, and his target bonus was prorated accordingly.
- (3) As described above, Dr. Papkoff's performance-based cash bonus opportunity was converted into a retention bonus earned and payable in 2021 upon the completion of the wind-down of our Microbiome program.

### ***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 them and motivate them to create long-term value. We believe that participation by our employees, including our NEOs, in the long-term equity incentive program is a critical factor in the achievement of long-term Company-wide 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. In 2020, our annual grants consisted of a mix of stock options and time-based RSUs, which is a common practice among the companies in our 2020 Peer Group. 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.

Our Compensation Committee has previously discussed incorporating performance elements to our long-term equity incentive program, however, based on discussions with the Compensation Consultant and the practices of our peer companies, the Compensation Committee decided that it is premature to include performance elements. We are a research and clinical stage biotechnology company that does not yet generate product revenues and, given our size, scope and the volatility of stock prices in our industry, the Compensation Committee believes that performance elements may not accurately reflect or reward our employees' performance, including that of our NEOs. The Compensation Committee believes that the structure of our current long-term equity incentive program best aligns the interests of both our management and stockholders.

Awards to our executive officers, other than those to 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, 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 2020, our Compensation Committee approved the annual grants to our NEOs summarized in the table below.

NEO	Options to Purchase Common Stock		Restricted Stock Units	
	Number of Shares	Grant Date Fair Value <sup>(1)</sup>	Number of Shares	Grant Date Fair Value <sup>(1)</sup>
John G. McHutchison, A.O., M.D. ....	100,000	\$ 1,028,163	50,000	\$ 722,500
Thomas J. Russo, CFA <sup>(2)</sup> .....	—	—	—	—
Jason A. Okazaki <sup>(2)</sup> .....	—	—	—	—
William E. Delaney IV, Ph.D. <sup>(2)</sup> .....	—	—	—	—
Jacqueline S. Papkoff, Ph.D. ....	34,000	319,280	17,000	245,650

- (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 8 of the consolidated financial statements included in the Annual Report on Form 10-K for the year ended December 31, 2020.
- (2) Mr. Russo did not receive a 2020 annual equity grant because he joined us after September 30, 2019, making him ineligible to receive such awards. Mr. Okazaki and Dr. Delaney joined us in March and May 2020, respectively. As such, they did not receive 2020 annual equity grants.

### **Other Compensation**

In 2020, 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.

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

As our core inhibitor product candidates advance through clinical development, our company is in a critical phase of our growth and maturation. Having found candidates of Mr. Okazaki and Dr. Delaney’s caliber to join our executive leadership team during this phase of our Company’s development, the Compensation Committee, with the assistance of the Compensation Consultant, developed compensation packages that considered pay structures for executives with similar responsibilities at peer companies and included meaningful time-based equity awards to incentivize Mr. Okazaki and Dr. Delaney to remain with the Company for a significant period of time.

In connection with Mr. Okazaki joining us as our Chief Legal and Business Officer in March 2020 and Dr. Delaney joining us as our Chief Scientific Officer, Virology in May 2020, each were offered a total compensation package that included a base salary and target annual performance-based cash bonus, a cash sign-on bonus and inducement equity grants consisting of stock options and RSUs.

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 at their former employer, 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 determining Mr. Okazaki’s and Dr. Delaney’s compensation packages.

The table below summarizes our newly hired NEOs’ base salaries, target annual performance-based cash bonuses as a percentage of base salary, cash sign-on bonuses and inducement equity grants of stock options and RSUs.

Name	Annual Compensation Structure		One-Time New Hire and “Make Whole” Payments	
	Base Salary	Annual Bonus Target	Equity Grants	Cash Sign-on Bonus
Jason A. Okazaki .....	\$ 515,000	50%	\$ 3,201,745	\$ 100,000
William E. Delaney IV, Ph.D. ....	415,000	40%	2,248,149	100,000

In Mr. Okazaki’s case, we gave significant weight to his dual role as Chief Legal and Business Officer, as he would be leading both our legal and corporate development functions—two critical departments for precommercial

biotechnology companies that have not, to date, generated revenues from product sales. In addition, because of his deep knowledge of the biotechnology industry and his extensive experience both leading complex legal organizations and negotiating multinational corporate development transactions, the Board believed that Mr. Okazaki would be an ideal addition to the leadership team, particularly given our size and the disproportionate impact that significant collaborations can have for companies like ours. Since he joined in March 2020, Mr. Okazaki has made a significant impact on the organization, having been instrumental in putting us in a position to raise up to \$300 million in the capital markets (including a \$100 million ATM sublimit) as well as successfully executing on three significant collaboration agreements, which bolster our research, clinical trial and commercial capabilities. On top of his extensive prior experience, significant achievements and broad skillset, we focused on his criticality to his role, his dual C-level responsibilities, 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 Dr. Delaney’s case, we gave significant weight to his extensive experience and track record leading scientific clinical virology, biology and discovery research groups, particularly his extensive experience working with, and developing therapeutics for, HBV. In addition to his prior experience and significant achievements, we focused on the criticality of our research program, 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.

#### Sign-on Bonuses

Mr. Okazaki and Dr. Delaney each received a cash sign-on bonus in connection with joining us. While these sign-on bonuses serve the dual 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 upon certain terminations of employment, their primary purpose is to provide compensation to our new NEOs to compensate for a portion of the compensation that they left behind when they left their prior employers.

Mr. Okazaki and Dr. Delaney each received a cash sign-on bonus of \$100,000. Mr. Okazaki’s sign-on bonus is subject to a declining repayment schedule if Mr. Okazaki’s employment is terminated under certain circumstances within 18 months of his start date depending on his length of service. Dr. Delaney is obligated to repay his sign-on bonus in full if his employment is terminated under certain circumstances at any time within 12 months of his start date.

#### Base Salaries and Performance-Based Cash Bonus Targets

Mr. Okazaki’s initial annual base salary was \$515,000, and his annual performance-based cash incentive bonus is targeted at 50% of his base salary. Dr. Delaney’s initial annual base salary was \$415,000, and his annual performance-based cash incentive bonus was targeted at 40% of his base salary.

#### Inducement Equity Grants

The inducement grants of stock options and RSUs made to Mr. Okazaki and Dr. Delaney in March and May 2020, respectively, are summarized in the table below.

NEO	Options to Purchase Common Stock <sup>(1)</sup>		Restricted Stock Units <sup>(2)</sup>	
	Number of Shares	Grant Date Fair Value <sup>(3)</sup>	Number of Shares	Grant Date Fair Value <sup>(3)</sup>
Jason A. Okazaki .....	250,000	\$ 2,449,245	50,000	\$ 752,500
William E. Delaney IV, Ph.D. ....	100,000	1,324,749	45,000	923,400

- (1) Represents stock option grants 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.
- (2) Represents time-based RSU grants that vest in four approximately equal installments on the first, second, third and fourth anniversaries of Mr. Okazaki and Dr. Delaney’s start dates.
- (3) 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 8 of the consolidated financial statements included in the Annual Report on Form 10-K for the year ended December 31, 2020.

## *Other Executive Compensation Policies*

### ***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 Insider Trading Policy, all persons subject to the policy, including executive officers, directors, employees, consultants and contractors, are prohibited from engaging in the following transactions related to our securities:

- Short sales;
- Publicly traded options, including put options, call options or other derivative securities;
- Hedging and monetization transactions, including through the use of financial instruments such as prepaid variable forwards, equity swaps, collars and exchange funds; and
- Margin accounts and pledged securities.

Our Insider Trading Policy prohibits these types of transactions because there is both a heightened legal risk and the appearance of improper conduct if covered persons take part in transactions of this sort.

### ***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 focus 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 consolidated 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 (Dodd-Frank), 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 of our newly hired senior leadership team members, the Compensation Committee expects to review its position regarding stock ownership guidelines over the next 12 months.



## Compensation Committee Report

The Compensation Committee has reviewed and discussed the Compensation Discussion and Analysis with management. Based on this review and discussion, the Compensation Committee recommended to the Board of Directors that the Compensation Discussion and Analysis be included in this proxy statement.

Submitted by: The Compensation Committee  
Myron Z. Holubiak, Chairman  
Susan Mahony, Ph.D.  
William R. Ringo, Jr.

## Summary Compensation Table

The following table shows the total compensation earned by the NEOs in the last three fiscal years. Other than Dr. Papkoff, none of our NEOs was employed by us in 2018.

Name and Principal Position	Year	Salary (\$) <sup>(1)</sup>	Bonus (\$)	Stock Awards (\$) <sup>(2)</sup>	Option Awards (\$) <sup>(2)</sup>	Non-Equity Incentive Plan Compensation (\$) <sup>(3)</sup>	All Other Compensation (\$) <sup>(4)</sup>	Total (\$)
John G. McHutchison, A.O., M.D. ....	2020	817,500	—	722,500	1,028,163	615,000	11,400	3,194,563
Chief Executive Officer and President....	2019	324,615 <sup>(5)</sup>	300,000 <sup>(6)</sup>	2,079,000	4,033,599	263,000	7,000	7,007,214
Thomas J. Russo, CFA .....	2020	429,375	—	626,884 <sup>(7)</sup>	—	172,000	11,400	1,239,659
Chief Financial Officer .....	2019	77,372 <sup>(8)</sup>	100,000 <sup>(9)</sup>	—	1,922,079	32,000	—	2,131,451
Jason A. Okazaki .....	2020	394,173 <sup>(10)</sup>	100,000 <sup>(11)</sup>	752,500	2,449,245	209,100	—	3,905,018
Chief Legal and Business Officer								
William E. Delaney IV, Ph.D. ....	2020	246,872 <sup>(12)</sup>	100,000 <sup>(13)</sup>	923,400	1,324,749	104,000	—	2,699,021
Chief Scientific Officer, Virology								
Jacqueline S. Papkoff, Ph.D. <sup>(14)</sup> .....	2020	417,500	—	245,650	319,280	— <sup>(15)</sup>	11,400	993,830
Senior Vice President, Chief Scientific Officer, Microbiome.....	2019	395,000	—	270,738	536,510	172,000	12,663	1,386,911
	2018	270,000 <sup>(16)</sup>	—	257,019	3,868,084	104,900	10,200	4,510,203

- (1) These amounts do not match the table under “Elements of Executive Compensation—Base Salary,” because our NEOs’ salary increases come into effect partway into the fiscal year.
- (2) 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 8 of the consolidated financial statements included in the Annual Report on Form 10-K for the year ended December 31, 2020.
- (3) Non-equity incentive plan compensation represents amounts earned as annual performance-based cash bonuses based on the achievement of Company-wide and individual performance goals and other factors deemed relevant by the Compensation Committee for the year indicated. Annual performance-based cash bonuses are paid in the first quarter of the following year. Amounts for Mr. Okazaki and Dr. Delaney in 2020, Dr. McHutchison and Mr. Russo in 2019 and Dr. Papkoff in 2018 reflect proration based on start date.
- (4) “All Other Compensation” represents 401(k) matching contributions made by the Company.
- (5) Reflects proration based on August 6, 2019 start date.
- (6) Represents a cash sign-on bonus paid in connection with Dr. McHutchison’s acceptance of our offer of employment pursuant to the terms of his employment agreement.
- (7) Represents a grant of RSUs received by Mr. Russo in March 2020 as a continuation of his new hire grant in connection with him becoming an employee in October 2019.
- (8) Reflects proration based on October 28, 2019 start date.
- (9) Represents a cash sign-on bonus paid in connection with Mr. Russo’s acceptance of our offer of employment pursuant to the terms of his employment agreement.

- (10) Reflects proration based on March 26, 2020 start date.
- (11) Represents a sign-on bonus paid in connection with Mr. Okazaki'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 Mr. Okazaki's employment is terminated under certain circumstances within 18 months of his start date.
- (12) Reflects proration based on May 27, 2020 start date.
- (13) Represents a sign-on bonus paid in connection with Dr. Delaney's acceptance of our offer of employment pursuant to the terms of his employment agreement. The sign-on bonus is subject to repayment in full if Dr. Delaney's employment is terminated under certain circumstances at any time within 12 months of his start date.
- (14) Dr. Papkoff's employment was terminated effective January 31, 2021, in connection with the wind-down of our Microbiome program.
- (15) Dr. Papkoff's 2020 performance-based cash bonus was converted into a retention bonus payable in 2021 in connection with the commencement of the strategic process for our Microbiome program. See "Elements of Executive Compensation—Annual Performance-Based Cash Bonus."
- (16) Reflects proration based on April 2, 2018 start date.

### **Grants of Plan-Based Awards**

The following table provides information for each of our NEOs regarding 2020 annual and long-term incentive award opportunities. Specifically, the table presents the 2020 grants of annual non-equity incentive awards, stock options and restricted stock unit awards. This table does not include annual grants of stock options made in March 2021.

Name	Plan	Grant Date	Estimated Possible Payouts Under Non-Equity Incentive Plan Awards		All Other Stock Awards: Number of Shares of Stock or Units (#)	All Other Option Awards: Number of Securities Underlying Options (#)	Exercise of Base Price of Option Awards (\$/Sh)	Grant Date Fair Value of Stock and Option Awards (\$) <sup>(2)</sup>
			Target (\$) <sup>(1)</sup>	Maximum (\$) <sup>(1)</sup>				
John G. McHutchison, A.O., M.D.....	2020 Corporate Bonus Plan	—	615,000	922,500	—	—	—	—
	2018 Stock Incentive Plan	3/27/2020 <sup>(3)</sup>	—	—	50,000	—	—	722,500
	2018 Stock Incentive Plan	3/27/2020 <sup>(4)</sup>	—	—	—	100,000	14.45	1,028,163
Thomas J. Russo, CFA ....	2020 Corporate Bonus Plan	—	172,000	258,000	—	—	—	—
	2018 Stock Incentive Plan	3/27/2020 <sup>(2)</sup>	—	—	43,383	—	—	626,884
Jason A. Okazaki .....	2020 Corporate Bonus Plan	—	204,000	306,000	—	—	—	—
	2020 Inducement Award Plan	3/26/2020 <sup>(5)</sup>	—	—	50,000	—	—	752,500
	2020 Inducement Award Plan	3/26/2020 <sup>(6)</sup>	—	—	—	250,000	15.05	2,449,245
William E. Delaney IV, Ph.D.....	2020 Corporate Bonus Plan	—	104,000	156,000	—	—	—	—
	2020 Inducement Award Plan	5/27/2020 <sup>(7)</sup>	—	—	45,000	—	—	923,400
	2020 Inducement Award Plan	5/27/2020 <sup>(8)</sup>	—	—	—	100,000	20.52	1,324,749
Jacqueline S. Papkoff, Ph.D.....	2020 Corporate Bonus Plan	— <sup>(9)</sup>	—	—	—	—	—	—
	2018 Stock Incentive Plan	3/27/2020 <sup>(3)</sup>	—	—	17,000	—	—	245,650
	2018 Stock Incentive Plan	3/27/2020 <sup>(4)</sup>	—	—	—	34,000	14.45	—

- (1) Represents the target award in respect of annual performance-based cash compensation in respect of fiscal year 2020, the amounts of which were earned in fiscal year 2020 and are reported in the Summary Compensation Table as Non-Equity Incentive Compensation for fiscal year 2020. There are no thresholds for these awards. Targets reported for Mr. Okazaki and Dr. Delaney reflect proration based on their start dates.
- (2) 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 8 of the consolidated financial statements included in the Annual Report on Form 10-K for the year ended December 31, 2020.
- (3) These RSUs vest in four approximately equal installments, assuming continuous service on each vesting date, as follows: March 29, 2021; March 29, 2022; March 29, 2023; March 29, 2024.
- (4) These stock options vest over four years, assuming continuous service on each vesting date, as follows: 25% shall vest on the first anniversary of the date of grant, March 29, 2021; and the remaining 75% shall vest in 36 equal monthly installments, with the options becoming fully vested on March 29, 2024.
- (5) These RSUs vest in four equal installments, assuming continuous service on each vesting date, as follows: March 26, 2021; March 26, 2022; March 26, 2023; March 26, 2024.

- (6) These stock options vest over four years, assuming continuous service on each vesting date, as follows: 25% shall vest on the first anniversary of the date of grant, March 26, 2021; and the remaining 75% shall vest in 36 approximately equal monthly installments, with the options becoming fully vested on March 26, 2024.
- (7) These RSUs vest in four approximately equal installments, assuming continuous service on each vesting date, as follows: May 27, 2021; May 27, 2022; May 27, 2023; May 27, 2024.
- (8) These stock options vest over four years, assuming continuous service on each vesting date, as follows: 25% shall vest on the first anniversary of the date of grant, May 27, 2021; and the remaining 75% shall vest in 36 approximately equal monthly installments, with the options becoming fully vested on May 27, 2024.
- (9) Dr. Papkoff's 2020 performance-based cash bonus was converted into a retention bonus payable in 2021 in connection with the commencement of our exploration of strategic alternatives for our Microbiome program. See "Elements of Executive Compensation—Annual Performance-Based Cash Bonus."

### Outstanding Equity Awards at December 31, 2020

The following table contains certain information concerning outstanding equity awards held by the NEOs as of December 31, 2020.

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. ....	222,222	277,778 <sup>(1)</sup>	11.86	08/06/2029	—	—	—	—
	—	100,000 <sup>(2)</sup>	14.45	03/27/2030	—	—	—	—
	—	—	—	—	66,667 <sup>(3)</sup>	403,335	—	—
	—	—	—	—	50,000 <sup>(4)</sup>	302,500	—	—
	—	—	—	—	—	—	100,000 <sup>(5)</sup>	605,000
Thomas J. Russo, CFA ....	53,958	131,042 <sup>(2)</sup>	15.69	10/28/2029	—	—	—	—
	—	—	—	—	43,383 <sup>(4)</sup>	262,467	—	—
Jason A. Okazaki .....	—	250,000 <sup>(2)</sup>	15.05	03/26/2030	—	—	—	—
	—	—	—	—	50,000 <sup>(6)</sup>	302,500	—	—
William E. Delaney IV, Ph.D. ....	—	100,000 <sup>(2)</sup>	20.52	05/27/2030	—	—	—	—
	—	—	—	—	45,000 <sup>(7)</sup>	272,250	—	—
Jacqueline S. Papkoff, Ph.D. ....	70,800	35,400 <sup>(2)</sup>	46.75	04/02/2028	—	—	—	—
	14,166	7,084 <sup>(8)</sup>	24.19	12/12/2028	—	—	—	—
	12,031	15,469 <sup>(2)</sup>	19.69	03/29/2029	—	—	—	—
	8,020	19,480 <sup>(2)</sup>	9.31	10/01/2029	—	—	—	—
	—	34,000 <sup>(2)</sup>	14.45	03/27/2030	—	—	—	—
	—	—	—	—	3,542 <sup>(8)</sup>	21,429	—	—
	—	—	—	—	10,313 <sup>(9)</sup>	62,394	—	—
	—	—	—	—	3,542 <sup>(4)</sup>	21,429	—	—

- (1) These options vest and become exercisable one-third on the first anniversary of the grant date and the remainder over the next 24 months in approximately equal monthly installments, provided the executive officer continues to be employed with us through the applicable vesting date.
- (2) 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 the executive officer continues to be employed with us through the applicable vesting date.
- (3) These RSUs vest in three approximately equal installments on August 6, 2020, August 6, 2021 and August 6, 2022 provided the executive officer continues to be employed with us through the applicable vesting date.

- (4) These RSUs vest in four approximately equal installments on March 29, 2021, March 29, 2022, March 29, 2023 and March 29, 2024, provided the executive officer continues to be employed with us through the applicable vesting date.
- (5) Reflects performance-based RSUs granted on September 28, 2019 that vest only upon the occurrence of certain milestones related to our HBV program and our Microbiome program and if certain market-based performance metrics are met. As of December 31, 2020, none of the performance-based RSUs have vested.
- (6) These RSUs vest in four approximately equal installments on March 26, 2021, March 26, 2022, March 26, 2023 and March 26, 2024, provided the executive officer continues to be employed with us through the applicable vesting date.
- (7) These RSUs vest in four approximately equal installments on May 27, 2021, May 27, 2022, May 27, 2023 and May 27, 2024, provided the executive officer continues to be employed with us through the applicable vesting date.
- (8) Dr. Papkoff's employment was terminated on January 31, 2021 in connection with the wind-down of our Microbiome program. All unvested awards as of that date were canceled, and all unexercised vested stock options as of May 1, 2021 will be canceled.
- (9) These awards vest in three approximately equal installments on December 12, 2019, December 12, 2020 and December 12, 2021 provided the executive officer continues to be employed with us through the applicable vesting date.
- (10) These RSUs vest in four approximately equal installments on March 29, 2020, March 29, 2021, March 29, 2022 and March 29, 2023, provided the executive officer continues to be employed with us through the applicable vesting date.

### Option Exercises and Stock Vested

The following table presents, for each of the NEOs, the shares of our common stock acquired upon the exercise of stock options and vesting of RSUs and the related value realized during the fiscal year ended December 31, 2020.

Name	Stock Awards	
	Number of Shares Acquired on Vesting (#)	Value Realized on Vesting <sup>(1)</sup> (\$)
John G. McHutchison, A.O., M.D. ....	33,333	744,493
Thomas J. Russo, CFA.....	—	—
Jason A. Okazaki .....	—	—
William E. Delaney IV, Ph.D. ....	—	—
Jacqueline S. Papkoff, Ph.D.....	6,979	71,094

- (1) The value realized on vesting is based on the closing market price per share of our common stock on The Nasdaq Global Select Market on the vesting date, multiplied by the number of RSUs that vested.

### Pension Benefits

We do not maintain any qualified or non-qualified defined benefit pension plans. As a result, none of our NEOs participates in or has account balances in qualified or non-qualified defined benefit plans sponsored by us.

### Nonqualified Deferred Compensation

None of our NEOs participates in or has account balances in nonqualified defined contribution plans or other non-qualified deferred compensation plans maintained by us.

### Employment Arrangements

As of December 31, 2020, 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.

*John G. McHutchison, A.O., M.D.*

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.

For a description of Mr. Russo's severance entitlements under his employment agreement, see "—Severance and Change in Control Provisions" below.

*Jason A. Okazaki*

In March 2020, we entered into an employment agreement with Mr. Okazaki. Mr. Okazaki's employment agreement provides for an initial annual base salary of \$515,000 and an annual performance-based incentive cash bonus in an amount initially targeted at 50% of Mr. Okazaki's base salary.

As an additional inducement under the employment agreement, we agreed to pay Mr. Okazaki a sign-on bonus in the gross amount of \$100,000, payable in a lump sum within 30 days of his start date. Mr. Okazaki'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.

If the payments or benefits payable to Mr. Okazaki 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. Okazaki.

For a description of Mr. Okazaki's severance entitlements under his employment agreement, see "—Severance and Change in Control Provisions" below.

*William E. Delaney IV, Ph.D.*

In May 2020, we entered into an employment agreement with Dr. Delaney. Dr. Delaney's employment agreement provides for an initial annual base salary of \$415,000 and an annual performance-based incentive cash bonus in an amount initially targeted at 40% of Dr. Delaney's base salary.

As an additional inducement under the employment agreement, we agreed to pay Dr. Delaney a sign-on bonus in the gross amount of \$100,000, payable in a lump sum within 30 days of his start date. Dr. Delaney'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.

For a description of Dr. Delaney's severance entitlements under his employment agreement, see "—Severance and Change in Control Provisions" below.

*Severance and Change in Control Provisions (Mr. Russo, Mr. Okazaki and Dr. Delaney)*

In addition to the terms detailed above, the employment agreements between us and Mr. Russo, Mr. Okazaki and Dr. Delaney share the following terms:

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

*Jacqueline S. Papkoff, Ph.D.*

In October 2018, we entered into an amended and restated employment agreement with Dr. Papkoff. Dr. Papkoff's employment was terminated on January 31, 2021 in connection with the wind-down of the Microbiome program.

In connection with the termination of her employment, pursuant to her employment agreement, Dr. Papkoff is due the following benefits: (1) continued payment of her then-current base salary for 12 months and (2) if Dr. Papkoff properly elects COBRA, reimbursement of COBRA premiums for 12 months following the termination of her employment 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 health 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.

**Potential Payments Upon Employment Termination or Change of Control**

The information below describes and quantifies certain compensation that would have become payable under employment agreements with our NEOs (other than Dr. Papkoff) had their employment with us been terminated as of December 31, 2020. Due to the number of factors that affect the nature and amount of any benefits provided upon the events discussed below, any actual amounts paid or distributed upon a termination or change of control may be different. Factors that could affect these amounts include the timing during the year of any such event. Dr. Papkoff's employment was terminated in connection with the wind-down of our Microbiome program on January 31, 2021, and accordingly, amounts reported for Dr. Papkoff reflect the actual amounts of severance and COBRA benefits under her contractual arrangements and equity acceleration pursuant to her separation agreement.



Name	Termination Without Cause Other Than Within 12 Months Following a Change of Control (\$)	Termination for Good Reason by Executive Other Than Within 12 Months Following a Change of Control (\$)	Disability (\$)	Death (\$)	Termination Without Cause, Disability or for Good Reason Within 12 Months Following a Change of Control (\$)
<b>John G. McHutchison, A.O., M.D.</b>					
Cash Severance .....	1,435,000	1,435,000	1,435,000	820,000	2,152,500
Continuation of Benefits ...	36,362	36,362	36,362	—	54,542
Equity Acceleration <sup>(1)</sup> .....	277,293	277,293	277,293	—	1,310,835
<b>Thomas J. Russo, CFA</b>					
Cash Severance .....	430,000	430,000	430,000	—	602,000
Continuation of Benefits ...	36,362	36,362	36,362	—	36,362
Equity Acceleration <sup>(1)</sup> .....	—	—	—	—	262,467
<b>Jason A. Okazaki</b>					
Cash Severance .....	515,000	515,000	515,000	—	719,000
Continuation of Benefits ...	36,362	36,362	36,362	—	36,362
Equity Acceleration <sup>(1)</sup> .....	—	—	—	—	302,500
<b>William E. Delaney IV, Ph.D.</b>					
Cash Severance .....	415,000	415,000	415,000	—	519,000
Continuation of Benefits ...	21,362	21,362	21,362	—	21,362
Equity Acceleration <sup>(1)</sup> .....	—	—	—	—	272,250
<b>Jacqueline S. Papkoff, Ph.D.<sup>(2)</sup></b>					
Cash Severance .....	420,000	—	—	—	—
Continuation of Benefits ...	740	—	—	—	—
Equity Acceleration <sup>(1)</sup> .....	42,899	—	—	—	—

(1) Reflects the accelerated value of all outstanding equity awards that would accelerate on the closing price of our stock on The Nasdaq Global Select Market on December 31, 2020, the last trading day of the year, which was \$6.05 per share. This would include any in-the-money value of accelerated stock options as of December 31, 2020; however, no accelerated stock options would have been in-the-money as of December 31, 2020.

(2) Dr. Papkoff's employment was terminated in connection with the wind-down of our Microbiome program on January 31, 2021. Amounts reported for Dr. Papkoff reflect the actual amounts of severance and COBRA benefits under her contractual arrangements. Equity acceleration relates to the acceleration of vesting of equity awards pursuant to her separation agreement.

## CEO Pay Ratio

As required by Dodd-Frank Section 953(b) and Item 402(u) of Regulation S-K, and the guidance thereunder, we determined the ratio of the annual total compensation of Dr. McHutchison relative to the annual total compensation of our median employee.

For purposes of reporting annual total compensation and the ratio of annual total compensation of the CEO to that of our median employee, both the CEO and median employee's annual total compensation were calculated consistently with the disclosure requirement of executive compensation under the Summary Compensation Table.

To determine our median employee's compensation for all employees other than our Chief Executive Officer who were employed by us as of December 31, 2020, we used the following consistently applied compensation method: base salary (annualized in the case of employees who joined us or after January 1, 2020 or who took an unpaid leave of absence for any period during 2020), target performance-based cash bonus, and equity granted during the year,

computed in accordance with ASC Topic 718, because we widely distribute annual equity awards to employees. In accordance with Item 402(u) and the instructions thereto, we included all 136 U.S.-based full-time, part-time and temporary employees, and excluded all employees based outside of the U.S. (our three employees based in China). We do not have any seasonal employees. We believe our consistently applied compensation method reasonably reflects the total annual compensation of our employees.

After applying the methodology described above, we identified two median employees. As a result, we selected the individual whose compensation was closest to our estimate used to identify the median employee. The median employee compensation was \$270,157. Our CEO's compensation in the Summary Compensation Table was \$3,194,563. Therefore, our CEO to median employee pay ratio is 12 to 1. This CEO to median employee pay ratio reflects our reasonable good faith estimate of such ratio.

This information is being provided for compliance purposes and is a reasonable estimate calculated in a manner consistent with SEC rules, based on our internal records and the methodology described above. The SEC rules for identifying the median compensated employee allow companies to adopt a variety of methodologies, to apply certain exclusions and to make reasonable estimates and assumptions that reflect their employee populations and compensation practices. Accordingly, the pay ratio reported by other companies may not be comparable to the pay ratio reported above, as other companies may have different employee populations and compensation practices and may use different methodologies, exclusions, estimates and assumptions in calculating their own pay ratios. Neither the Compensation Committee nor management used the CEO Pay Ratio measure in making compensation decisions.

#### **Compensation Committee Interlocks and Insider Participation**

Mr. Holubiak, Dr. Mahony, Mr. Ringo and Mark Auerbach served as members of our Compensation Committee during the year ended December 31, 2020. No member of our Compensation Committee has ever been an executive officer or employee of us or any of our subsidiaries. None of our executive officers currently serves, or has served during the last completed fiscal year, on the compensation committee or board of directors of any other entity that has one or more executive officers serving as a member of the Board or Compensation Committee. During 2020, no members of our Compensation Committee had any relationships requiring disclosure by us under SEC rules requiring disclosure of certain relationships and related party transactions.

## CERTAIN RELATIONSHIPS AND RELATED PARTY TRANSACTIONS

The written charter of our Audit Committee authorizes 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 only on terms no less favorable to us than could be obtained from unaffiliated third parties.

In September 2019, we retained Colin Watanabe as a consultant to provide critical bioinformatic support for intellectual property filings made by our Microbiome program, which was wound down in January 2021. Dr. Watanabe shares a common household with, and is the significant other of, Jacqueline Papkoff, our former Chief Scientific Officer – Microbiome. Dr. Watanabe retired in March 2019 following a 40-year career building a bioinformatics programming infrastructure at a large pharmaceutical company, and we retained him in connection with the resignation of our then-only bioinformatics employee. Dr. Watanabe initially backfilled the role of the departed employee and participated in the screening of bioinformatics candidates. Upon the completion of the restaffing of the bioinformatics team, Dr. Watanabe dedicated his time to rebuilding our bioinformatics infrastructure and workflows, as well as building new databases that enabled new types of bioinformatics sequence analyses that greatly improved taxonomic classification, which was critical to our Microbiome program's intellectual property efforts. Since Dr. Watanabe is retired, he was not seeking full-time employment and worked only ten hours per week between September 2019 and the end of his engagement in December 2020. In 2020, we paid Dr. Watanabe approximately \$135,000, which includes a 17.5% markup paid to a third-party management company.

Other than the above transaction and the compensation agreements and other arrangements described under "Executive Compensation—Employment Arrangements," since January 1, 2020, 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 40,059,122 shares outstanding as of March 23, 2021, the record date for the Annual Meeting, 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. Share ownership in each case includes (1) shares issuable upon exercise of options and warrants that may be exercised within 60 days after the record date and (2) RSUs held by the individual that are scheduled to vest and settle within 60 days after the record 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 40,059,122 shares outstanding on the record date.

There are no arrangements known to us, including any pledge by any person of our securities, 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 (%)
<b>5% Stockholders:</b>		
BlackRock, Inc. <sup>(1)</sup> 55 East 52nd Street New York, New York 10055.....	2,783,308	6.9%
Armistice Capital, LLC <sup>(2)</sup> 510 Madison Capital, LLC New York, New York 10022.....	2,624,000	6.6%
Muneer A. Satter <sup>(3)</sup> c/o Satter Management Co., L.P. 676 North Michigan Avenue, Suite 4000 Chicago, Illinois 60611.....	2,227,500	5.6%
<b>Directors, Director Nominee and Named Executive Officers:</b>		
Anthony E. Altig <sup>(4)</sup> .....	127,000	*
Gina Consylman .....	—	*
Richard D. DiMarchi, Ph.D. <sup>(5)</sup> .....	438,240	1.1%
Myron Z. Holubiak <sup>(6)</sup> .....	99,000	*
Lisa R. Johnson-Pratt.....	—	—
Susan Mahony, Ph.D. <sup>(6)</sup> .....	47,500	*
William R. Ringo, Jr. <sup>(7)</sup> .....	121,465	*
John G. McHutchison, A.O., M.D. <sup>(8)</sup> .....	352,432	*
Thomas J. Russo, CFA <sup>(9)</sup> .....	80,220	*
Jason A. Okazaki <sup>(10)</sup> .....	83,708	*
William E. Delaney IV, Ph.D. ....	—	—
Jacqueline S. Papkoff, Ph.D. <sup>(11)</sup> .....	137,760	*
All directors and executive officers as a group (12 persons).....	1,556,803	3.9%

\* Less than 1%.

(1) Based on the information contained in the Schedule 13G/A filed with the SEC on January 29, 2021 by BlackRock, Inc. (BlackRock), a parent holding company or control person, as of December 31, 2020, BlackRock beneficially owns 2,783,308 shares of common stock. BlackRock has sole voting power over

2,684,886 shares of common stock and sole dispositive power over 2,783,308 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 (Luxembourg) S.A., 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.

- (2) Based on the information contained in the Schedule 13G filed with the SEC on February 16, 2021 by Armistice Capital, LLC, as of December 31, 2020, the persons hold shared voting and dispositive power over the shares of common stock.
- (3) Based on the information contained in the Schedule 13G/A filed with the SEC on February 12, 2021 by Muneer A. Satter. Consists of (a) 1,800,000 shares that are held by Satter Medical Technology Partners, L.P. for which the Reporting Person has sole voting and dispositive power over all such shares; (b) 215,147 shares of common Stock that are held by Muneer A. Satter Revocable Trust for which the Reporting Person serves as trustee and, in such capacity, has sole voting and dispositive power over all such shares; and (c) 212,353 shares of common Stock that are held by various other trusts and other entities for which the Reporting Person serves as trustee, investment advisor or manager and, in such capacity, has sole voting and dispositive power over all such shares.
- (4) Includes 8,000 shares of common stock and 119,000 shares of common stock that Mr. Altig has the right to acquire from us within 60 days after the record date pursuant to the exercise of stock options.
- (5) Includes 319,240 shares of common stock and 119,000 shares of common stock that Dr. DiMarchi has the right to acquire from us within 60 days after the record 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 record date pursuant to the exercise of stock options.
- (7) Includes 17,465 shares of common stock and 104,000 shares of common stock that Mr. Ringo has the right to acquire from us within 60 days after the record date pursuant to the exercise of stock options.
- (8) Includes 21,182 shares of common stock, 12,500 RSUs scheduled to vest within 60 days of the record date and 318,750 shares of common stock that Dr. McHutchison has the right to acquire from us within 60 days after the record date pursuant to the exercise of stock options.
- (9) Includes 10,845 RSUs scheduled to vest within 60 days of the record date and 69,375 shares of common stock that Mr. Russo has the right to acquire from us within 60 days after the record date pursuant to the exercise of stock options.
- (10) Includes 3,500 shares of common stock, 12,500 RSUs scheduled to vest within 60 days of the record date and 67,708 shares of common stock that Mr. Okazaki has the right to acquire from us within 60 days after the record date pursuant to the exercise of stock options.
- (11) Includes 11,382 shares of common stock and 126,378 shares of common stock that Dr. Papkoff has the right to acquire from us within 60 days after the record date pursuant to the exercise of stock options, all of which will be cancelled on May 1, 2021 in connection with Dr. Papkoff's termination in connection with the wind-down of our Microbiome program.

## **DEADLINE FOR STOCKHOLDER PROPOSALS FOR THE 2022 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 2022 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 8, 2021, to our Corporate Secretary at 331 Oyster Point Blvd., Fourth Floor, South San Francisco, California 94080; provided, however, that if our 2022 Annual Meeting of Stockholders is held before April 20, 2022 or after June 19, 2022, then the deadline is a reasonable amount of time prior to the date we begin to print and send our proxy statement for the 2022 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. 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 2022 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 8, 2021 and no later than the close of business on December 8, 2021; provided, however, that if our 2022 Annual Meeting of Stockholders is held before April 20, 2022 or after June 19, 2022, then the deadline is the close of business on the date that is 180 days prior to the 2022 Annual Meeting of Stockholders or the tenth day following the date that the 2022 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 nominate a person 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 2022 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 business to be brought before the meeting other than the proposals identified in this proxy statement. If any other matters properly come before the stockholders at the Annual Meeting, it is the intention of the persons named on the proxy to vote the shares represented thereby in accordance with their best judgment.

**Appendix A**

**Proposed Amendment No. 4 to Assembly Biosciences, Inc. 2018 Stock Incentive Plan**

**AMENDMENT NO. 4**

**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, by Omnibus Amendment to Assembly Biosciences, Inc. Stock Plans effective as of March 11, 2020 and by Amendment No. 3 effective as of June 11, 2020 (as amended from time to time, the “Plan”).

Prior to this Amendment No. 4 to the Plan, the number of shares of Common Stock, par value \$0.001 per share, reserved under the Plan was 4,600,000.

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. Section 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 Six Million Six Hundred Thousand (6,600,000) 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. 4, 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. 4 has been adopted by the Board of Directors of the Company as of March 18, 2021.

This Amendment No. 4 will be submitted to the stockholders of the Company for approval at the annual stockholders meeting to be held on May 20, 2021 and will become effective upon receipt of approval by the stockholders.

**Appendix B**

**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 ~~Four Million Six Hundred Thousand (4,600,000)~~ **Six Million Six Hundred Thousand (6,600,000)** 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:

(i) to select the Employees, Directors and Consultants to whom Awards may be granted from time to time hereunder;

(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



- Entity; or
- (vii) past or future services actually or to be rendered to the Company or a Related
  - (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 June 11, 2020

**Amendment No. 4 approved by the Board of Directors on March 18, 2021**

**And the stockholders [ ], 2021**

**Proposed Assembly Biosciences, Inc. Amended and Restated 2018 Employee Stock Purchase Plan****AMENDED AND RESTATED 2018 EMPLOYEE STOCK PURCHASE PLAN**

The purpose of the Assembly Biosciences, Inc. 2018 Employee Stock Purchase Plan (“the Plan”) is to provide eligible employees of Assembly Biosciences, Inc. (the “Company”) and each Designated Subsidiary (as defined in Section 11) with opportunities to purchase shares of the Company’s common stock, par value \$0.01 per share (the “Common Stock”). An aggregate of ~~400,000~~ **1,300,000** shares of Common Stock have been approved and reserved for this purpose.

The Plan includes two components: a Code Section 423 Component (the “423 Component”) and a non-Code Section 423 Component (the “Non-423 Component”). It is intended for the 423 Component to constitute an “employee stock purchase plan” within the meaning of Section 423(b) of the U.S. Internal Revenue Code of 1986, as amended (the “Code”) and the 423 Component shall be interpreted in accordance with that intent (although the Company makes no undertaking or representation to maintain such qualification). In addition, this Plan authorizes the grant of options under the Non-423 Component that does not qualify as an “employee stock purchase plan” under Section 423 of the Code. Except as otherwise provided herein, the Non-423 Component will operate and be administered in the same manner as the 423 Component.

1. **Administration.** The Plan will be administered by the person or persons (the “Administrator”) appointed by the Company’s Board of Directors (the “Board”) for such purpose. The Administrator has authority at any time to: (i) adopt, alter and repeal such rules, guidelines and practices for the administration of the Plan and for its own acts and proceedings as it shall deem advisable; (ii) interpret the terms and provisions of the Plan; (iii) make all determinations it deems advisable for the administration of the Plan; (iv) decide all disputes arising in connection with the Plan; and (v) otherwise supervise the administration of the Plan. All interpretations and decisions of the Administrator shall be binding on all persons, including the Company and the Participants. No member of the Board or individual exercising administrative authority with respect to the Plan shall be liable for any action or determination made in good faith with respect to the Plan or any option granted hereunder.

2. **Offerings.** The Company will make one or more offerings to eligible employees to purchase Common Stock under the Plan (“Offerings”). Unless otherwise determined by the Administrator, the initial Offering will begin on June 15, 2018 and will end on the following November 14th (the “Initial Offering”). Thereafter, unless otherwise determined by the Administrator, an Offering will begin on the first business day occurring on or after each November 15th and May 15th and will end on the last business day occurring on or before the following May 14th and November 14th, respectively. The Administrator may, in its discretion, designate a different period for any Offering, provided that no Offering shall exceed six months in duration or overlap any other Offering.

3. **Eligibility.** All individuals classified as employees on the payroll records of the Company and each Designated Subsidiary are eligible to participate in any one or more of the Offerings under the Plan, provided that as of the first day of the applicable Offering (the “Offering Date”) they are employed by the Company or a Designated Subsidiary and have completed at least 30 days of employment. Notwithstanding any other provision herein, individuals who are not contemporaneously classified as employees of the Company or a Designated Subsidiary for purposes of the Company’s or applicable Designated Subsidiary’s payroll system are not considered to be eligible employees of the Company or any Designated Subsidiary and shall not be eligible to participate in the Plan. In the event any such individuals are reclassified as employees of the Company or a Designated Subsidiary for any purpose, including, without limitation, common law or statutory employees, by any action of any third party, including, without limitation, any government agency, or as a result of any private lawsuit, action or administrative proceeding, such individuals shall, notwithstanding such reclassification, remain ineligible for participation. Notwithstanding the foregoing, the exclusive means for individuals who are not contemporaneously classified as employees of the Company or a Designated Subsidiary on the Company’s or Designated Subsidiary’s payroll system to become eligible to participate in this Plan is through an amendment to this Plan, duly executed by the Company, which specifically renders such individuals eligible to participate herein.

#### 4. Participation.

(a) An eligible employee who is not a Participant in any prior Offering may participate in a subsequent Offering by submitting an enrollment form to his or her appropriate payroll location at least 15 business days before the Offering Date (or by such other deadline as shall be established by the Administrator for the Offering).

(b) The enrollment form will (a) state a whole percentage to be deducted from an eligible employee's Compensation (as defined in Section 11) per pay period, (b) authorize the purchase of Common Stock in each Offering in accordance with the terms of the Plan and (c) specify the exact name or names in which shares of Common Stock purchased for such individual are to be issued pursuant to Section 10. An employee who does not enroll in accordance with these procedures will be deemed to have waived the right to participate. Unless a Participant files a new enrollment form or withdraws from the Plan, such Participant's deductions and purchases will continue at the same percentage of Compensation for future Offerings, provided he or she remains eligible.

(c) Notwithstanding the foregoing, participation in the Plan will neither be permitted nor be denied contrary to the requirements of the Code.

5. Employee Contributions. Each eligible employee may authorize payroll deductions at a minimum of one percent up to a maximum of 15 percent of such employee's Compensation for each pay period. The Company will maintain book accounts showing the amount of payroll deductions made by each Participant for each Offering. No interest will accrue or be paid on payroll deductions.

6. Deduction Changes. Except as may be determined by the Administrator in advance of an Offering, a Participant may not increase or decrease his or her payroll deduction during any Offering, but may increase or decrease his or her payroll deduction with respect to the next Offering (subject to the limitations of Section 5) by filing a new enrollment form at least 15 business days before the next Offering Date (or by such other deadline as shall be established by the Administrator for the Offering). The Administrator may, in advance of any Offering, establish rules permitting a Participant to increase, decrease or terminate his or her payroll deduction during an Offering.

7. Withdrawal. A Participant may withdraw from participation in the Plan by delivering a written notice of withdrawal to his or her appropriate payroll location. The Participant's withdrawal will be effective as of the next business day. Following a Participant's withdrawal, the Company will promptly refund such individual's entire account balance under the Plan to him or her (after payment for any Common Stock purchased before the effective date of withdrawal). Partial withdrawals are not permitted. Such an employee may not begin participation again during the remainder of the Offering, but may enroll in a subsequent Offering in accordance with Section 4.

8. Grant of Options. On each Offering Date, the Company will grant to each eligible employee who is then a Participant in the Plan an option ("Option") to purchase on the last day of such Offering (the "Exercise Date"), at the Option Price hereinafter provided for, the lowest of (a) a number of shares of Common Stock determined by dividing such Participant's accumulated payroll deductions on such Exercise Date by the Option Price (as defined herein), (b) ~~4,000~~**2,500** shares; or (c) such other lesser maximum number of shares as shall have been established by the Administrator in advance of the Offering; provided, however, that such Option shall be subject to the limitations set forth below. Each Participant's Option shall be exercisable only to the extent of such Participant's accumulated payroll deductions on the Exercise Date. The purchase price for each share purchased under each Option (the "Option Price") will be 85 percent of the Fair Market Value of the Common Stock on the Offering Date or the Exercise Date, whichever is less.

Notwithstanding the foregoing, no Participant may be granted an option hereunder if such Participant, immediately after the option was granted, would be treated as owning stock possessing five percent or more of the total combined voting power or value of all classes of stock of the Company or any Parent or Subsidiary (as defined in Section 11). For purposes of the preceding sentence, the attribution rules of Section 424(d) of the Code shall apply in determining the stock ownership of a Participant, and all stock which the Participant has a contractual right to purchase shall be treated as stock owned by the Participant. In addition, no Participant may be granted an Option which permits his or her rights to purchase stock under the Plan, and any other employee stock purchase plan of the Company and its Parents and Subsidiaries, to accrue at a rate which exceeds \$25,000 of the fair market value of such stock (determined on the option grant date or dates) for each calendar year in which the Option is outstanding at any



time. The purpose of the limitation in the preceding sentence is to comply with Section 423(b)(8) of the Code and shall be applied taking Options into account in the order in which they were granted.

9. Exercise of Option and Purchase of Shares. Each employee who continues to be a Participant in the Plan on the Exercise Date shall be deemed to have exercised his or her Option on such date and shall acquire from the Company such number of whole shares of Common Stock reserved for the purpose of the Plan as his or her accumulated payroll deductions on such date will purchase at the Option Price, subject to any other limitations contained in the Plan. Any amount remaining in a Participant's account at the end of an Offering solely by reason of the inability to purchase a fractional share will be carried forward to the next Offering; any other balance remaining in a Participant's account at the end of an Offering will be refunded to the Participant promptly.

10. Issuance of Certificates. Certificates representing shares of Common Stock purchased under the Plan may be issued only in the name of the employee, in the name of the employee and another person of legal age as joint tenants with rights of survivorship, or in the name of a broker authorized by the employee to be his, her or their, nominee for such purpose.

#### 11. Definitions.

The term "Compensation" means the amount of base pay, prior to salary reduction pursuant to Sections 125, 132(f) or 401(k) of the Code, but excluding overtime, commissions, incentive or bonus awards, allowances and reimbursements for expenses such as relocation allowances or travel expenses, income or gains on the exercise of Company stock options, and similar items.

The term "Designated Subsidiary" means any present or future Subsidiary (as defined below) that has been designated by the Board to participate in the Plan. The Board may so designate any Subsidiary, or revoke any such designation, at any time and from time to time, either before or after the Plan is approved by the stockholders and may further designate such Subsidiaries as participating in the 423 Component or the Non-423 Component. The current list of Designated Subsidiaries is attached hereto as Appendix A.

The term "Fair Market Value of the Common Stock" on any given date means the fair market value of the Common Stock determined in good faith by the Administrator; provided, however, that if the Common Stock is admitted to quotation on the National Association of Securities Dealers Automated Quotation System ("NASDAQ"), NASDAQ Global Select Market or The NASDAQ Capital Market of The NASDAQ Stock Market LLC or another national securities exchange, the determination shall be made by reference to the closing price on such date. If there is no closing price for such date, the determination shall be made by reference to the last date preceding such date for which there is a closing price.

The term "Parent" means a "parent corporation" with respect to the Company, as defined in Section 424(e) of the Code.

The term "Participant" means an individual who is eligible as determined in Section 3 and who has complied with the provisions of Section 4.

The term "Subsidiary" means a "subsidiary corporation" with respect to the Company, as defined in Section 424(f) of the Code.

The term "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.

12. Rights on Termination of Employment. If a Participant's employment terminates for any reason before the Exercise Date for any Offering, no payroll deduction will be taken from any pay due and owing to the Participant and the balance in the Participant's account will be paid to such Participant or, in the case of such Participant's death, to his or her designated beneficiary as if such Participant had withdrawn from the Plan under Section 7. An employee will be deemed to have terminated employment, for this purpose, if the corporation that employs him or her, having been a Designated Subsidiary, ceases to be a Subsidiary, or if the employee is transferred to any corporation other than the Company or a Designated Subsidiary. An employee will not be deemed to have terminated employment for this purpose, if the employee is on an approved leave of absence for military service or sickness or for any other purpose approved by the Company, if the employee's right to reemployment is guaranteed either by a statute or by contract or under the policy pursuant to which the leave of absence was granted or if the Administrator otherwise provides in writing.

13. Special Rules. Notwithstanding anything herein to the contrary, the Administrator may adopt special rules applicable to the employees of a particular Designated Subsidiary, whenever the Administrator determines that such rules are necessary or appropriate for the implementation of the Plan in a jurisdiction where such Designated Subsidiary has employees; provided that if such rules are inconsistent with the requirements of Section 423(b) of the Code, these employees will participate in the Non-423 Component. Any special rules established pursuant to this Section 13 shall, to the extent possible, result in the employees subject to such rules having substantially the same rights as other Participants in the Plan.

14. Optionees Not Stockholders. Neither the granting of an Option to a Participant nor the deductions from his or her pay shall constitute such Participant a holder of the shares of Common Stock covered by an Option under the Plan until such shares have been purchased by and issued to him or her.

15. Rights Not Transferable. Rights under the Plan are not transferable by a Participant other than by will or the laws of descent and distribution, and are exercisable during the Participant's lifetime only by the Participant.

16. Designation of Beneficiary.

(a) A Participant may file a written designation of a beneficiary who is to receive any shares of Common Stock and/or cash, if any, from the Participant's account under the Plan in the event of such Participant's death subsequent to the end of an Offering but prior to delivery to the Participant of such shares of Common Stock or cash. In addition, a Participant may file a written designation of a beneficiary who is to receive any cash from the Participant's account under the Plan in the event of such Participant's death during an Offering. Any such designation shall be on a form provided by or otherwise acceptable to the Company.

(b) The Participant may change such designation of beneficiary at any time by written notice to the Company. In the event of the death of a Participant and in the absence of a beneficiary validly designated under the Plan who is living at the time of such Participant's death, the Company shall deliver such shares of Common Stock and/or cash to the executor or administrator of the estate of the Participant, or if no such executor or administrator has been appointed (to the knowledge of the Company), the Company, in its sole discretion, may deliver such shares of Common Stock and/or cash to the spouse or to any one or more dependents or relatives of the Participant, or if no spouse, dependent or relative is known to the Company, then to such other person as the Company may designate.

17. Application of Funds. All funds received or held by the Company under the Plan may be combined with other corporate funds and may be used for any corporate purpose.

18. Adjustment in Case of Changes Affecting Common Stock; Corporate Transaction.

(a) In the event of a subdivision of outstanding shares of Common Stock, the payment of a dividend in Common Stock or any other change affecting the Common Stock, the number of shares approved for the Plan and the share limitation set forth in Section 8 shall be equitably or proportionately adjusted to give proper effect to such event.

(b) In the event of a Corporate Transaction, then the Participants' accumulated payroll deductions under an ongoing Offering shall be used to purchase shares of Common Stock subject to the limitations in this Plan on a date determined by the Company within ten (10) business days prior to the closing of the Corporate Transaction, which date shall constitute the Exercise Date under this Plan, and the Plan shall terminate immediately after such Exercise Date and the issuance of the shares purchased on such Exercise Date.

19. Amendment of the Plan. The Board may at any time and from time to time amend the Plan in any respect, except that without the approval within 12 months of such Board action by the stockholders, no amendment shall be made increasing the number of shares approved for the Plan or making any other change that would require stockholder approval in order for the Plan, as amended, to qualify as an "employee stock purchase plan" under Section 423(b) of the Code.

20. Insufficient Shares. If the total number of shares of Common Stock that would otherwise be purchased on any Exercise Date plus the number of shares purchased under previous Offerings under the Plan exceeds the maximum number of shares issuable under the Plan, the shares then available shall be apportioned among Participants in proportion to the amount of payroll deductions accumulated on behalf of each Participant that would otherwise be used to purchase Common Stock on such Exercise Date.

21. Termination of the Plan. Except as otherwise contemplated under Section 18(b) with respect to a Corporate Transaction, the Plan may be terminated at any time by the Board. Upon termination of the Plan, all amounts in the accounts of Participants shall be promptly refunded.

22. Governmental Regulations. The Company's obligation to sell and deliver Common Stock under the Plan is subject to obtaining all governmental approvals required in connection with the authorization, issuance, or sale of such stock.

23. Governing Law. This Plan and all Options and actions taken thereunder shall be governed by, and construed in accordance with, the laws of the State of Delaware, applied without regard to conflict of law principles.

24. Issuance of Shares. Shares may be issued upon exercise of an Option from authorized but unissued Common Stock, from shares held in the treasury of the Company, or from any other proper source.

25. Tax Withholding. Participation in the Plan is subject to any minimum required tax withholding on income of the Participant in connection with the Plan. Each Participant agrees, by entering the Plan, that the Company and its Subsidiaries shall have the right to deduct any such taxes from any payment of any kind otherwise due to the Participant, including shares issuable under the Plan.

26. Notification Upon Sale of Shares. Each Participant agrees, by entering the Plan, to give the Company prompt notice of any disposition of shares purchased under the Plan where such disposition occurs within two years after the date of grant of the Option pursuant to which such shares were purchased or within one year after the date such shares were purchased.

27. Effective Date and Approval of Shareholders. The Plan shall take effect on the later of the date it is adopted by the Board and the date it is approved by the holders of a majority of the votes cast at a meeting of stockholders at which a quorum is present or by written consent of the stockholders.

**APPENDIX A**

**Designated Subsidiaries**

None



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