



April 30, 2021

Dear Stockholder:

You are cordially invited to attend the 2021 Annual Meeting of Stockholders of bluebird bio, Inc. We intend to hold the Annual Meeting on June 15, 2021 at 8.30 a.m. EDT. In light of the ongoing COVID-19 pandemic, for the safety of all our stockholders and personnel, and taking into account the various federal, state and local health guidance that have been issued, we have determined that the Annual Meeting will be held in a virtual meeting format only via the Internet, with no physical in-person meeting. You will be able to attend and participate in the Annual Meeting online by visiting the meeting center at www.virtualshareholdermeeting.com/BLUE2021 and entering your control number found on your enclosed proxy card, where you will be able to listen to the Annual Meeting live, submit questions and vote. As always, we encourage you to vote your shares prior to the annual meeting.

Details regarding admission to the Annual Meeting and the business to be conducted are more fully described in the accompanying Notice of Annual Meeting and Proxy Statement.

At this Annual Meeting, the agenda includes the election of three Class II directors for three-year terms, the approval of executive compensation by a non-binding advisory vote, the recommendation, by non-binding advisory vote, on the frequency of future non-binding advisory votes on executive compensation, the approval of an amendment to our 2013 Employee Stock Purchase Plan, and the ratification of the appointment of Ernst & Young LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2021.

Under Securities and Exchange Commission rules, we are providing access to the proxy materials for the Annual Meeting to stockholders via the Internet. Accordingly, you can access the proxy materials and vote at www.proxyvote.com. Instructions for accessing the proxy materials and voting are described below and in the Notice of Annual Meeting that you received in the mail. Your vote is very important. Whether or not you plan to attend the Annual Meeting, please carefully review the enclosed proxy statement and then cast your vote, regardless of the number of shares you hold. If you are a stockholder of record, you may vote over the Internet, by telephone, or, if you request to receive a printed set of the proxy materials, by completing, signing, dating and mailing the accompanying proxy card in the return envelope. Submitting your vote via the Internet or by telephone or proxy card will not affect your right to vote at the Annual Meeting if you decide to attend the Annual Meeting virtually. If your shares are held in street name (held for your account by a broker or other nominee), you will receive instructions from your broker or other nominee explaining how to vote your shares, and you will have the option to cast your vote by telephone or over the Internet if your voting instruction form from your broker or nominee includes instructions and a toll-free telephone number or Internet website to do so. In any event, to be sure that your vote will be received in time, please cast your vote by your choice of available means at your earliest convenience.

We hope that you will join us on June 15, 2021. Your continuing interest in bluebird is very much appreciated.

Sincerely,

A handwritten signature in black ink that reads "Nick Leschly". The signature is written in a cursive, flowing style.

Nick Leschly
President & Chief Executive Officer



NOTICE OF 2021 ANNUAL MEETING OF STOCKHOLDERS

- Date** June 15, 2021
- Time** 8:30 a.m. Eastern Time
- Virtual Meeting** This year's Annual Meeting will be a virtual meeting via live webcast on the internet at www.virtualshareholdermeeting.com/BLUE2021.
- Record Date** April 19, 2021. Only stockholders of record at the close of business on the record date are entitled to receive notice of, and to vote at, the Annual Meeting.
- Purpose**
- To elect John O. Agwunobi, M.D., Daniel S. Lynch and William R. Sellers, M.D. as Class II members of the Board of Directors, to serve until the Company's 2024 Annual Meeting of Stockholders and until their successors are duly elected and qualified;
 - To hold a non-binding advisory vote on the compensation paid to the Company's named executive officers;
 - To hold a non-binding advisory vote on the frequency of future non-binding advisory votes on the compensation paid to the Company's named executive officers;
 - To approve an amendment to the 2013 Employee Stock Purchase Plan;
 - To ratify the selection of Ernst & Young LLP as the Company's independent registered public accounting firm for the fiscal year ending December 31, 2021; and
 - To transact any other business that may properly come before the meeting or any adjournment thereof.
- Proxy Voting** If you are a stockholder of record, please vote via the Internet or, for shares held in street name, please submit the voting instruction form you receive from your broker or nominee, as soon as possible so your shares can be voted at the Annual Meeting. You may submit your voting instruction form by mail. If you are a stockholder of record, you may also vote by telephone or by submitting a proxy card by mail. If your shares are held in street name, you will receive instructions from your broker or other nominee explaining how to vote your shares, and you may also have the choice of instructing the record holder as to the voting of your shares over the Internet or by telephone. Follow the instructions on the voting instruction form you received from your broker or nominee.
- Corporate Headquarters** 60 Binney Street, Cambridge, MA 02142

By order of the Board of Directors,

Jason F. Cole, Secretary

Cambridge, Massachusetts
April 30, 2021

Important Notice Regarding the Availability of Proxy Materials for the Annual Meeting to Be Held on June 15, 2021:
The Notice of 2021 Annual Meeting of Stockholders, proxy statement and our Annual Report on Form 10-K for the fiscal year ended December 31, 2020, are available at investor.bluebirdbio.com.

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**BLUEBIRD BIO, INC.
60 BINNEY STREET
CAMBRIDGE, MASSACHUSETTS 02142**

**PROXY STATEMENT
FOR THE 2021 ANNUAL MEETING OF STOCKHOLDERS
TO BE HELD ON JUNE 15, 2021
AT 8:30 AM EDT**

GENERAL INFORMATION

When are this proxy statement and the accompanying materials scheduled to be sent to stockholders?

We have elected to provide access to our proxy materials to our stockholders via the Internet. Accordingly, on or about April 30, 2021, we will begin mailing a Notice of Internet Availability of Proxy Materials and the proxy materials, including the Notice of 2021 Annual Meeting of Stockholders, this proxy statement and accompanying proxy card or, for shares held in street name (held for your account by a broker or other nominee), voting instruction form, and the Annual Report on Form 10-K for the year ended December 31, 2020 will be made available to stockholders on the Internet on the same date.

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

Pursuant to rules adopted by the Securities and Exchange Commission (SEC), we are providing access to our proxy materials over the Internet rather than printing and mailing the proxy materials. We believe electronic delivery will expedite the receipt of materials and will help lower our costs and reduce the environmental impact of our annual meeting materials. Therefore, a Notice of Internet Availability will be mailed to holders of record and beneficial owners of our common stock starting on or around April 30, 2021. The Notice of Internet Availability will provide instructions as to how stockholders may access and review the proxy materials, including the Notice of Annual Meeting, proxy statement, proxy card and Annual Report on Form 10-K, on the website referred to in the Notice of Internet Availability or, alternatively, how to request that a copy of the proxy materials, including a proxy card, be sent to them by mail. The Notice of Internet Availability will also provide voting instructions. In addition, stockholders of record may request to receive the proxy materials in printed form by mail or electronically by e-mail on an ongoing basis for future stockholder meetings. Please note that, while our proxy materials are available at the website referenced in the Notice of Internet Availability, and our Notice of Annual Meeting, proxy statement and Annual Report on Form 10-K are available on our website, no other information contained on either website is incorporated by reference in or considered to be a part of this document.

Who is soliciting my vote?

The Board of Directors of bluebird bio, Inc. is soliciting your vote for the 2021 Annual Meeting of Stockholders.

When is the record date for the Annual Meeting?

The Board has fixed the record date for the Annual Meeting as of the close of business on April 19, 2021.

How many votes can be cast by all stockholders?

A total of 67,447,548 shares of our common stock were outstanding on April 19, 2021, and entitled to be voted at the meeting. Each share of common stock is entitled to one vote on each matter.

How do I vote?

If you are a stockholder of record and your shares are registered directly in your name, you may vote:

- **By Internet.** Access the website of our tabulator, Broadridge, at: www.proxyvote.com, using the voter control number printed on the furnished proxy card. Your shares will be voted in accordance with your instructions. You must specify how you want your shares voted or your Internet vote cannot be completed and you will receive an error message. If you vote on the Internet, you may also request electronic delivery of future proxy materials.

- **By Telephone.** Call 1-800-690-6903 toll-free from the U.S., U.S. territories and Canada, and follow the instructions on the enclosed proxy card. Your shares will be voted in accordance with your instructions. You must specify how you want your shares voted or your telephone vote cannot be completed.
- **By Mail.** Complete and mail a proxy card in the enclosed postage prepaid envelope to Broadridge. Your proxy will be voted in accordance with your instructions. If you sign and return the enclosed proxy but do not specify how you want your shares voted, they will be voted **FOR** the director nominees named herein to our Board, **FOR** the non-binding advisory resolution approving the compensation of the named executive officers, for holding a non-binding advisory vote on the compensation of our named executive officers **ONCE** every year, **FOR** the approval of the amendment to the 2013 Employee Stock Purchase Plan, and **FOR** the ratification of Ernst & Young LLP as our independent registered public accounting firm for the fiscal year ending December 31, 2021 and will be voted according to the discretion of the proxy holder upon any other business that may properly be brought before the meeting and at all adjournments and postponements thereof. If you are mailed or otherwise receive or obtain a proxy card or voting instruction form, and you choose to vote by telephone or by Internet, you do not have to return your proxy card or voting instruction form.
- **In Person (virtually).** If you are a stockholder of record, you may vote in person (virtually) at the Annual Meeting.

Whether or not you plan to attend the meeting, we urge you to vote by proxy.

If your shares of common stock are held in street name (held for your account by a broker or other nominee):

- **By Internet or By Telephone.** You will receive instructions from your broker or other nominee if you are permitted to vote by Internet or telephone.
- **By Mail.** You will receive instructions from your broker or other nominee explaining how to vote your shares.
- **In Person (virtually).** As a beneficial owner, you are invited to attend (virtually) the Annual Meeting. However, since you are not a stockholder of record, you may not vote your shares in person (virtually) at the Annual Meeting unless you request and obtain a legal proxy from the organization that holds your shares.

What are the Board's recommendations on how to vote my shares?

Our Board recommends a vote:

Proposal 1: **FOR** election of the three Class II director nominees (page 6)

Proposal 2: **FOR** the non-binding advisory resolution approving the compensation of our named executive officers (page 19)

Proposal 3: for holding the non-binding advisory vote on the compensation of our named executive officers **ONCE** every year (page 20)

Proposal 4: **FOR** the approval of the amendment to the 2013 Employee Stock Purchase Plan (page 53)

Proposal 5: **FOR** ratification of the selection of Ernst & Young LLP as our independent registered public accounting firm (page 58)

Who pays the cost for soliciting proxies?

We will pay the cost for the solicitation of proxies by the Board. The solicitation of proxies will be made primarily by mail and through Internet access to materials. Proxies may also be solicited personally, by telephone, fax or e-mail by employees of bluebird without any remuneration to such individuals other than their regular compensation. We will also reimburse brokers, banks, custodians, other nominees and fiduciaries for forwarding these materials to their principals to obtain the authorization for the execution of proxies. We have engaged Innisfree M&A Incorporated to assist in the

solicitation of proxies and provide related advice and informational support, for a services fee, plus customary expense disbursements, which are not expected to exceed \$50,000 in total.

Will my shares be voted if I do not return my proxy?

If your shares are registered directly in your name, your shares will not be voted if you do not vote over the Internet, by telephone, by returning your proxy or by ballot at the Annual Meeting. If your shares are held in street name, your bank, broker or other nominee may under certain circumstances vote your shares if you do not timely return your proxy. Banks, brokers and other nominees can vote customers' unvoted shares on routine matters, but cannot vote such shares on non-routine matters. If you do not timely return a proxy to your bank, broker or other nominee to vote your shares, your bank, broker or other nominee may, on routine matters, either vote your shares or leave your shares unvoted. Your bank, broker or other nominee cannot vote your shares on any non-routine matter. The election of directors (Proposal 1), the non-binding advisory vote on executive compensation (Proposal 2), the non-binding advisory vote on the frequency of future non-binding votes on executive compensation (Proposal 3) and the approval of the amendment to the 2013 Employee Stock Purchase Plan (Proposal 4) are non-routine matters. The ratification of the appointment of our independent registered public accounting firm (Proposal 5) is a routine matter. We encourage you to provide voting instructions to your bank, broker or other nominee by giving your proxy to them. This ensures that your shares will be voted at the Annual Meeting according to your instructions. You should receive directions from your bank, broker or other nominee about how to submit your proxy to them at the time you receive this proxy statement.

Can I change my vote?

You may revoke your proxy at any time before it is voted by notifying the Secretary in writing, by returning a signed proxy with a later date, by transmitting a subsequent vote over the Internet or by telephone prior to the close of the Internet voting facility or the telephone voting facility, or by attending the Annual Meeting and voting in person (virtually). If your stock is held in street name, you must contact your broker or nominee for instructions as to how to change your vote.

How is a quorum reached?

The presence, in person or by proxy, of holders of at least a majority of the total number of outstanding shares entitled to vote is necessary to constitute a quorum for the transaction of business at the Annual Meeting. Shares held of record by stockholders or brokers, bankers or other nominees who do not return a signed and dated proxy or attend the Annual Meeting in person will not be considered present or represented at the Annual Meeting and will not be counted in determining the presence of a quorum. Abstentions and broker non-votes, if any, will be counted for purposes of determining whether a quorum is present for the transaction of business at the meeting.

What vote is required to approve each item and how are votes counted?

Votes cast by proxy or in person at the Annual Meeting will be counted by the persons appointed by bluebird to act as tabulators for the meeting. The tabulators will count all votes FOR and AGAINST, abstentions, frequency votes, and broker non-votes, as applicable, for each matter to be voted on at the Annual Meeting. Abstentions and broker non-votes are not counted as votes cast and, therefore, do not have the effect of votes in opposition to such proposals. A broker non-vote occurs when a nominee holding shares for a beneficial owner does not vote on a particular proposal because the nominee does not have discretionary voting power with respect to that item and has not received instructions from the beneficial owner.

Proposal 1 – Election of three Class II director nominees

For the election of the three Class II director nominees, each director nominee presented must be elected by a majority of the votes cast in person or by proxy at the Annual Meeting. Director nominees are elected by a majority vote for non-contested director elections. Because the number of director nominees properly nominated for the Annual Meeting does not exceed the number of positions on the Board to be filled by election at the Annual Meeting, this election of directors is non-contested. To elect a director nominee to the Board, the votes cast FOR the director nominee must exceed the votes cast AGAINST. Only FOR and AGAINST votes will affect the outcome. Abstentions will have no effect on the voting of Proposal 1. **Proposal 1 is a non-routine matter.** Therefore, if your shares are held by your bank, broker or other nominee in street name and you do not vote your shares, your bank, broker or other nominee cannot vote your shares on Proposal 1. Shares held in street name by banks, brokers or nominees who indicate on their proxies that they do not have authority to vote the shares on Proposal 1 will not be counted as votes FOR or AGAINST any director nominee and will be treated as broker non-votes. As a result, broker non-votes will have no effect on the voting of Proposal 1.

Proposal 2 – Non-binding advisory vote on executive compensation

For the non-binding advisory vote on executive compensation, the votes cast FOR must exceed the votes cast AGAINST to approve, on a non-binding advisory basis, the compensation of our named executive officers. Only FOR and AGAINST votes will affect the outcome. Abstentions will have no effect on the voting of Proposal 2. **Proposal 2 is a non-routine matter.** Therefore, if your shares are held by your bank, broker or other nominee in street name and you do not vote your shares, your bank, broker or other nominee cannot vote your shares on Proposal 2. Shares held in street name by banks, brokers or nominees who indicate on their proxies that they do not have authority to vote the shares on Proposal 2 will not be counted as votes FOR or AGAINST the proposal and will be treated as broker non-votes. As a result, broker non-votes will have no effect on the voting of Proposal 2.

Proposal 3 – Non-binding advisory vote on the frequency of future non-binding advisory votes on executive compensation

A plurality of votes casts is necessary for the approval of the non-binding advisory vote on the frequency of future non-binding advisory votes on the compensation of our named executive officers (Proposal 3). This means that the option that receives the most votes will be recommended by the stockholders to the Board. Abstentions and broker non-votes are not counted for the advisory vote on frequency of future non-binding advisory votes on our executive compensation and, therefore, will have no effect on the outcome of this Proposal 3. **Proposal 3 is a non-routine matter.** Therefore, if your shares are held through a broker, those shares will not be voted in this Proposal 3 unless you affirmatively provide the broker with instructions on how to vote on this Proposal 3.

Proposal 4 – Approval for the amendment to the 2013 Employee Stock Purchase Plan

For the approval of the amendment to the 2013 Employee Stock Purchase Plan, the votes cast FOR must exceed the votes cast AGAINST to approve the increase in the number of shares authorized for issuance under the 2013 Employee Stock Purchase Plan. Only FOR and AGAINST votes will affect the outcome. Abstentions will have no effect on the voting of Proposal 4. **Proposal 4 is a non-routine matter.** Therefore, if your shares are held by your bank, broker or other nominee in street name and you do not vote your shares, your bank, broker or other nominee cannot vote your shares on Proposal 4. Shares held in street name by banks, brokers or nominees who indicate on their proxies that they do not have authority to vote the shares on Proposal 4 will not be counted as votes FOR or AGAINST the proposal and will be treated as broker non-votes. As a result, broker non-votes will have no effect on the voting of Proposal 4.

Proposal 5 – Ratification of selection of Ernst & Young LLP as our independent registered public accounting firm

For the ratification of the selection of Ernst & Young LLP as our independent registered public accounting firm for our 2021 fiscal year, the votes cast FOR must exceed the votes cast AGAINST. Only FOR and AGAINST votes will affect the outcome. Abstentions will have no effect on the voting of Proposal 5. **Proposal 5 is a routine matter.** Therefore, if your shares are held by your bank, broker or other nominee in street name and you do not vote your shares, your bank, broker or other nominee may vote your shares on Proposal 5.

If there are insufficient votes to approve Proposal(s) 1, 2, 3, 4 or 5, your proxy may be voted by the persons named in the proxy to adjourn the Annual Meeting in order to solicit additional proxies in favor of the approval of such proposal. If the Annual Meeting is adjourned or postponed for any purpose, at any subsequent reconvening of the meeting, your proxy will be voted in the same manner as it would have been voted at the original convening of the Annual Meeting unless you withdraw or revoke your proxy. Your proxy may be voted in this manner even though it may have been voted on the same or on any other matter at a previous session of the Annual Meeting.

Could other matters be decided at the Annual Meeting?

bluebird does not know of any other matters that may be presented for action at the Annual Meeting. Should any other business come before the meeting, the persons named on the enclosed proxy will have discretionary authority to vote the shares represented by such proxies in accordance with their best judgment. If you hold shares through a broker, bank or other nominee as described above, they will not be able to vote your shares on any other business that comes before the Annual Meeting unless they receive instructions from you with respect to such matter.

What happens if the meeting is postponed or adjourned?

Your proxy may be voted at the postponed or adjourned meeting. You will still be able to change your proxy until it is voted.

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

Preliminary voting results will be announced at the Annual Meeting. Final voting results will be published in a Current Report on Form 8-K, that we expect to file with the SEC 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 publish preliminary results and, within four business days after the final results are known to us, file an additional Form 8-K to publish the final results.

What does it mean if I receive more than one proxy card or voting instruction form?

It means that you have multiple accounts at the transfer agent or with brokers. Please complete and return all proxy cards or voting instruction forms to ensure that all of your shares are voted.

Who should I call if I have any additional questions?

If you hold your shares directly, please call Jason F. Cole, Secretary of the Company, at (339) 499-9300. If your shares are held in street name, please contact the telephone number provided on your voting instruction form or contact your broker or nominee holder directly.

**PROPOSAL 1
ELECTION OF DIRECTORS**

In accordance with Delaware law and our certificate of incorporation and By-laws, our Board is divided into three classes of approximately equal size. The members of each class are elected to serve a three-year term with the term of office of each class ending in successive years. John O. Agwunobi, M.D., Daniel S. Lynch and William R. Sellers, M.D. are the directors whose terms expire at this Annual Meeting. Each of John O. Agwunobi, M.D., Daniel S. Lynch and William R. Sellers, M.D. has been nominated for and has agreed to stand for re-election to the Board to serve as a Class II director of the Company until the 2024 Annual Meeting and until his or her successor is duly elected.

Our By-laws provide for a majority voting standard for the election of directors in uncontested elections, which provides that to be elected, a director nominee must receive a greater number of votes FOR his or her election than votes AGAINST such election. The number of votes cast with respect to that director's election excludes abstentions and broker non-votes with respect to that director's election. In contested elections where the number of director nominees exceeds the number of directors to be elected, the voting standard will be a plurality of the shares present in person or by proxy and entitled to vote. If a director nominee who already serves as a director is not elected and no successor is elected, the resignation policy in our Corporate Governance Guidelines provides that such director will offer to tender his or her resignation to the Board. Our Nominating and Corporate Governance Committee will make a recommendation to the Board on whether to accept or reject the resignation, or whether to take some other action. The Board will act on the Nominating and Corporate Governance Committee's recommendation and publicly disclose its decision within 90 days from the date of the certification of the election results.

It is intended that, unless you give contrary instructions, shares represented by proxies solicited by the Board will be voted for the election of the three director nominees listed below. We have no reason to believe that any director nominee will be unavailable for election at the Annual Meeting. In the event that one or more director nominees is unexpectedly not available to serve, proxies may be voted for another person nominated as a substitute by the Board, or the Board may reduce the number of directors to be elected at the Annual Meeting. Information relating to each director nominee and for each continuing director, including his or her period of service as a director of bluebird, principal occupation and other biographical material is shown below. Pursuant to the By-laws, the Board has fixed the number of directors at nine as of the date of this year's Annual Meeting of Stockholders. Due to David Schenkein's resignation from the Board effective January 9, 2021, we currently have a vacancy on the Board. Vacancies on the Board are filled exclusively by the affirmative vote of a majority of the remaining directors, even if less than a quorum is present, and not by the stockholders. Your proxy cannot be voted for a greater number of persons than the number of director nominees named in this proxy statement.

THE BOARD UNANIMOUSLY RECOMMENDS THAT YOU VOTE

FOR

EACH OF THESE DIRECTOR NOMINEES FOR CLASS II DIRECTOR:

JOHN O. AGWUNOBI, M.D.

DANIEL S. LYNCH

WILLIAM R. SELLERS, M.D.

(PROPOSAL 1 ON YOUR PROXY CARD)

CORPORATE GOVERNANCE

Board Composition

We currently have eight directors and the terms of office of the directors are divided into three classes:

Class I	Term expiring 2023
Class II	Term expiring 2024
Class III	Term expiring 2022

At each Annual Meeting, the successors to directors whose terms will then expire shall serve from the time of election and qualification until the third Annual Meeting following election and until their successors are duly elected and qualified. A resolution of the Board may change the authorized number of directors. Any additional directorships resulting from an increase in the number of directors will be distributed among the three classes so that, as nearly as possible, each class will consist of one-third of the directors. This classification of the Board may have the effect of delaying or preventing changes in control or management of our company.

Our directors as of April 19, 2021 are as set forth below.

CLASS II DIRECTOR NOMINEES:

John O. Agwunobi, M.D.

Other Current Board Experience:

Herbalife Nutrition Institute (HLF)
U.S. African Development Foundation (private)

Previous Board Experience within the Last Five Years:

Magellan Health Inc. (MGLN)

Professional Highlights:

Since April 2020, Dr. Agwunobi has served as Chief Executive Officer and Chairman of Herbalife Nutrition Institute. Previously, Dr. Agwunobi served as Chief Health and Nutrition Officer at Herbalife, responsible for training, education, science strategy and product development since 2016. He has also served as Co- President of Herbalife since May 2018. Prior to joining Herbalife, Dr. Agwunobi was an independent consultant, advising a number of privately-held health-related companies, including serving as an advisory board member of Shopko Stores Operating Co., LLC on behalf of the private equity firm Sun Capital Partners. From September 2007 to April 2014, Dr. Agwunobi served as Senior Vice President and President of Health and Wellness for Wal-Mart (NYSE: WMT) in the United States where he grew the business and provided insight and advice on the company's health reform position. From December 2005 to September 2007, he served as the Assistant Secretary of Health for the U.S. Department of Health and Human Services, where he was responsible for disease prevention and health promotion. His responsibilities included the oversight of the Centers for Disease Control, National Institute of Health, the U.S. Food and Drug Administration, the Office of the U.S. Surgeon General, and numerous other public health offices and programs.

Key Qualifications and Expertise:

Dr. Agwunobi has significant experience as a senior executive and board member in the health and wellness field. In addition, he has deep expertise in public health programs and governmental agencies relevant to the healthcare industry, from his prior service and experience with the public sector. The insights he has developed from these roles provides our Board with important perspectives on the issues facing our company.

Daniel S. Lynch

Other Current Board Experience:

Omega Alpha Spac (OMEG)

SpringWorks Therapeutics (SWTX)

Xilio Therapeutics, Inc. (private)

Blueprint Medicines Corporation (BPMC)

Not standing for re-election; term expiring in June 2021

Translate Bio, Inc. (TBIO)

Not standing for re-election; term expiring in June 2021

Previous Board Experience within the Last Five Years:

BIND Biosciences, Inc. (BIND)

Proclara Biosciences, Inc. (private)

Sesen Bio, Inc (SESN)

Surface Oncology, Inc. (SURF)

Professional Highlights:

Mr. Lynch joined Third Rock Ventures, L.P., or Third Rock, as an entrepreneur-in-residence in May 2011, and became a Venture Partner in May 2013, and now he is a Senior Advisor. Previously, Mr. Lynch served as Chief Executive and Chief Financial Officer of ImClone Systems Corporation, or ImClone. As ImClone's Chief Executive Officer, he led ImClone through a significant turnaround, helping to restore the company's reputation and to secure FDA approval of ERBITUX (Cetuximab), a novel cancer treatment. As its Chief Financial Officer, Mr. Lynch led negotiations to form the major partnership between ImClone and BMS. Earlier in his career, he served in various financial positions at BMS over a 15-year tenure. He served on the board of directors and the audit committee of U.S. Oncology, Inc. for five years until December 2010, when it was acquired by McKesson. Mr. Lynch received his B.A. in mathematics from Wesleyan University and his M.B.A. from the Darden Graduate School of Business Administration at the University of Virginia.

Key Qualifications and Expertise:

Mr. Lynch has extensive knowledge and experience with respect to the biotechnology and pharmaceutical industries. With service on multiple public company boards, Mr. Lynch brings significant management and financial expertise and extensive experience in areas of corporate governance to our Board.

William R. Sellers, M.D.

Other Current Board Experience:

Civetta Therapeutics (private)

Previous Board Experience within the Last Five Years:

Peloton Therapeutics (private)

Professional Highlights:

Since 2017, Dr. Sellers has served as a Core Institute Member at the Broad Institute and a Professor of Medicine at the Dana-Farber Institute and Harvard Medical School where he is responsible for running a research group focused on translating genomic discoveries into new therapeutics. In 2019, Dr. Sellers co-founded Civetta Therapeutics where he serves as a member of the board of directors. Dr. Sellers also serves as a member of the scientific advisory board for several biopharmaceutical companies, including Ideaya Biosciences (NASDAQ: IDYA), Epidarex Capital, Servier Pharmaceuticals, and Astex Pharmaceuticals. Furthermore, he served as a member of the board of directors for Peloton Therapeutics from 2017 to 2019. Dr. Sellers previously served as Vice President / Global Head of Oncology at Novartis Institutes for BioMedical Research from 2005 to 2016 where he led preclinical drug discovery and early clinical development. Appointed by President Barack Obama, he also served as a member of the National Cancer Advisory Board from 2011 to 2016. He previously was an Associate Professor of Medicine at the Dana-Farber Cancer Institute and Harvard Medical School and an Associate Member of the Broad Institute. Dr. Sellers received his B.S. in biology from Georgetown University in 1982 and M.D. from the University of Massachusetts Medical School in 1986. He completed his internship and residency in internal medicine at the University of California San Francisco in 1989 and trained in medical oncology at the Dana-Farber Cancer Institute.

Key Qualifications and Expertise:

Dr. Sellers has extensive research and drug discovery experience and broad scientific and medical knowledge.

CONTINUING DIRECTORS:

Wendy L. Dixon, Ph.D.

Other Current Board Experience:

Alkermes PLC (ALKS)
Arvinas, Inc. (ARVN)
Incyte Corporation (INCY)

Previous Board Experience within the Last Five Years:

Sesen Bio, Inc. (SESN)
Voyager Therapeutics, Inc. (VYGR)

Professional Highlights:

Dr. Dixon served as Chief Marketing Officer and President, Global Marketing for Bristol Myers Squibb Company from December 2001 until May 2009 and served on the Chief Executive Officer's Executive Committee. From 1996 to 2001, she was Senior Vice President, Marketing—USHH at Merck & Co., Inc., and prior to that she held executive management positions at West Pharmaceuticals, Osteotech, Inc. and Centocor, Inc. and various positions at SmithKline & French Pharmaceuticals in marketing, regulatory affairs, project management and as a biochemist.

Key Qualifications and Expertise:

Dr. Dixon has extensive technical background and leadership experience in drug development, commercialization, marketing and regulatory affairs in the pharmaceutical industry.

Ramy Ibrahim, M.D.

Other Current Board Experience:

Surface Oncology, Inc. (SURF)

Previous Board Experience within the Last Five Years:

None

Professional Highlights:

Dr. Ibrahim is a medical oncologist who has served as the Chief Medical Officer of BitBio since October of 2020 and as the Chief Medical Officer of CMO Milkyway Advisors since January of 2021. Dr. Ibrahim also serves as a board member for Surface Oncology, a scientific advisory board member for Harpoon Therapeutics, and as a clinical advisor at the Parker Institute for Cancer Immunotherapy. He formerly served as chief medical officer at the Parker Institute for Cancer Immunotherapy from 2016 to 2021. Prior to the Parker Institute, Dr. Ibrahim served as the vice president of clinical development for immuno-oncology AstraZeneca from 2011 to 2016. In this role, he led the development of the early checkpoint inhibitor antibodies durvalumab and tremelimumab. From 2005 to 2011, at Bristol-Myers Squibb, Dr. Ibrahim played a key role in the clinical development of ipilimumab, the first FDA-approved immune checkpoint inhibitor, from early phase II through multiple global launches. He also played a key role in the early development of nivolumab, as well as the development of anti-PD-L1 and anti-CD137 antibody programs. Dr. Ibrahim trained in medicine and medical oncology at Cairo University then conducted bench and clinical immunotherapy research at the cancer vaccine branch of the National Cancer Institute in Bethesda, Maryland, prior to moving into industry.

Key Qualifications and Expertise:

Dr. Ibrahim has significant industry knowledge and drug development experience, as well as broad scientific and medical expertise.

Nick Leschly

Other Current Board Experience:

Synlogic, Inc. (SYBX)
Biotechnology Innovation Organization (BIO) (private)

Previous Board Experience within the Last Five Years:

Proclara Biosciences, Inc. (private)

Professional Highlights:

Formerly a partner of Third Rock Ventures, L.P. since its founding in 2007, Mr. Leschly played an integral role in the overall formation, development and business strategy of several of Third Rock's portfolio companies, including Agios Pharmaceuticals, Inc. and Edimer Pharmaceuticals, Inc. Prior to joining Third Rock, he worked at Millennium Pharmaceuticals, Inc. (now a subsidiary of Takeda), leading several early-stage drug development programs and served as the product and alliance leader for VELCADE. Mr. Leschly also founded and served as Chief Executive Officer of MedXtend Corporation. He received his B.S. in molecular biology from Princeton University and his M.B.A. from The Wharton School of the University of Pennsylvania.

Key Qualifications and Expertise:

Mr. Leschly has deep operating and historical experience with our Company gained from serving as our President, Chief Executive Officer and member of the Board. In addition, Mr. Leschly also has significant experience in the venture capital industry and drug research and development.

Denice Torres

Other Current Board Experience:

Glaukos Corporation (GKOS)
Karuna Therapeutics (KRTX)
National Resilience Inc. (private)

Previous Board Experience within the Last Five Years:

None

Professional Highlights:

Ms. Torres is currently chief executive officer of The Ignited Company, a Pennsylvania-based consulting firm she founded in 2017. From 2005 to 2017, she served in various senior leadership roles at Johnson & Johnson (J&J). From 2015 to 2017, she was chief strategy and transformation officer for J&J's global medical device business, a \$25 billion business with more than 50,000 employees. From 2011 to 2015, she was president of J&J McNeil Consumer Healthcare, where she led the recovery of OTC brands, including the iconic Tylenol portfolio, by transforming business operations, manufacturing, quality systems and commercialization approaches, and creating high levels of employee engagement across all functions of the business. From 2009 to 2011, she served as president of J&J Janssen Pharmaceuticals, Neuroscience, and from 2006-2009 she held various marketing positions at J&J. Ms. Torres was the sole recipient of the prestigious J&J HONOR award in 2016 for her work in diversity and inclusion, and she was named the 2015 Woman of the Year by the Healthcare Businesswomen's Association. Before joining J&J, Ms. Torres built a successful, 14-year career at Eli Lilly and Company, where she focused on marketing and business unit management. She is also the founder of The Mentoring Place, a nonprofit organization offering free executive mentoring to help women achieve their careers goals. Ms. Torres holds a B.S. in Psychology from Ball State University, a J.D. from Indiana University and an MBA from the University of Michigan. She is a member of the Michigan Bar Association.

Key Qualifications and Expertise:

Ms. Torres has extensive executive and operational leadership experience. In addition, Ms. Torres brings to our Board expertise in cultural transformation and leadership development in the healthcare and pharmaceutical industries.

Mark Vachon

Other Current Board Experience:

Beacon Mobility (private)
Klöckner Pentaplast Group (private)
Numotion (private)

Previous Board Experience within the Last Five Years:

Charitable Health and Retirement Trust (private)

Professional Highlights:

Mr. Vachon served as an Executive Vice President Sales, Integration and Operations at Change Healthcare Holdings, Inc. from November 2016 to April 2018. For over 30 years, Mr. Vachon held a variety of leadership positions across the General Electric organization, and was a company officer beginning in 1999 and a member of GE's Corporate Executive Council. Mr. Vachon was President and CEO of GE Healthcare Americas from 2009 to 2010, and prior to that he was President and CEO of Global Diagnostics Imaging, GE Healthcare, between 2006 and 2009. Between 2003 and 2006, Mr. Vachon was Executive Vice President and CFO of GE Healthcare. Mr. Vachon is currently a member of the D'Amore McKim Business School Dean's Executive Council. Mr. Vachon holds a B.S. in Finance from Northeastern University and an M.A. from Boston College.

Key Qualifications and Expertise:

Mr. Vachon's corporate leadership experience and financial expertise make him a valuable contributor to our Board. In addition, Mr. Vachon has extensive experience in executive operating roles and in the healthcare field on a global basis. He is an "audit committee financial expert" with particular experience in matters faced by the audit committee of a life sciences company.

Identifying and Evaluating Director Nominees

Our Board is responsible for selecting its own members. The Board delegates the selection and nomination process to the Nominating and Corporate Governance Committee, with the expectation that other members of the Board, and of management, will be requested to take part in the process as appropriate.

Generally, our Nominating and Corporate Governance Committee identifies candidates for director nominees in consultation with management, through the use of search firms or other advisors, and through the recommendations submitted by stockholders or through such other methods as the Nominating and Corporate Governance Committee deems to be helpful in identifying candidates. Once candidates have been identified, our Nominating and Corporate Governance Committee confirms that the candidates meet all of the minimum qualifications for director nominees established by the Nominating and Corporate Governance Committee. The Nominating and Corporate Governance Committee may gather information about the candidates through interviews, detailed questionnaires, background checks or any other means that the Nominating and Corporate Governance Committee deems to be appropriate in the evaluation process. The Nominating and Corporate Governance Committee then meets as a group to discuss and evaluate the qualities and skills of each candidate, both on an individual basis and taking into account the overall composition and needs of our Board. Based on the results of the evaluation process, the Nominating and Corporate Governance Committee recommends candidates for the Board's approval as director nominees for election to the Board.

Director Qualifications and Diversity

Our Nominating and Corporate Governance Committee will consider, among other things, the following qualifications, skills and attributes when recommending candidates for the Board's selection as director nominees for the Board and as candidates for appointment to the Board's committees: a director nominee shall have the highest personal and professional integrity, shall have demonstrated exceptional ability and judgment, and shall be most effective, in conjunction with the other director nominees to the Board, in collectively serving the long-term interests of the stockholders.

In evaluating proposed director candidates, our Nominating and Corporate Governance Committee may consider, in addition to the minimum qualifications and other criteria for board membership approved by the Board from time to time, all facts and circumstances that it deems appropriate or advisable, including, among other things, diversity considerations, the skills of the proposed director candidate, his or her depth and breadth of professional experience or other background characteristics, his or her independence, and the needs of the Board. Our corporate governance guidelines also provide that diversity on the Board should be considered by our Nominating and Corporate Governance Committee in the director evaluation and nomination process. While we do not have a formal policy with respect to diversity, our Nominating and Corporate Governance Committee believes that it is essential that the members of the Board represent diverse viewpoints. Our Nominating and Corporate Governance Committee believes that the backgrounds and qualifications of our directors, considered as a group, should provide a composite mix of experience, knowledge and abilities that will allow our Board to promote our strategic objectives and fulfill its responsibilities to our stockholders, and considers diversity of gender, race,

national origin, education, professional experience, and differences in viewpoints and skills when evaluating proposed director candidates.

Our Nominating and Corporate Governance Committee's priority in selecting directors is identification of persons who will further the interests of our Company through his or her established record of professional accomplishment, the ability to contribute positively to the collaborative culture among directors, and professional and personal experiences and expertise relevant to our growth strategy. The Nominating and Corporate Governance Committee will consider candidates recommended by stockholders. The policy adopted by the Nominating and Corporate Governance Committee provides that candidates recommended by stockholders are given appropriate consideration in the same manner as other candidates.

The expertise and experience, characteristics and committee assignments for each of our directors are summarized in the table below:

	Director Nominees			Continuing Directors				
	Agwunobi	Lynch	Sellers	Dixon	Ibrahim	Leschly	Torres	Vachon
Expertise & Experience								
General Management Experience	✓	✓				✓	✓	✓
Financial Experience		✓						✓
Audit Committee Financial Expertise		✓						✓
Business Development, Corporate Development, and Mergers & Acquisitions Experience		✓		✓		✓	✓	✓
Discovery Research Experience			✓		✓			
Drug Development Experience			✓	✓	✓	✓		
Commercial Experience	✓			✓			✓	
International Business Experience	✓			✓	✓			✓
Public Policy Experience	✓							
Operations Experience		✓				✓	✓	✓
Other Public Company Board Service		✓		✓	✓	✓	✓	
Director Characteristics								
Independence	✓	✓	✓	✓	✓		✓	✓
Term expiring	2021	2021	2021	2022	2023	2023	2022	2023
Age	56	63	60	65	46	48	61	62
Tenure on Board	2017	2011	2019	2013	2021	2010	2020	2014
Gender	M	M	M	F	M	M	F	M
Ethnic or Racial Diversity	✓				✓		✓	
Committee Composition								
Audit Committee		✓		✓				Chair
Compensation Committee		Chair		✓			✓	
Nominating & Corporate Governance Committee	Chair				✓		✓	

Board Independence

Our Board has determined, upon the recommendation of our Nominating and Corporate Governance Committee, that each of our directors, other than Nick Leschly who serves as our President and Chief Executive Officer, has no relationship that would interfere with the exercise of independent judgment in carrying out the responsibilities of a director and is independent within the meaning of the director independence standards of the Nasdaq Stock Market rules and the SEC. At least annually, our Board evaluates all relationships between us and each director in light of relevant facts and circumstances for the purposes of determining whether a material relationship exists that might signal a potential conflict of interest or otherwise interfere with such director's ability to satisfy his or her responsibilities as an independent director. Based on this evaluation, our Board makes an annual determination of whether each director is independent within the meaning of NASDAQ, and the SEC independence standards.

Board Meetings and Attendance

Our Board held nine meetings during the fiscal year ended December 31, 2020. In the fiscal year ended December 31, 2020, each of our directors attended at least 75% of the meetings of the Board and the committees of the Board, in the period for which he or she served, with the exception of Douglas Melton, who resigned from our Board on September 30, 2020.

We encourage our directors to attend the Annual Meeting of Stockholders. Of the eight members of our Board at the time of last year's Annual Meeting, all eight attended the meeting.

Board Committees

Our Board has established three standing committees: the Audit Committee, the Compensation Committee and the Nominating and Corporate Governance Committee, each of which is comprised solely of independent directors, and is described more fully below. Each of the Audit Committee, Compensation Committee and Nominating and Corporate Governance Committee operates pursuant to a written charter and each committee reviews and assesses the adequacy of its charter and submits its charter to the Board for approval on an annual basis. The charters for the Audit Committee, Compensation Committee and Nominating and Corporate Governance Committee are all available on our website www.bluebirdbio.com in the *Investors & Media—Corporate Governance* section. Our Board establishes additional committees from time to time.

Audit Committee

Our Audit Committee is currently composed of Dr. Dixon, Mr. Lynch, and Mr. Vachon, with Mr. Vachon serving as chair of the committee. Our Board has determined that each member of the Audit Committee meets the independence requirements of Rule 10A-3 under the Securities Exchange Act of 1934, as amended, and the applicable listing standards of NASDAQ. Our Board has determined that Mr. Lynch and Mr. Vachon are "audit committee financial experts" within the meaning of the SEC regulations and applicable listing standards of NASDAQ. During the fiscal year ended December 31, 2020, the Audit Committee met four times. The report of the Audit Committee is included in this Proxy Statement under *Report of the Audit Committee*. The Audit Committee's responsibilities include:

- appointing, approving the compensation of, and assessing the independence of our independent registered public accounting firm;
- approving audit and permissible non-audit services, and the terms of such services, to be provided by our independent registered public accounting firm;
- reviewing the audit plan (both internal and external) with the independent registered public accounting firm and members of management responsible for performing our internal audit and preparing our financial statements;
- reviewing and discussing with management and the independent registered public accounting firm our annual and quarterly financial statements and related disclosures, including critical audit matters as well as critical accounting policies and practices used by us;
- reviewing the adequacy of our internal control over financial reporting;
- overseeing the qualifications, independence and performance of our internal audit function;
- establishing policies and procedures for the receipt and retention of accounting-related complaints and concerns;

- recommending, based upon the Audit Committee’s review and discussions with management and the independent registered public accounting firm, whether our audited financial statements shall be included in our Annual Report on Form 10-K;
- monitoring the integrity of our financial statements and our compliance with legal and regulatory requirements as they relate to our financial statements and accounting matters;
- preparing the Audit Committee report required by the rules of the SEC to be included in our annual proxy statement;
- reviewing all related party transactions for potential conflict of interest situations and approving all such transactions;
- monitoring compliance with our investment policy;
- overseeing our enterprise risk assessment program; and
- reviewing quarterly earnings releases.

Compensation Committee

Our Compensation Committee is currently composed of Dr. Dixon, Mr. Lynch and Ms. Torres, with Mr. Lynch serving as chair of the committee. Our Board has determined each member of the Compensation Committee is “independent” as defined under the applicable listing standards of NASDAQ. In addition, each member qualifies as an “outside director” within the meaning of Section 162(m) of the Internal Revenue Code of 1986, as amended, and as a non-employee director, as defined in Rule 16b-3 of the Securities Exchange Act. During the fiscal year ended December 31, 2020, the Compensation Committee met nine times. The Compensation Committee’s responsibilities include:

- annually reviewing and approving corporate goals and objectives relevant to the compensation of our Chief Executive Officer;
- evaluating the performance of our Chief Executive Officer in light of such corporate goals and objectives and determining the compensation of our Chief Executive Officer;
- reviewing and approving the compensation of our other executive officers and certain other members of senior management;
- appointing, compensating and overseeing the work of any compensation consultant, legal counsel or other advisor retained by the Compensation Committee;
- conducting the independence assessment outlined in NASDAQ rules with respect to any compensation consultant, legal counsel or other advisor retained by the Compensation Committee;
- annually reviewing and reassessing the adequacy of the committee charter in its compliance with the listing requirements of NASDAQ;
- reviewing and establishing our overall management compensation, philosophy and policy;
- overseeing and administering our compensation and similar plans;
- reviewing and approving our policies and procedures for the grant of equity-based awards;
- reviewing and making recommendations to the Board with respect to director compensation;
- reviewing and discussing with management the compensation discussion and analysis to be included in our annual proxy statement or Annual Report on Form 10-K; and
- reviewing and discussing with the Board corporate succession plans for our Chief Executive Officer and other key executives.

Historically, our Compensation Committee has made most of the significant adjustments to annual compensation, determined cash incentive and equity awards and established new performance objectives at one or more meetings held during the first and last quarters of the year. However, our Compensation Committee also considers matters related to individual compensation, such as compensation for new executive hires, as well as high-level strategic issues, such as the efficacy of our compensation strategy, potential modifications to that strategy and new trends, plans or approaches to compensation, at various meetings throughout the year. Generally, the Compensation Committee’s process consists of two related elements: the determination of compensation levels and the establishment of performance objectives for the current year. For executives other than our Chief Executive Officer, our Compensation Committee solicits and considers evaluations

and recommendations submitted to the Compensation Committee by our Chief Executive Officer. In the case of our Chief Executive Officer, the evaluation of his performance is conducted by the Compensation Committee, which determines any adjustments to his compensation as well as awards to be granted. For all executives and directors as part of its deliberations, the Compensation Committee may review and consider, as appropriate, materials such as financial reports and projections, operational data, tax and accounting information, tally sheets that set forth the total compensation that may become payable to executives in various hypothetical scenarios, executive and director stock ownership information, company stock performance data, analyses of historical executive compensation levels and current Company-wide compensation levels and recommendations of our Chief People Officer, including analyses of executive and director compensation paid at a peer group of other companies approved by our Compensation Committee. The Compensation Committee may delegate its authority to grant certain equity awards to certain individuals to our Chief Executive Officer and in 2020, has delegated such authority to Mr. Leschly. For more information, see *Executive Officer and Director Compensation—Compensation Discussion and Analysis—Equity Granting Practices* below.

Nominating and Corporate Governance Committee

Our Nominating and Corporate Governance Committee is composed of Dr. Agwunobi, Dr. Ibrahim, and Ms. Torres, with Dr. Agwunobi serving as chair of the committee. Our Board has determined that each member of the Nominating and Corporate Governance Committee is “independent” as defined under the applicable listing standards of NASDAQ. During fiscal year ended December 31, 2020, the Nominating and Corporate Governance Committee met three times. The Nominating and Corporate Governance Committee’s responsibilities include:

- developing and recommending to the Board for its approval criteria for membership of the Board and its committees;
- establishing procedures for identifying and evaluating Board candidates, including candidates recommended by stockholders;
- identifying individuals qualified to become members of the Board;
- recommending to the Board the persons to be nominated for election as directors and to each of the committees of the Board;
- developing and recommending to the Board a set of corporate governance guidelines and Code of Conduct and Business Ethics; and
- overseeing the evaluation of the Board.

The Nominating and Corporate Governance Committee oversees an annual self-evaluation process of the Board and its committees with the assistance of an external advisor specializing in strategic planning and organizational development. The results of the self-evaluation are presented to the Nominating and Corporate Governance Committee, which determines what actions, if any, to present to the Board and the other committees to further enhance the performance and effectiveness of the Board and its committees.

Non-Management Director Meetings

In addition to the meetings of the committees of the Board described above, in connection with the Board meetings, the non-management directors met four times in executive session during the fiscal year ended December 31, 2020. The Chair of the Board presides at these executive sessions. The Audit Committee and the Board have established a procedure whereby interested parties may make their concerns known to non-management directors, which is described on our website.

Leadership Structure and Risk Oversight

Our Board is currently chaired by Mr. Lynch. As a general policy, our Board believes that separation of the positions of Chair and Chief Executive Officer reinforces the independence of the Board from management, creates an environment that encourages objective oversight of management’s performance and enhances the effectiveness of the Board as a whole. As such, Mr. Leschly serves as our President and Chief Executive Officer while Mr. Lynch serves as our Chair of the Board but is not an officer.

We face a number of risks in our business, including risks related to clinical research and development of our programs in severe genetic disease and oncology; manufacturing and supply chain; regulatory reviews and approvals; commercial operations and our ability to obtain reimbursement for our products if, and when, they gain marketing approval; growth and capability expansion in the United States and Europe; intellectual property filings, prosecution, maintenance and

challenges; the establishment and maintenance of strategic alliances; competition; litigation and government investigations; and the ability to access additional funding for our business; among other risks. Our management is responsible for the day-to-day management of the risks that we face, while our Board, as a whole and through its committees, has responsibility for the oversight of risk management.

Our Board performs its oversight role by using several different levels of review. Our Chair meets regularly with our Chief Executive Officer and other executive officers to discuss our strategy and material risks. Members of senior management attend the quarterly Board meetings, present on strategic matters involving our business, and are available to address any questions or concerns raised by the Board on risk management-related issues and any other matters. Our Board reviews the risks, including any environmental or social governance risks, associated with our business strategies periodically throughout the year as part of its consideration of undertaking any such business strategies.

Each of the committees of our Board also oversees the management of our risk that falls within the committee's areas of responsibility. In performing this function, each committee has full access to management, as well as the ability to engage advisors. The Audit Committee oversees our enterprise risk management program as it relates to our operations by identifying the primary risks associated with our operations and corporate functions, receiving periodic updates on activities to manage such risks, and providing reports to the Board regarding such activities. In carrying out its responsibilities for the oversight of operational risk management, members of the Audit Committee regularly discuss with management our risk exposures in the areas of financial reporting, internal controls, information security, and our legal and regulatory compliance programs, and the steps we take to manage them. Our Chief Financial Officer, our Chief Operating and Legal Officer, our Chief Compliance Officer all periodically provide reports to the Audit Committee and are responsible for identifying, evaluating and implementing risk management controls and methodologies to address any identified risks. Our Audit Committee also meets privately with representatives from our independent registered public accounting firm as part of its oversight of our risk management. The Compensation Committee assists the Board in fulfilling its oversight responsibilities with respect to the management of risks arising from our compensation policies and programs and succession planning for our executive officers, and evaluates potential risks associated with independent director compensation for consideration by the full Board. The Nominating and Corporate Governance Committee assists the Board in fulfilling its oversight responsibilities with respect to the management of risks associated with Board organization, membership and structure, succession planning for our directors, and corporate governance.

Compensation Committee Interlocks and Insider Participation

Dr. Dixon, Mr. Lynch, Dr. Schenkein and Ms. Torres served as members of our Compensation Committee during the year ended December 31, 2020. None of the members of our Compensation Committee have at any time been one of our officers or employees. None of our executive officers currently serves, or in the past fiscal year has served, as a member of the board of directors or on a compensation committee of any entity that has one or more executive officers serving on our Board or Compensation Committee. For a description of transactions between us and members of our Compensation Committee and affiliates of such members, please see *Certain Relationships and Related Party Transactions*.

Code of Business Conduct and Ethics and Corporate Governance Guidelines

We have adopted a Code of Business Conduct and Ethics for our directors, officers and employees, including our President and Chief Executive Officer, Principal Financial Officer, Principal Accounting Officer, and Controller (or persons performing an equivalent function). A copy of our Code of Business Conduct and Ethics may be accessed free of charge by visiting the Company's website at www.bluebirdbio.com and going to the *Investors & Media—Corporate Governance* section or by requesting a copy in writing from Jason F. Cole, Secretary, at our Cambridge, Massachusetts office. We intend to post on its website any amendment to, or waiver under, a provision of the Code of Business Conduct and Ethics that applies to our President and Chief Executive Officer, Principal Financial Officer, Principal Accounting Officer, or Controller (or persons performing an equivalent function) within four business days following the date of such amendment or waiver.

A copy of the Corporate Governance Guidelines may also be accessed free of charge by visiting the website at www.bluebirdbio.com and going to the *Investors & Media—Corporate Governance* section or by requesting a copy from Jason F. Cole, Secretary, at our Cambridge, Massachusetts office.

Our Environmental Sustainability and Social Responsibility Efforts

For patients and society to benefit from the therapies we develop, we believe they must be available to those who will benefit from them. To enable access to our approved and potential future products following commercial launch, we are continuing to engage in discussions with stakeholders across the healthcare system, including public and private payers,

patient advocates and organizations, professional societies, and healthcare providers. These discussions are part of a broader ongoing dialogue exploring pathways for bringing our product and potential future products to patients at a sustainable cost.

In addition, as a leading gene therapy company, the way we operate, the work we do, and the support we provide to our local communities is tied to our desire to extend and improve the lives of our patients. We are committed to patient advocacy and community endeavors that promote and improve the understanding of severe genetic disease and cancer. Our company participates in charitable activities relevant to our business and linked to our mission, vision and values. For example, we provide, support and sponsor diversity and inclusion efforts both within our company and in our communities. We support educational and cultural institutions in our communities, and we also encourage employee volunteerism, partnering with community service organizations to provide opportunities for employees to donate time and talents to assist neighbors in need. On top of our commitments to patient access and social responsibility, we believe that we have a responsibility to monitor and control our ecological impact and adopt best practices on environmental and social issues that may have a material effect on corporate strategy, risks, opportunities or performance.

We view our employees as our most valuable asset and we believe that by creating a positive culture together we can drive positive business and patient impact. We demonstrate this by providing a comprehensive benefits package, including health and wellness benefits, commuting stipend, paid sabbatical and parental leave. In addition, we believe in helping our employees to continue to grow at bluebird through one-on-one coaching, leadership development, and Employee Resource Groups. We also offer an employee stock purchase plan to promote employee ownership of our shares and to allow employees to share in our success.

EXECUTIVE OFFICERS

The following table sets forth information regarding our executive officers as of April 19, 2021:

<u>Name</u>	<u>Age</u>	<u>Position(s)</u>
Executive Officers:		
Nick Leschly (1)	48	President, Chief Executive Officer and Director (Principal Executive Officer)
William D. Baird, III	49	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)
Philip Gregory, D. Phil.	50	Chief Scientific Officer
Jason F. Cole, Esq.	48	Chief Operating and Legal Officer and Secretary
Andrew Obenshain	47	President, Severe Genetic Diseases

(1) Nick Leschly is also a director and his biographical information appears on page 10.

William D. Baird, III – Mr. Baird has served as our Chief Financial Officer since February 2019, our Principal Financial Officer since March 2019 and our Principal Accounting Officer since February 2021. Mr. Baird served as Chief Financial Officer of Amicus Therapeutics, Inc. from April 2012 until December 2018. From April 2005 until April 2012, Mr. Baird served as Chief Financial Officer of PTC Therapeutics, Inc. (PTC). Before that, Mr. Baird held various positions of increasing responsibility with PTC from 2002 to 2005. Mr. Baird previously worked in the life science practice at L.E.K. Consulting, a strategy consulting firm, from 1999 to 2002, and at First Union National Bank as a corporate underwriter from 1994 to 1997. Since June 2018, Mr. Baird has served on the board of directors of Axcella Health, a biotechnology company. Mr. Baird received a B.S. from Georgetown University's Edmund A. Walsh School of Foreign Service, and an M.B.A. from The Wharton School of the University of Pennsylvania.

Philip Gregory, D. Phil. – Dr. Gregory has served as our Chief Scientific Officer since June 2015. Prior to joining us, Dr. Gregory was formerly with Sangamo BioSciences, where he held multiple leadership positions over a nearly 15-year tenure, most recently serving as Chief Scientific Officer and Senior Vice President, Research. In this role, he was responsible for the scientific direction and strategic research planning for the company. Dr. Gregory played an integral role in Sangamo's partnerships and drove early discovery and development for several product candidates in multiple therapeutic areas. Prior to joining Sangamo, he was a postdoctoral fellow at Ludwig-Maximilians-Universität in Munich, Germany. Dr. Gregory holds a D. Phil in biochemistry from Oxford University, Keble College and a B.Sc. in microbiology from Sheffield University.

Jason F. Cole, Esq. – Mr. Cole has served as our Chief Operating and Legal Officer and Secretary since February 2019. Prior to this role, Mr. Cole served as our Chief Legal Officer and Secretary since March 2016 and also previously served as our Senior Vice President, General Counsel and Secretary from March 2014 to March 2016. Prior to joining us, Mr. Cole served as Executive Vice President, Corporate Development and General Counsel at Zalicus Inc. from September 2011 through March 2014, and as Senior Vice President, General Counsel of Zalicus and its predecessor company CombinatoRx, Incorporated from January 2006 to September 2011. From 1999 to 2006, Mr. Cole was a corporate and securities attorney at Ropes & Gray LLP. Mr. Cole received an A.B. in Government from Dartmouth College and a J.D. from Columbia University School of Law.

Andrew Obenshain – Mr. Obenshain has served as our President, Severe Genetic Diseases since October 2020. Prior to this role, Mr. Obenshain served as our Senior Vice President, Head of Europe since 2016. Prior to joining us, Mr. Obenshain was formerly with Shire in Paris, France since 2015 where he was the general manager of France and Benelux overseeing a portfolio including seven rare disease products. Prior to Shire, Mr. Obenshain held various roles with increasing responsibility in business development, marketing and global commercial operations at Genzyme and Sanofi from 2007 to 2013. Mr. Obenshain received his M.B.A. from Northwestern University's Kellogg School of Management, and his B.A. in genetics, cell and developmental biology from Dartmouth College.

PROPOSAL 2
NON-BINDING ADVISORY VOTE ON EXECUTIVE COMPENSATION

Our Board is committed to excellence in governance. As part of that commitment, and as required by Section 14A(a)(1) of the Securities Exchange Act, our Board is providing our stockholders with an opportunity to approve, on a non-binding advisory basis, the compensation of our named executive officers.

As described below under *Executive Officer and Director Compensation—Compensation Discussion and Analysis*, we have developed a compensation policy that is designed to attract and retain key executives responsible for our success and motivate management to enhance long-term stockholder value. We believe our compensation policy strikes an appropriate balance between the implementation of responsible, measured compensation practices and the effective provision of incentives for our named executive officers to exert their best efforts for our success.

For the reasons discussed above, the Board unanimously recommends that our stockholders vote in favor of the following resolution:

“RESOLVED, that the Company’s stockholders hereby approve, on a non-binding advisory basis, the compensation of the named executive officers, as disclosed in the Company’s proxy statement for the 2021 Annual Meeting of Stockholders pursuant to the compensation disclosure rules of the Securities and Exchange Commission, including the Compensation Discussion and Analysis, Summary Compensation Table and the other compensation related tables and disclosure.”

The resolution will be approved, on a non-binding advisory basis, if the votes cast FOR exceed the votes cast AGAINST the proposal. Abstentions and broker non-votes will have no effect on the voting of this proposal. As this vote is advisory, it will not be binding upon the Board or the Compensation Committee and neither our Board nor the Compensation Committee will be required to take any action as a result of the outcome of this vote. However, our Board and the Compensation Committee value the opinions of our stockholders, and the Compensation Committee will carefully consider the outcome of this vote when considering future executive compensation policies.

THE BOARD UNANIMOUSLY RECOMMENDS THAT YOU VOTE

FOR

THE NON-BINDING ADVISORY RESOLUTION APPROVING THE COMPENSATION OF OUR NAMED EXECUTIVE OFFICERS

(PROPOSAL 2 ON YOUR PROXY CARD)

PROPOSAL 3

ADVISORY VOTE ON THE FREQUENCY OF FUTURE NON-BINDING ADVISORY VOTES ON EXECUTIVE COMPENSATION

As part of the Board’s commitment to excellence in corporate governance, and as required by the Section 14A(a)(2) of the Securities Exchange Act, the Board is providing our stockholders with an opportunity to provide an advisory vote to determine whether future non-binding advisory stockholder votes on the compensation of our named executive officers should occur every one, two or three years.

After careful consideration, our Board has determined that an annual advisory vote on executive compensation remains the most appropriate approach for our company because it allows stockholders to provide timely, direct input on our executive compensation philosophy, policies and practices as disclosed in the proxy statement each year. The Board believes that an annual vote provides the greatest opportunity for stockholder input and constructive communication, by enabling the vote to correspond to the compensation information presented in this proxy statement for each Annual Meeting. In addition, an annual advisory vote on the compensation of our named executive officers is consistent with our policy of reviewing our compensation programs annually. We believe the continuation of an annual vote would be the best governance practice for our company at this time.

The frequency choice that receives the highest number of votes cast will be considered to be the preferred frequency of our stockholders with which we are to hold future non-binding stockholder advisory “say-on-pay” votes on the compensation of our named executive officers. Our Board will take into consideration the outcome of this vote in determining the frequency of future non-binding, advisory votes on the compensation of our named executive officers. However, because this vote is advisory and non-binding, our Board may decide that it is in our best interests and those of our stockholders to hold the advisory vote to approve the compensation of our named executive officers more or less frequently.

THE BOARD UNANIMOUSLY RECOMMENDS THAT YOU VOTE

FOR ONCE EVERY YEAR

FOR THE FREQUENCY OF FUTURE NON-BINDING ADVISORY VOTES ON EXECUTIVE COMPENSATION

(PROPOSAL 3 ON YOUR PROXY CARD)

EXECUTIVE OFFICER AND DIRECTOR COMPENSATION

Compensation Discussion and Analysis

Our Compensation Committee is responsible for overseeing the total compensation of our senior management team, which consists of our executive officers and certain other senior managers. In this capacity, our Compensation Committee designs, implements, reviews and approves all compensation for our Chief Executive Officer and our other executive officers. This section discusses the principles underlying our policies and decisions with respect to the compensation of our named executive officers, and all material factors relevant to an analysis of these policies and decisions. Our named executive officers for the fiscal year ended December 31, 2020, were:

- Nick Leschly, our Chief Executive Officer and Principal Executive Officer;
- William D. Baird, III, our Chief Financial Officer, Principal Financial Officer and Principal Accounting Officer;
- Philip Gregory, D. Phil., our Chief Scientific Officer;
- David Davidson, M.D., our former Chief Medical Officer; and
- Joanne Smith-Farrell, our former Chief Operating Officer, Oncology.

Against the challenging backdrop of the COVID-19 pandemic, which had various impacts across our business, 2020 was a year in which we made significant progress across our programs in both severe genetic diseases and in oncology, while also managing setbacks in our clinical programs as well as our early-stage commercialization efforts. To that end, our Compensation Committee took multiple steps in 2020 to respond to the COVID-19 pandemic and its impacts on our business, and in response to concerns expressed by our stockholders, with whom we proactively engaged to deepen our understanding of their concerns.

As part of our comprehensive business review in the second quarter of 2020, and with the goal of ensuring our ability to execute on our strategy in light of the COVID-19 pandemic, certain senior executives voluntarily elected to reduce their base salary for a 12-month period beginning May 2020. Each participant received a grant of restricted stock units pursuant to our 2013 Stock Option and Incentive Plan equal to 80% of the amount of his or her salary reduction, which vests monthly over the 12-month period. Our Chief Executive Officer reduced his base salary by approximately 100% during this 12-month period, and each other participating senior executive reduced his or her base salary by 20%.

The Compensation Committee also reviewed our 2020 annual incentive plan and determined that (with limited exceptions) incentive awards would be paid in an equal mix of cash and fully-vested stock rather than entirely in cash. In addition, given the uncertainty of 2020 and the course of the COVID-19 pandemic, the Compensation Committee determined not to adjust the pre-established 2020 goals for purposes of the annual incentive program. Instead, the Compensation Committee determined that maintaining our pre-established 2020 goals maximized the potential for stockholder value creation. The Compensation Committee reviewed our 2020 performance against our 2020 goals; however, taking into account the impact the COVID-19 pandemic has had on our business, operations, and industry, in determining the overall performance level. As a consequence and consistent with our pay for performance philosophy, the Compensation Committee held the senior executives accountable and used its discretion to determine that the Chief Executive Officer did not earn an annual incentive award and the performance level applicable to him was 0%. Our overall company performance level in 2020 applicable to other senior executives, with limited exceptions, was determined to be 50%.

Furthermore, in 2021 we began to grant performance-based restricted stock units based on relative total shareholder return to our Chief Executive Officer, to further tie executive compensation to stock price performance and in response to stockholder feedback. This is intended as a first step to provide a greater emphasis on performance-based long-term incentive compensation, in response to our stockholder feedback, and the Compensation Committee intends to regularly evaluate this allocation as part of its overall review of our executive compensation program.

Company Background

We are a biotechnology company committed to researching, developing, and commercializing potentially transformative gene therapies for severe genetic diseases and cancer. We have built an integrated product platform with broad therapeutic potential in a variety of indications based on our lentiviral gene addition platform, gene editing and cancer immunotherapy capabilities. We have an early-stage commercial program with ZYNTEGLO, a treatment for transfusion-dependent beta-thalassemia, and late-stage clinical programs with LentiGlobin for sickle cell disease (SCD) and elivaldogene autotemcel (eli-cel; formerly Lenti-D gene therapy) as a treatment for cerebral adrenoleukodystrophy. Our recently-approved product candidate in multiple myeloma, idecabtagene vicleucel (ide-cel; being marketed as Abecma in the United States) is partnered with Bristol-Myers Squibb (BMS).

In 2020, the Company demonstrated resilience and flexibility in the midst of uncertainty and unexpected setbacks. In an extraordinary year globally and at the company, the impacts of COVID-19 were felt broadly and deeply across our business, operations, and industry. These effects included:

- increased restrictions on the number of people and activities in research and development laboratories and manufacturing facilities,
- disruption of clinical trial enrollment and other development activities,
- impacts to available healthcare resources within health systems to provide services and support activities unrelated to pandemic response,
- decreased patient demand in the commercial context,
- interruptions in activities in our supply chain due to staffing shortages at our third-party manufacturing sites, and
- effects on our ongoing interactions with health regulatory agencies and pricing and reimbursement agencies due to shifting priorities.

In response we:

- promptly transitioned to a remote work environment for nearly all of our people,
- prioritized research and manufacturing efforts in light of increased facilities restrictions while ensuring the safety of our people, and
- conducted a comprehensive business review to prioritize our investments across our programs with the goal of ensuring our ability to execute on our strategy in light of the increased uncertainty.

Thus, although we launched commercialization of ZYNTEGLO in Europe in early 2020, the onset of the COVID-19 pandemic meant that reaching patients in the commercial context was an uphill climb throughout the year, as we navigated changing circumstances in the global healthcare system, and at regulatory authorities and with pricing and reimbursement authorities.

Similarly, after the submission of the Biologics License Application (BLA) for ide-cel to the U.S. Food and Drug Administration (FDA) in March 2020, we responded quickly to resubmit the BLA in July 2020 with additional manufacturing-related information following a refuse-to-file letter from the FDA. In our LentiGlobin for SCD program, we made significant progress in gaining clarity on the requirements for submitting a BLA. However, we were disappointed with a shift in timing for our planned development activities relative to our earlier expectations.

Nevertheless, despite the challenges of the year, we made significant progress across our programs. By the end of 2020, the FDA had accepted for filing the BLA for ide-cel, which ultimately received marketing approval on March 26, 2021 as a treatment for relapsed and refractory multiple myeloma. In our LentiGlobin for SCD program, we reached general agreement with the FDA on the clinical data needed to support a BLA, as well as on the comparability data needed for our suspension vector manufacturing process. The Marketing Authorisation Application for eli-cel, was accepted by the European Medicines Agency in October 2020.

In January 2021, we announced our intent to separate our severe genetic disease and oncology programs into two independent, publicly-traded companies. The separation is expected to be completed by year-end 2021, and it is anticipated that the spinoff of the oncology business into a separate legal entity, which we refer to as "Oncology Newco," will be tax-free to stockholders, subject to the receipt of a favorable Internal Revenue Service ruling. Following the separation, bluebird bio, Inc. intends to focus on delivery of our therapies in severe genetic disease, expand access and reimbursement for our commercial product, ZYNTEGLO, in Europe and continue to explore innovative tools and technologies to ultimately bring these transformative medicines to more patients. Oncology Newco plans to support the commercialization of ide-cel and continued development of bb21217, our clinical program in multiple myeloma being developed in collaboration with BMS. In addition, Oncology Newco intends to progress the pipeline for next-generation engineered cell therapies for the treatment of non-Hodgkin's lymphoma, acute myeloid leukemia, multiple myeloma and solid tumors. The Board determined to separate the severe genetic disease and oncology programs into separate companies after extensive consideration and with the aim to better focus our operations and to drive long-term value for our stockholders.

Say on Pay and Stockholder Engagement

Following our 2020 Annual Meeting, our Board and the Compensation Committee determined to conduct robust outreach efforts in response to the results of our say-on-pay vote in the past two years, which received 61% support at the 2020 Annual Meeting, and 67% at the 2019 Annual Meeting. From late 2020 through the beginning of 2021, we reached out

to stockholders representing over 70% of our outstanding shares as of the end of the third quarter of 2020, including each of our largest stockholders. We made numerous outreach efforts to holders who had not initially responded and engaged with all of those who responded, as we sought to gain their feedback. As a result, we met with stockholders representing over 40% of shares outstanding, including several who voted against our 2020 "say-on-pay" proposal. The primary focus of these engagements was on our executive compensation program and on corporate governance, with our Chief People Officer and corporate counsel participating in these meetings, and the Chair of our Compensation Committee (who is also the Chair of our Board) participating in half of these meetings.

Feedback from our investors on these calls was reported to our Compensation Committee and Nominating and Corporate Governance Committee, and ultimately, the entire Board over multiple meetings for consideration and discussion. In general, there was a strong expectation of a robust response to low stockholder support in 2020 and 2019, even among investors who supported the "say-on-pay" proposal in 2020. As a consequence, in 2020 the Compensation Committee thoroughly evaluated our overall executive compensation program and consulted with Radford, its compensation consultant, for responsive action focused on enhancing our long-term incentive compensation elements. Our response included the introduction of performance-based restricted stock units granted to our Chief Executive Officer in 2021. This is intended as a first step to provide a greater emphasis on performance-based long-term incentive compensation, and the Compensation Committee intends to regularly evaluate this allocation as part of its overall review of our executive compensation program. The specific feedback we heard and the actions we took in response are summarized below:

What we heard	Our response
Chief Executive Officer quantum of pay is too high relative to total shareholder return	Our Chief Executive Officer did not receive an annual incentive award for 2020, and his 2020 total compensation decreased by over 50% from his 2019 total compensation, as reported on the <i>Summary Compensation Table</i> .
Desire for stronger tie of Chief Executive Officer compensation to performance	In 2021, approximately 20% of our Chief Executive Officer's target equity compensation is allocated to performance-based restricted stock units that vest based on relative total shareholder return. In addition, our Chief Executive Officer did not receive an annual incentive award with respect to 2020 performance.
Members of our peer group have greater market capitalization relative to our current capital structure	Three companies included in our 2020 peer group were removed and are not included in our 2021 peer group because their market capitalization exceeded our selection criteria. Our Compensation Committee reviews our peer group and selection criteria each year, adding and removing companies as our selection criteria evolves.
Desire for more transparent disclosure regarding separation pay practices and use of Compensation Committee discretion	We have enhanced our disclosure by highlighting where our Compensation Committee exercised its discretion and considerations that were taken into account. We have also included more context with respect to our separation arrangements with named executive officers and directors.
No cap on short-term annual incentive award	We have clarified in our disclosures that the maximum payout under our short-term annual incentive plan is 150% of the target amount.
Disapproval of the evergreen provision in our stock option plan	The 2013 Stock Option and Incentive Plan, including the evergreen provisions, was approved by our stockholders in connection with our initial public offering. Our Compensation Committee determined that the evergreen provision in our 2013 Stock Option and Incentive Plan has been crucial in supporting our high growth stage, and the evergreen provision has enabled us to execute on various goals in our strategic business plan. Our Compensation Committee's perspective is that the evergreen provision enables us to recruit and retain talented employees in our competitive biotech industry by ensuring we have enough shares to grant equity awards to new hires and continuing employees. We regularly review equity utilization to assess current dilution and our share needs in the upcoming year. However, the Compensation Committee does not intend to seek to extend the evergreen provisions, or adopt new ones, upon the expiration of our 2013 Stock Option and Incentive Plan in 2023.

Furthermore, we intend to continue our stockholder outreach following the filing of this proxy statement with the SEC, to seek support for our annual meeting proposals and to solicit additional feedback regarding executive compensation and corporate governance matters of importance to our stockholders. We view this outreach effort as a valuable opportunity to discuss compensation and corporate governance measures that are important to our stockholders. We also intend to

continue our stockholder engagement efforts following the 2021 Annual Meeting regardless of the outcome of the 2021 "say-on-pay" proposal.

Compensation Philosophy

Our Compensation Committee believes a well-designed compensation program should align executive interests with the drivers of growth and stockholder returns by supporting the company’s achievement of its primary business goals, and our ability to attract and retain employees whose talents, expertise, leadership, and contributions are expected to sustain growth and drive long-term stockholder value. Consequently, we maintain an ongoing commitment to corporate governance principles and strong performance orientation in our compensation program. Our Compensation Committee regularly reviews our compensation policies and program design overall, to ensure that they are aligned with the interests of our stockholders and our business goals, and that the total compensation paid to our employees is fair, reasonable and competitive. The market for qualified and talented executives in the biopharmaceutical industry is highly competitive and we compete for talent with many companies that have greater resources than we do. Furthermore, as the biopharmaceutical industry is characterized by a very long product development cycle, including a lengthy research and development period and a rigorous approval phase involving clinical studies and governmental regulatory approval, many of the traditional benchmarking metrics, such as product sales, revenues and profits are inappropriate for a late-stage development or early-commercial stage biopharmaceutical company such as bluebird.

Overview of Our Compensation Programs

Key elements of our executive compensation programs include the following:

Compensation Element	Purpose	Features		
Base salary	To attract and retain highly skilled executives	Fixed component of pay to provide financial stability, based on responsibilities, experience, individual contributions		
Annual incentive program	To promote and reward the achievement of our key short-term strategic and business goals; to motivate and attract executives	Variable component of pay based on annual quantitative and qualitative company performance goals and, for our executives other than our Chief Executive Officer, individual performance goals	Short Term Incentive	
Long-term equity incentive compensation	To encourage executives to focus on long-term performance; to promote retention; to reward outstanding company and individual performance	Typically subject to multi-year vesting based on continued service and are primarily in the form of stock options and restricted stock units, the value of which depends on the performance of our common stock price, in order to align employee interests with those of our stockholders over the longer-term	Long Term Incentive	At-Risk Compensation

We may award annual increases in base salary based upon an assessment of each executive’s performance, the scope of his or her responsibilities and an assessment of competitive market data based on our approved peer group. Our 2020 annual incentive program was designed to reward annual achievements as measured against pre-established quantitative and qualitative company performance goals, and, with respect to members of our senior management team other than our Chief Executive Officer, individual objectives. We awarded cash incentive payments as well as grants of fully-vested stock to our named executive officers and the other members of our senior management team under our 2020 annual incentive program, which is described in more detail below.

We typically make equity grants to each of our executive officers upon commencement of employment, annually in conjunction with our review of their individual performance and competitive market data based on our approved peer group, and in connection with a promotion. In addition, equity awards are our primary long-term incentive vehicle for our executives. We believe that equity grants provide our executives with a strong link to our long-term performance, create an ownership culture, and help align the interests of our executives and our stockholders. Accordingly, we believe equity compensation is a crucial component of any competitive executive compensation package we offer.

The mix of compensation components is designed to reward annual results as well as drive long-term company performance and create stockholder value. The Compensation Committee generally targeted overall target compensation for our executive officers near the 50th percentile of compensation paid to similarly situated executives of companies in our peer group.

In addition to our direct compensation elements, the following features of our compensation program are designed to align our executive team with stockholder interests and with market best practices:

What We Do	What We Don't Do
Use market data from an industry-specific peer group to set competitive compensation levels	Allow hedging or pledging of equity
Deliver executive compensation primarily through performance-based pay	Permit re-pricing of stock options without stockholder approval
Have a clawback policy covering cash and equity incentive compensation paid to our Chief Executive Officer and other executive officers	Provide excessive perquisites
Set challenging short-term incentive program goals	Provide supplemental executive retirement plans
Offer market-competitive benefits for executives that are consistent with those offered to the rest of our employees	Provide tax gross-up payments for any change-of-control payments
Maximum payout of 150% of target under our short-term incentive program	
Have stock ownership guidelines applicable to our senior executive officers and non-employee directors	
Annual stockholder say-on-pay votes	
Double-trigger severance arrangements in a change of control	
Stockholder engagement efforts	
Consult with an independent compensation advisor on compensation levels and practices	

Management Changes Since the End of our Last Completed Fiscal Year

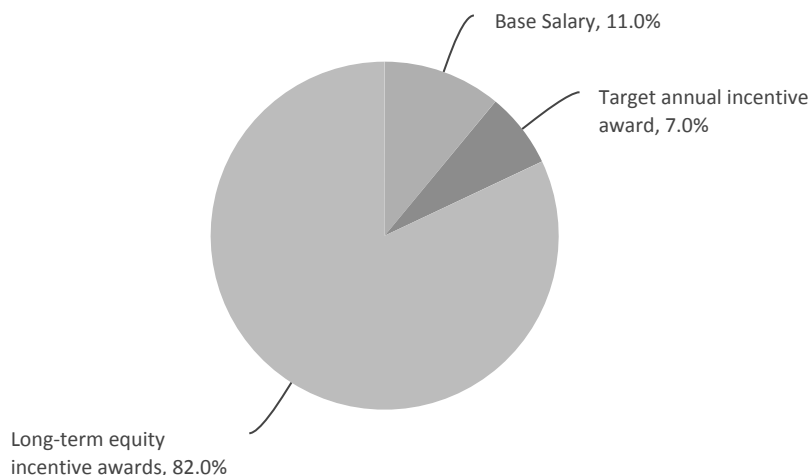
Dr. Davidson served as our Chief Medical Officer until the effectiveness of his resignation on April 16, 2021. Dr. Smith-Farrell served as our Chief Operating Officer, Oncology until her resignation from that role effective February 1, 2021, following which she remained with us and continued to support our preparations for the planned spinoff of oncology programs and portfolio through April 3, 2021.

Chief Executive Officer Compensation

We believe the target compensation mix provided to our Chief Executive Officer in 2020 encouraged him to focus on the our long-term success and was aligned with the long-term interests of our stockholders, in accordance with our compensation philosophy. Mr. Leschly’s total target compensation was set near the 50th percentile of compensation paid to similarly situated executives of companies in our 2020 peer group. In 2020 however, base salary for Mr. Leschly was approximately at the 35th percentile of our 2020 peer group, his target short-term incentive compensation was at the 30th percentile of our 2020 peer group, and his long-term incentive compensation was at the 25th percentile of our 2020 peer group.

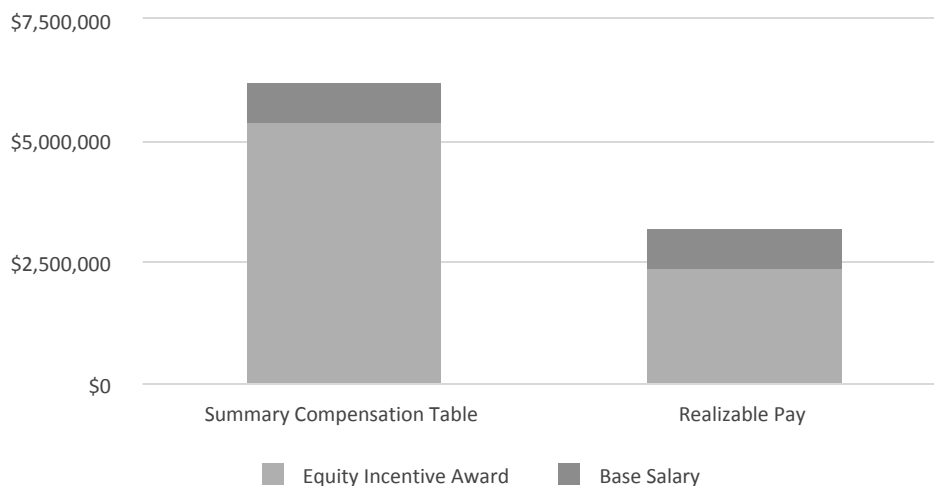
The graphic below illustrates the target mix of compensation elements among base salary, annual incentive award, and long-term equity that vests over multiple years for our Chief Executive Officer in 2020. **Approximately 89% of the target compensation mix was at-risk.** Over 80% of the target compensation mix consisted of long-term incentive compensation in the form of equity awards that vest over multiple years.

2020 CEO Target Compensation Mix



Due to the strong alignment between pay and performance over the last year, our Chief Executive Officer’s total realizable pay in the year ended December 31, 2020, represented by his actual salary and restricted stock unit grants, is approximately 52% of the value disclosed in the *Summary Compensation Table*. Approximately 48% of Mr. Leschly’s 2020 total compensation as reported in the *Summary Compensation Table* relates to stock options which vest over a four-year period. Mr. Leschly will not realize any value from these stock option grants unless our share price increases above \$73.84, our share price on the date of grant. Approximately 38% of his total 2020 compensation as reported in the *Summary Compensation Table* relates to restricted stock units that also vest over a four-year period, which promotes retention while using a fewer number of authorized shares to deliver equivalent value.

Chief Executive Officer Realizable Pay as of December 31, 2020



In addition, given the uncertainty facing the Company in 2020, Mr. Leschly voluntarily reduced his salary for a 12-month period beginning May 2020 and, received a grant of restricted stock units covering 80% of the salary reduction amount, which vests monthly during the 12-month period. In 2020, Mr. Leschly did not receive an annual incentive award under the Company’s short-term incentive plan. Furthermore, after extensive consideration and incorporating stockholder feedback as more fully described below, the Compensation Committee introduced performance-based restricted stock units in addition to stock options and restricted stock units with time-based vesting for Mr. Leschly’s equity compensation in 2021. Mr. Leschly’s equity compensation in 2021 was allocated between stock options, restricted stock units with time-based vesting, and performance-based restricted stock units as summarized in the table below.

Allocation of Mr. Leschly's Long-Term Equity Compensation	2020				2021			
	Shares		Grant date fair value		Shares		Grant date fair value	
	#	%	\$	%	#	%	\$	%
Stock options with time-based vesting over multiple years	65,000	67 %	2,999,893	56 %	90,000	67 %	1,494,095	40 %
Restricted stock units with time-based vesting over multiple years	32,500	33 %	2,399,800	44 %	18,000	13 %	511,920	14 %
Restricted stock units with performance-based vesting (based on relative total shareholder return)		— %	—	— %	27,000	20 %	1,708,560	46 %
Total	97,500	100 %	5,399,693	100 %	135,000	100 %	3,714,575	100 %

Role of Compensation Committee

Each year, our Compensation Committee reviews and establishes the levels of each element of total compensation for our employees, including our senior executives. As part of this process, our Compensation Committee reviews the mix of compensation elements to ensure our performance-based compensation is an appropriate proportion of overall compensation and is aligned with our business goals and strategy. The specific performance factors our Compensation Committee considers when determining the compensation of our named executive officers include:

- key research and development achievements, including advances in our gene addition and gene editing platforms in the fields of severe genetic diseases and cancer;
- initiation and progress of clinical studies for our product candidates;
- expansion of our manufacturing and operational capabilities, including our commercial readiness, on a global basis;
- achievement of regulatory milestones, including regulatory filings for marketing approval;
- achievement of commercialization milestones, including pricing and reimbursement approval, engagement of qualified treatment centers, and number of patients treated in the commercial context;
- establishment and maintenance of key strategic relationships and new business initiatives, including financings; and
- development of global organizational capabilities, success in hiring and growth management initiatives.

Our senior executives, including our named executive officers, are also evaluated based on factors such as individual, strategic, and leadership achievements. These performance factors are considered by our Compensation Committee in connection with our annual performance reviews described below and are a critical component in the determination of annual incentive awards for our executives.

By the end of the first quarter of each year, annual company goals and individual performance objectives applicable to incentive compensation are determined and set forth in writing. After the end of each year, our Compensation Committee determines executive compensation levels after carefully reviewing overall company performance and performing an evaluation of each named executive officer's annual performance against established company goals, as well as each individual executive officer's contributions to achievement of the company goals and, in the case of senior executives other than our Chief Executive Officer, the achievement of individual performance objectives. In addition, our Compensation Committee may apply its discretion, as it deems appropriate, in determining executive compensation.

Our Compensation Committee, with input from the Board, evaluates our Chief Executive Officer's individual performance and determines whether to change his base salary, grant him an annual equity award and/or change his target percentage cash award under our annual incentive program. Our Compensation Committee typically grants annual equity awards, and determines changes in base salary and the amount of any incentive payments, at its first regularly scheduled meeting of the new year. Our Compensation Committee may also review the compensation of our senior executive officers throughout the course of the year. With respect to year-end reviews, any changes in base salary are effective at the beginning of the following year.

Role of Management

Annual company goals are proposed by our senior executive team and reviewed and approved by our Board and Compensation Committee. Our Chief Executive Officer's annual incentive award is determined entirely on the company's performance relative to pre-established company goals (to drive maximal stockholder value) and the annual incentive awards of our other senior executives are based 80% on company goals and 20% on individual objectives. Individual goals for 2020 for our senior executives other than our Chief Executive Officer focused on leadership development objectives as well as individual contributions that were intended to drive achievement of the company goals and were proposed by each senior executive, with review and input from our Chief Executive Officer. Any merit increases in base salary and any annual equity awards or awards made under our 2020 annual incentive program were based on the achievement of these Company and individual, as applicable, performance goals. Our Compensation Committee establishes the target incentive award opportunity for each senior executive under the annual incentive program as a percentage of each individual's base salary.

During the last quarter of each year, our senior executives evaluate our company performance as compared to the company goals and, as applicable, their own performance relative to their individual goals for that year. Based on these evaluations, our Chief Executive Officer recommends to our Compensation Committee any increases in base salary and any annual equity awards and/or awards under our annual incentive program for each senior executive other than himself.

Role of Our Independent Compensation Consultant

For 2020, our Compensation Committee engaged Radford, which is part of the Rewards Solutions practice at Aon plc, as its independent compensation consultant to advise on executive and Board compensation matters including: overall compensation program design, peer group development and updates, and collection of market data to inform our compensation programs for our executives and directors. We develop our compensation programs after reviewing publicly available compensation data and we also subscribe to Radford's various global annual and specialized life sciences and general industry surveys on an ongoing basis. Radford advised the Compensation Committee on all of the principal aspects of executive compensation, including executive new hire compensation arrangements. Radford consultants attend meetings of the Compensation Committee when requested to do so. Radford reports directly to our Compensation Committee and not to management, although it meets with management for purposes of gathering information for its analyses and recommendations. Our Compensation Committee has assessed the independence of Radford consistent with SEC regulations and NASDAQ listing standards and has concluded that the engagement of Radford does not raise any conflict of interest.

Defining and Comparing Compensation to Market Benchmarks

The Compensation Committee uses competitive compensation data from the annual total compensation study of peer companies to inform its decisions about overall compensation opportunities and specific compensation elements. The Compensation Committee also considers other reference points and criteria when establishing targeted compensation levels, such as the executive's experience level, contribution to established Company's goals, individual performance against the executive's individual goals where applicable, scope of responsibility, skill sets, and leadership potential, as well as the Company's critical needs and succession planning.

In evaluating the total compensation of our named executive officers, our Compensation Committee, using information provided by Radford, in the middle of each fiscal year, establishes a peer group of publicly traded companies in the biopharmaceutical and biotechnology industries that is selected based on a balance of the following criteria:

- companies whose number of employees, stage of development and market capitalization are similar, though not necessarily identical, to ours;
- companies with similar executive positions to ours;
- companies against which we believe we compete for executive talent; and
- public companies based in the United States whose compensation and financial data are available in proxy statements or through widely available compensation surveys.

In addition to the criteria above, our Compensation Committee also reviewed the peer selection criteria used by proxy advisors and considered the specific peers identified independently by each advisor. Our Compensation Committee also takes into account companies who list bluebird as a peer in their compensation disclosures. Because the market for executive talent in the biopharmaceutical and biotechnology industries is competitive, and in particular the pool of candidates with relevant experience for our gene therapy business is small, our peer group reflects the fact that we compete for executive talent with companies who are larger than us and may have more resources than we do. In addition, in establishing the peer group for the following compensation cycle, the Compensation Committee reviews the current peer group with a view to preserve continuity in peer group from year to year, despite the inherent volatility in market capitalization and size of companies in the biopharmaceutical and biotechnology industries, as well as a high degree of merger and acquisition activity.

Furthermore, the Compensation Committee seeks to have an equal balance of smaller versus larger companies by market capitalization and by size.

For purposes of establishing the 2020 peer group, the selection criteria for inclusion in the peer group included biopharmaceutical and biotechnology companies that were: (1) in late-stage clinical development or early commercial stage; (2) revenue under \$1.5 billion to exclude mature, commercial companies; (3) market capitalization of one third to three times bluebird's market capitalization at the time of review; and (4) headcount of one third to three times bluebird's projected headcount for the end of 2019, which resulted in a range of 350 to 3,300 employees in size. For purposes of establishing the 2021 peer group, the selection criteria were substantially the same, however the market capitalization range was adjusted downward to reflect our market capitalization at the time of review in mid-2020, and the headcount range was also adjusted to reflect our projected headcount for the end of 2020, which resulted in a range of 450 to 4,000 employees in size.

With reference to these and other key business metrics, the Compensation Committee established the following peer groups for 2020 and 2021 as set forth in the following table:

Peer Group Company	2020	2021	Description of change
ACADIA Pharmaceuticals Inc.		X	<i>Added in 2021</i>
Accelaron Pharma Inc.		X	<i>Added in 2021</i>
Agios Pharmaceuticals, Inc.	X	X	
Alkermes p.l.c.	X	X	
Alnylam Pharmaceuticals, Inc.	X	X	
BioMarin Pharmaceutical Inc.	X		<i>Removed for 2021: Market capitalization exceeded selection criteria</i>
Blueprint Medicines Corporation		X	<i>Added in 2021</i>
Exelixis, Inc.	X	X	
FibroGen, Inc.	X	X	
Global Blood Therapeutics, Inc.		X	<i>Added in 2021</i>
Incyte Corporation	X		<i>Removed for 2021: Market capitalization exceeded selection criteria</i>
Ionis Pharmaceuticals, Inc.	X	X	
Jazz Pharmaceuticals plc	X	X	
Nektar Therapeutics	X	X	
Neurocrine Biosciences, Inc.	X	X	
Portola Pharmaceuticals, Inc.	X	X	
Sage Therapeutics, Inc.	X	X	
Sarepta Therapeutics, Inc.	X	X	
Seattle Genetics, Inc.	X		<i>Removed for 2021: Market capitalization exceeded selection criteria</i>
Spark Therapeutics, Inc.	X		<i>Acquired by Roche in December 2019</i>
Ultragenyx Pharmaceutical Inc.	X	X	

Base Salary

We provide base salaries to our named executive officers to compensate them with a fair and competitive base level of compensation for services rendered during the year. Our Compensation Committee typically determines the base salary for each executive based on the executive's responsibilities, experience and, if applicable, the base salary level of the executive prior to joining bluebird. In addition, our Compensation Committee reviews and considers the level of base salary paid by companies in our peer group for similar positions. Our Compensation Committee's assessment of our named executive officers' base salary takes into account our compensation objectives and philosophy to retain highly qualified executives, to motivate them to achieve our business goals, and to reward them for superior short- and long-term performance.

At the beginning of 2020, our Compensation Committee reviewed the compensation for our Chief Executive Officer and each of our other named executive officers. With respect to Mr. Leschly, our Chief Executive Officer, our Compensation Committee reviewed his overall compensation and determined to increase his annual base salary from \$660,000 to \$725,000. This determination was based on his critical role at the company, company performance throughout 2019 in meeting key milestones and objectives, as well in consideration of the critical upcoming execution and risk inflection points throughout 2020 and into 2021. In addition, the Compensation Committee took into consideration the market conditions and a

comparison of his base salary to the base salary of chief executive officers in our 2020 peer group. The Compensation Committee also approved merit increases in base salary for each of our other named executive officers serving at that time, based on the company's performance against the 2019 company goals, as well as each named executive officer's achievement of individual goals in 2019, in addition to a consideration the market conditions and a comparison of their base salaries to similarly situated executives in our 2020 peer group. In the aggregate, the base salaries of our named executive officers reflect approximately the 40th percentile of our 2020 peer group. The table below sets forth the adjustments to the base salary, in dollars and as a percentage, for each of our named executive officers, as approved in early 2020:

Name	2019 Base Salary (\$)	2020 Base Salary (\$)	Increase (%)
Nick Leschly	\$ 660,000	\$ 725,000	9.8%
William D. Baird, III	\$ 450,000	\$ 474,600	5.5%
Philip Gregory, D. Phil.	\$ 455,000	\$ 479,500	5.4%
David Davidson, M.D.	\$ 486,000	\$ 512,500	5.5%
Joanne Smith-Farrell, Ph.D.	\$ 369,870	\$ 455,000	23.0%

In April 2019, Dr. Smith-Farrell received a 9.5% promotional increase bringing her annualized base salary from \$369,870 to \$405,000 in connection with her promotion from SVP, Corporate Development & Strategy (reporting to our Chief Strategy Officer) to Chief Business Officer (reporting to our Chief Executive Officer). Subsequent to the Compensation Committee's determination of her 2020 base salary of \$455,000 in early 2020, in connection with Dr. Smith-Farrell's exceptional performance, expanded scope of responsibilities and promotion to Chief Operating Officer, Oncology in October 2020, her annualized base salary was further increased by 5.5% to \$480,000.

However, 2020 was an extraordinary year globally due to the COVID-19 pandemic, and our operations and ability to execute on our strategy were impacted as a result. As part of our comprehensive business review in the second quarter of 2020, and with the goal of ensuring our ability to execute on our strategy in light of the COVID-19 pandemic, certain senior executives voluntarily elected to reduce their base salary for a 12-month period beginning May 2020. Our Chief Executive Officer reduced his base salary by approximately 100% during this 12-month period, and each other participating senior executive reduced his or her base salary by 20%. Each participant received a grant of restricted stock units under our 2013 Stock Option and Incentive Plan equal to 80% of the amount of his or her salary reduction, determined using \$50.77, the closing market price on the NASDAQ Stock Market of bluebird's common stock on May 1, 2020, rounded down to the nearest whole share. The closing market price on the NASDAQ Stock Market of our common stock on April 19, 2021 was \$27.98, below the grant date price. The grants vest in equal monthly installments over the 12-month period following the date of grant. The named executive officers participating in this program, their original 2020 base salaries, their base salaries as reduced through participation in this program, as well as the number of restricted stock units granted are set forth in the table below.

Name	2020 Base Salary (\$)	Reduction of Base Salary (\$)	Reduced 2020 Base Salary (effective May 2020)	Number of Restricted Stock Units Granted
Nick Leschly	\$ 725,000	\$ 722,513	\$ 2,487	11,384
Philip Gregory, D. Phil.	\$ 479,500	\$ 95,900	\$ 383,600	1,511
David Davidson, M.D.	\$ 512,500	\$ 102,500	\$ 410,000	1,615
Joanne Smith-Farrell, Ph.D. (1)	\$ 455,000	\$ 91,000	\$ 364,000	1,433

(1) In connection with Dr. Smith-Farrell's exceptional performance, expanded scope of responsibilities and promotion to Chief Operating Officer, Oncology, her annualized base salary was increased to \$480,000 in October 2020.

At the beginning of 2021, our Compensation Committee reviewed the base salaries of our named executive officers, including our Chief Executive Officer. Taking into account the Company's performance in 2020 amid the challenging context of the COVID-19 pandemic, and the need to provide a competitive base level of salary balanced against financial discipline, the

Compensation Committee determined that each named executive officer, including our Chief Executive Officer, would have an increase of base salary of approximately 3.5%, as set forth in the table below.

Name	2020	2021	Increase (%)
	Base Salary (\$)	Base Salary (\$)	
Nick Leschly	\$ 725,000	\$ 750,500	3.5%
William D. Baird, III	\$ 474,600	\$ 491,300	3.5%
Philip Gregory, D. Phil.	\$ 479,500	\$ 496,300	3.5%
David Davidson, M.D.	\$ 512,500	\$ 530,500	3.5%
Joanne Smith-Farrell, Ph.D.	\$ 480,000	\$ 496,800	3.5%

The 2020 base salary for Dr. Smith-Farrell in the table above reflects her base salary at the end of 2020, following her promotion to Chief Operating Officer, Oncology and the accompanying increase in base salary.

Annual Incentive Program

At the beginning of 2020, our Compensation Committee approved the annual incentive program for 2020. At the time of such approval, consistent with past practice, the 2020 annual incentive program consisted of the opportunity for eligible participants to earn cash incentive awards calculated as a percentage of pre-established bonus targets based on the company's performance against pre-established company goals and, other than for the Chief Executive Officer, individual performance throughout 2020 against pre-established individual goals.

Each year, our pre-established Company goals are proposed by management, reviewed by our Board prior to the beginning of each fiscal year with an eye towards setting our overall business strategy and long-range planning, and approved by our Compensation Committee at the beginning of each fiscal year for purposes of determining compensation. Our goal-setting philosophy is to adopt goals that are challenging, to increase the likelihood of driving high value creation, but also with the expectation that performance against these pre-established goals will be considered in the full context of value creation. At the end of each fiscal year, management provides the Compensation Committee with its recommendation of company and individual performance against these pre-established goals, without taking into consideration overall value creation. The Compensation Committee's uses its discretion in its evaluation by taking into consideration management's recommendation, unplanned accomplishments, and also the overall value creation context such as stock performance, and the trajectory of company performance over the course of the year.

Under our annual incentive plan our Chief Executive Officer's incentive award is based entirely on the company's performance relative to these pre-established company goals, and the incentive award for each of our other named executive officers is based 80% on the company's performance relative to the pre-established company goals, and 20% on individual performance. Our Compensation Committee however, reserves the discretion to adjust upward or downward any cash incentive award as it deems appropriate, provided that neither company performance nor individual performance may exceed 150% and, accordingly, bonuses are capped at 150% of target amounts.

After careful consideration, the Compensation Committee determined not to adjust the pre-established 2020 company goals. Instead, the Compensation Committee determined that maintaining our pre-established 2020 company goals maximized the potential for stockholder value creation. Given the exceptional circumstances of 2020 however, and the impacts of the COVID-19 pandemic across our industry and our business, our Compensation Committee reviewed our 2020 annual incentive plan in Q2 2020 and determined that, with limited exceptions, incentive awards would be paid in an equal mix of cash and fully-vested stock rather than entirely in cash.

In Q4 2020, the Compensation Committee assessed company performance relative to the pre-established 2020 company goals and individual performance, taking into account the impact the COVID-19 pandemic has had on our business, operations, and industry, including: the transition to a work-from-home policy applicable to the majority of our personnel, increased restrictions on the number of our people and activities in research and development laboratories and manufacturing facilities, disruption of clinical trial enrollment and other development activities, impacts to available healthcare resources within health systems to provide services and support activities unrelated to pandemic response, decreased patient demand in the commercial context, interruptions in activities in our supply chain due to staffing shortages at our third-party manufacturing sites, and effects on our ongoing interactions with health regulatory agencies and pricing and reimbursement agencies due to shifting priorities. Ultimately, the Compensation Committee determined that overall, the company achieved an 85% performance level against the pre-established 2020 company goals, taking into consideration these external factors due to the COVID-19 pandemic and unplanned accomplishments. This performance level was used to establish the annual incentive awards to our employees other than the senior executive officers. The table below summarizes

the pre-established 2020 company goals, their relative weighting, and level of achievement for each Company goal as approved by the Compensation Committee.

2020 Company Goals	Weighting	2020 Company performance assessment
Deliver for patients	30%	75% (23%)
<ul style="list-style-type: none"> ■ <i>Meet targets for commercial patient enrollment and treatment</i> ■ <i>Meet targets for pricing & reimbursement approval</i> ■ <i>Meet milestones for manufacture of vector using suspension process</i> 		We made substantial progress in establishing internal expertise and gaining experience in our first commercial launch; however, the impact of the COVID-19 pandemic on global healthcare systems, biotechnology operations, and regulatory authorities' and pricing authorities' priorities meaningfully affected the Company's ability to fully achieve these goals.
Launch the next wave	35%	80% (28%)
<ul style="list-style-type: none"> ■ <i>Achieve milestones for ide-cel development</i> ■ <i>Achieve milestones for LentiGlobin for SCD development</i> ■ <i>Achieve milestones for beti-cel development</i> ■ <i>Achieve milestones for eli-cel development</i> 		In our SCD program, we reached general agreement with FDA on clinical data needed to support accelerated approval, and on comparability data using suspension vector. We also submitted the Marketing Authorisation Application for eli-cel in Q3 2020. Nevertheless, we encountered unexpected regulatory setbacks with respect to manufacturing requirements and release assays across multiple programs, which negatively affected our ability to fully achieve our development goals.
Secure the future	20%	95% (19%)
<ul style="list-style-type: none"> ■ <i>Execute on key pipeline objectives in oncology</i> ■ <i>Execute on initiatives to lower cost-of-goods-sold and to expand patient reach</i> 		We ended 2020 with multiple oncology programs on track for Investigational New Drug submission in 2021. In addition, we entered into a collaboration agreement with Magenta Therapeutics for clinical proof-of-concept for an alternative mobilization protocol.
People business	15%	100% (15%)
<ul style="list-style-type: none"> ■ <i>Meet targets for people engagement & organizational health metrics</i> ■ <i>Conclude 2020 with at least 18 months of cash, cash equivalents and marketable securities</i> 		The negative impacts of COVID-19 pandemic on people engagement and organizational health were mitigated by focused efforts at all levels of the organization; we implemented a successful and swift transition to virtual operations. Re-negotiation of BMS collaboration agreement and \$575 million equity financing, with prioritized investments, meant we ended 2020 on solid financial footing.
2020 Performance	100%	85%

However, the Compensation Committee also recognized that the company as a whole missed critical goals based on a failure to execute leading to meaningful impacts on our business, and that the efforts of the company at large did not translate into demonstrable results. **As a consequence and consistent with our pay for performance philosophy, the Compensation Committee held the senior executives accountable and used its discretion to adjust downward the applicable company performance level applicable to the Chief Executive Officer to 0%, and to other senior executives with the exception of Dr. Smith-Farrell, to 50%.** The Compensation Committee used its discretion to recognize Dr. Smith-Farrell's contributions to the company's achievements in its oncology programs during 2020 to adjust upward the 2020 Company performance applicable to determining her annual incentive award, to 100%. In addition, the Compensation Committee included in its consideration that although Dr. Smith-Farrell was resigning from her role as Chief Operating Officer, Oncology as of February 1, 2021, she intended to stay on through April 3, 2021 to support the preparations for the company's planned spinoff of the oncology programs and portfolio into a separate independent entity.

The pre-established individual goals and individual performance against those goals in 2020 applicable to our named executive officers other than our Chief Executive Officer were as follows:

Name	2020 Individual performance assessment	2020 Individual goals
William D. Baird, III	85%	Guide organization through re-prioritized budgeting and investment initiatives in light of impacts of COVID-19 pandemic
Philip Gregory, D. Phil.	85%	Execute on key pipeline objectives in oncology business unit
David Davidson, M.D.	80%	Execute on development strategy across platform; continue to build commercial medical affairs organization
Joanne Smith-Farrell, Ph.D.	100%	Re-negotiate BMS collaboration agreement; define and execute on business development strategy for oncology business; establish robust oncology operations

The table below shows each named executive officer's target incentive award under the 2020 annual incentive program as a percentage of the named executive officer's annual base salary in 2020, the target incentive award opportunity in dollars for 2020 and the actual incentive awards to our named executive officers for 2020 performance, which were paid in February 2021, as well as the actual 2020 incentive award payment as a percentage of the 2020 target incentive award opportunity. Dr. Smith-Farrell's incentive award was paid entirely in the form of cash, rather than an equal mix of cash and fully-vested stock, in light of her impending departure from bluebird and because equity compensation is intended for incentivizing long-term value creation. In the aggregate, the target incentive award opportunity for our named executive officers reflects approximately the 42nd percentile of our 2020 peer group.

Name	2020 Target Incentive Award (% of 2020 Base Salary)	2020 Target Incentive Award Opportunity (\$)	Actual Total 2020 Incentive Award Amount (\$ (1))	Cash Portion of 2020 Incentive Award Amount (\$)	Equity Portion of 2020 Incentive Award Amount (# of shares) (2)	2020 Actual Incentive Award Amount (% of 2020 Target Incentive Award Opportunity)
Nick Leschly	65%	\$ 471,250	\$ —	\$ —	—	—%
William D. Baird, III	45%	\$ 213,570	\$ 121,800	\$ 60,900	2,141	57%
Philip Gregory, D. Phil.	45%	\$ 215,775	\$ 123,000	\$ 61,500	2,162	57%
David Davidson, M.D.	45%	\$ 230,625	\$ 129,200	\$ 64,600	2,271	56%
Joanne Smith-Farrell, Ph.D. (3)	45%	\$ 216,000	\$ 216,000	\$ 216,000	—	100%

- (1) Represents the total 2020 incentive award amount, which, except as noted below, was paid 50% in cash, and 50% in the form of a grant of fully-vested stock.
- (2) Represents the number of shares of stock granted, determined by dividing 50% of the total 2020 incentive award amount by \$28.44, the closing price of our common stock on the date of the grant.
- (3) Dr. Smith-Farrell's 2020 annual incentive award was paid out entirely in cash in Q1 2021.

In Q1 2021, the Compensation Committee approved the annual incentive program for 2021. The terms of the 2021 annual incentive program are substantially the same as the 2020 annual incentive program. As for 2020, the pre-established 2021 Company goals that will be used to assess Company performance in 2021 reflect the following imperatives:

2021 Company Goal	Weighting
★ Deliver for patients	30%
<i>Meet commercial launch milestones for ZYNTEGLO and ABECMA</i>	
★ Create sustaining value	30%
<i>Advance development of LentiGlobin for SCD and key oncology programs</i>	
★ Eye on execution	30%
<i>Meet milestones for regulatory submissions across programs in severe genetic disease and oncology</i>	
★ People & Business	10%
<i>Meet targets for diversity & inclusion, people engagement and organizational health; successfully complete planned spinoff transaction</i>	
Total	100%

In light of the planned transaction in which the oncology programs and portfolio will be spun off into an independent, publicly-traded entity, our Compensation Committee determined that 2021 performance for bluebird and Oncology Newco will be pro-rated for each business, to be defined by timing for completion of the separation. The annual incentive award target for each named executive officer is set forth below.

Name	2021 Base Salary (\$)	2021 Target Award (% of Base Salary)	2021 Target Award Opportunity (\$)
Nick Leschly	\$ 750,500	65%	\$487,825
William D. Baird, III	\$ 491,300	45%	\$221,085
Philip Gregory, D. Phil.	\$ 496,300	45%	\$223,335
David Davidson, M.D. (1)	\$ 530,500	45%	\$238,725
Joanne Smith-Farrell, Ph.D. (1)	\$ 496,800	45%	\$223,560

(1) Neither Dr. Davidson nor Dr. Smith-Farrell will be eligible to receive an annual incentive award with respect to 2021 performance, due to their respective departures in 2021.

Long-Term Incentive Awards

Our long-term incentive equity awards are generally in the form of stock options and restricted stock units, which deliver equivalent value while using fewer authorized shares. We typically make equity award grants to each of our executive officers upon commencement of employment, and annually in conjunction with our review of their individual performance. Additional equity award grants may be made in connection with a promotion, or as a special incentive. Our executives benefit from stock options only if our stock price increases through the creation of stockholder value, and the value of restricted stock units increase as our stock price increases. Accordingly, we believe stock options and restricted stock units provide meaningful incentives to our executives to achieve increases in the value of our stock over time. In addition, the vesting feature of our long-term incentive grants contributes to executive retention by providing an incentive to our executives to remain employed by us during the vesting period. **Beginning in 2021, we began to grant performance-based restricted stock units based on relative total shareholder return to our Chief Executive Officer, to further tie executive compensation to stock price performance and in response to stockholder feedback.**

All equity awards to our executive officers are approved by our Compensation Committee and, other than equity awards to new hires, are typically granted at our Compensation Committee's regularly scheduled meeting at the beginning of the year. The size of equity awards varies among our executive officers based on their positions, competitive market data, and annual performance assessments. All stock options granted by bluebird have exercise prices equal to the fair market value of our common stock on the date of grant, so that the recipient will not realize any value from his or her options unless our share price increases above the stock price on the date of grant. Accordingly, this portion of our executive officers' compensation is at risk and is directly aligned with stockholder value creation.

As part of the ongoing review of our compensation strategy and practices, the Compensation Committee determines the appropriate mix of the type of equity awards, based in part on recommendations from Radford, its independent compensation consultant. Because of the volatility of our stock price in relation to when equity grants are made, our equity compensation guidelines set forth aggregate grant targets reflecting stock options plus restricted stock units based on number of shares (rather than value of the equity grants), and these guidelines are developed based on and in reference to our equity grant data for our peer companies. Beginning in 2020, the target mix for long-term incentive equity grants to our executive officers is generally split approximately one-half in stock options and one-half in restricted stock units based on option equivalents. The Compensation Committee believes that this deliberate mix of equity ensures that compensation remains tied to stock performance and promotes retention. The Compensation Committee may adjust the mix of award types or approve different award types as part of the overall compensation strategy. Awards made in connection with a new, extended or expanded employment relationship may involve a different mix of equity awards, depending on the Compensation Committee's assessment of the total compensation package being offered.

In addition, long-term equity incentive grants of stock options and restricted stock units to our executive officers typically vest over four years, which we believe provides an incentive to our executives to add value to the Company over the long-term and to remain with bluebird. Typically, the stock options we grant to our executives have a ten-year term and vest as to 25% of the shares on the first anniversary of their hire date (in the case of initial equity grants) or on or about the first anniversary of the first business day of the year of grant (in the case of annual grants) and then the remaining shares vest in equal monthly installments thereafter until the fourth anniversary of such date. Vesting of option grants to employees ceases upon termination of employment and exercise rights typically cease three months following termination of employment, except in the case of death or disability. Prior to the exercise of an option, the stock option holder does not have any rights as a stockholder with respect to the shares subject to such option, including voting rights or the right to receive dividends or dividend equivalents. Annual restricted stock units granted to our executives generally vest in equal annual installments

beginning on or about the first anniversary of the first business day of the year of grant, until the fourth anniversary of such date.

In connection with the annual review of our named executive officers' performance during 2019 and consistent with our compensation philosophy, in January 2020, our Compensation Committee approved the annual long-term equity incentive awards granted to our named executive officers serving at that time as set forth in the table below:

Name	2020 Option Award		2020 RSU Award	
	# Shares	Grant date fair value	# Shares	Grant date fair value
Nick Leschly	65,000	\$2,999,893	32,500	\$2,399,800
William D. Baird, III	20,000	\$923,044	10,000	\$738,400
Philip Gregory, D.Phil.	20,000	\$923,044	10,000	\$738,400
David Davidson, M.D.	20,000	\$923,044	10,000	\$738,400
Joanne Smith-Farrell, Ph.D.	20,000	\$923,044	10,000	\$738,400

The equity awards granted to our named executive officers during 2020, and the grant date fair values of those awards presented above and shown in the *Summary Compensation Table* and the *2020 Grants of Plan-Based Awards* table below were determined in accordance with Financial Accounting Standards Board (FASB), Accounting Standards Codification (ASC), Topic 718. These values reflect approximately the 27th percentile of our 2020 peer group.

In connection with the annual review of our named executive officers' performance during 2020 and consistent with our compensation philosophy to motivate our named executive officers to achieve our business goals and to reward for superior short- and long-term performance, in January 2021, our Compensation Committee approved the annual long-term equity incentive awards to our named executive officer serving at that time as set forth in the table below:

Name (1)	2021 Option Award		2021 RSU Award Time-Based Vesting		2021 RSU Award Performance-Based Vesting (based on relative total shareholder return)	
	# Shares	Grant date fair value	# Shares	Grant date fair value	Target # Shares	Grant date fair value
Nick Leschly	90,000	\$1,494,095	18,000	\$511,920	27,000	\$1,708,560
William D. Baird, III	25,000	\$415,027	12,500	\$355,500	—	—
Philip Gregory, D.Phil.	25,000	\$415,027	12,500	\$355,500	—	—
David Davidson, M.D.	20,000	\$332,021	10,000	\$284,400	—	—

(1) Dr. Smith-Farrell did not receive any equity awards in 2021, as she resigned as Chief Operating Officer, Oncology effective February 1, 2021, and left the company on April 3, 2021.

In 2021, we introduced a new type of performance-based restricted stock unit award to further align our Chief Executive Officer's compensation with stockholder experience, in response to investor feedback. This performance-based award is earned based on total shareholder return compared to a peer group of companies in the Standard & Poor Biotechnology Select Industry Index having a market value of between \$750 million and \$4.5 billion, which reflects a weighted average of current bluebird and the projected size of Oncology Newco following the anticipated spinoff transaction expected to be completed in the Q4 2021 over a three-year period of 2021 through 2023. The multiplier used to determine the number of earned restricted stock units could range between 50% and 200%, with a threshold achievement level at -25th percentile (as compared to the peer median) required to earn any restricted stock units, and a ceiling achievement level at the +50th percentile (as compared to the peer median). The total shareholder return performance-based restricted stock units, to the extent earned, vest in full on the third anniversary of the grant date, subject to Mr. Leschly's continued service. For 2021, the target number of shares subject to this performance-based restricted stock unit award is 27,000 shares and made up approximately 20% of our Chief Executive Officer's total target equity compensation for 2021. Under the terms of this award, the number of performance-based restricted stock units earned is calculated by multiplying the target number of performance-based restricted stock units by a performance multiplier.

The peer group consists of companies making up the Standard & Poor Biotechnology Select Industry Index.

In its design of the performance-based restricted stock units, the Compensation Committee considered various design elements and alternative approaches including milestone-based approaches. Given the stage of the company and the number of programs in late-stage development and one in early-stage commercialization, the Compensation Committee felt

that an overall relative stock performance metric best captures the value inflections that would potentially be unlocked through exceptional company performance, and is fully aligned with stockholder interests. Furthermore, a three-year measurement period provides an incentive for the Chief Executive Officer to take a long-term view with respect to company performance.

Benefits and Other Compensation

Other compensation to our executives consists primarily of the broad-based benefits we provide to all full-time employees in the United States, including medical, dental and vision insurance, group life and disability insurance, an employee stock purchase plan and a 401(k) plan. Pursuant to our employee stock purchase plan, employees, including our named executive officers, have an opportunity to purchase our common stock at a discount on a tax-qualified basis through payroll deductions. The employee stock purchase plan is designed to qualify as an “employee stock purchase plan” under Section 423 of the Internal Revenue Code. The purpose of the employee stock purchase plan is to encourage our employees, including our named executive officers, to become our stockholders and better align their interests with those of our other stockholders. Pursuant to our 401(k) plan, employees, including our named executive officers, may elect to defer a portion of their current compensation up to the statutorily prescribed annual limit (which was \$19,500 in 2020), with additional salary deferrals not to exceed \$26,000 available to those employees 50 years of age or older, and to have the amount of this deferral contributed to our 401(k) plan. We make discretionary matching contributions and other employer contributions on behalf of eligible employees under our 401(k) plan. For fiscal year 2020, we matched a portion of eligible employee contributions equal to 100% of the first 4% of eligible contributions pursuant to our 401(k) plan’s matching formula.

Currently, we do not view perquisites or other personal benefits as a significant component of our executive compensation program. Accordingly, we do not provide perquisites to our named executive officers, except in situations where we believe it is appropriate to assist an individual in the performance of his or her duties, to make him or her more efficient and effective, and for recruitment and retention purposes. All future practices with respect to perquisites or other personal benefits will be approved and subject to periodic review by our Compensation Committee.

Certain executives, including our named executive officers, may be entitled to certain severance and/or change in control protections pursuant to their employment agreements, which are described below under *Executive Officer and Director Compensation—Employment Arrangements with Our Named Executive Officers*. Our goal in providing severance and change in control benefits is to offer sufficient cash continuity protection such that our executives will focus their full time and attention on the requirements of the business rather than the potential implications for their respective position. We prefer to have certainty regarding the potential severance amounts payable to the named executive officers, rather than negotiating severance at the time that a named executive officer’s employment terminates.

Anti-Hedging and Anti-Pledging Policies; Insider Trading Policy

Our insider trading policy expressly prohibits short sales and derivative transactions of our stock by our named executive officers, directors and specified other employees, including short sales of our securities, including short sales “against the box”; purchases or sales of puts, calls or other derivative securities of the Company or any derivative securities that provide the economic equivalent of ownership of any of our securities or an opportunity, direct or indirect, to profit from any change in the value of our securities; or other hedging or monetization transactions accomplished through the use of prepaid variable forwards, equity swaps, collars and exchange funds. In addition, our insider trading policy expressly prohibits our named executive officers, directors and specified other employees from purchasing our securities on margin, borrowing against Company securities held in a margin account, or pledging our securities as collateral for a loan.

Clawback Policy

In 2017, our Compensation Committee and Board adopted a clawback policy that covers incentive compensation paid to our executive officers, including our Chief Executive Officer, Principal Financial Officer and our Principal Accounting Officer. The policy provides that if we are required to prepare an accounting restatement due to our material non-compliance with any financial reporting requirement and/or intentional misconduct by a covered executive, our Compensation Committee may require the covered executive to repay to us any excess compensation received by the covered executive during the covered period. For purposes of this policy, excess compensation means annual cash bonus and long-term equity incentive compensation that is in excess of the amount such covered executive would have received, if the annual cash bonus and/or long term equity incentive compensation had been determined based on the financial results reported in the restated financial statement.

Share Ownership Guidelines

In 2017, our Compensation Committee and Board adopted share ownership guidelines applicable to our non-employee directors and our senior executive officers, including our Chief Executive Officer, to further align the interests of the

leadership of the Company with those of our stockholders. The equity ownership guidelines are as set forth on the table below:

Covered Individuals	Applicable Stock Ownership Guideline
Chief Executive Officer	3x base salary
Other Senior Executive Officer	1x base salary
Non-Employee Director	3x annual cash retainer for service on the Board

Covered individuals and newly appointed or elected persons have five years to achieve the guideline. The following forms of equity will count toward the ownership guidelines: shares owned outright, vested but unexercised “in-the-money” stock options, and fifty percent of unvested restricted stock units. All senior executive officers and directors are currently meeting or are working to achieve these guidelines within the five-year time period.

Tax and Accounting Considerations

Deductibility of Executive Compensation

Generally, Section 162(m) of the Internal Revenue Code disallows a federal income tax deduction for public corporations of remuneration in excess of \$1 million paid in any fiscal year to certain specified executive officers or former executive officers. For taxable years beginning before January 1, 2018 (i) these executive officers consisted of a public corporation’s chief executive officer and up to three other executive officers (other than the chief financial officer) whose compensation is required to be disclosed to stockholders under the Securities Exchange Act because they are our most highly-compensated executive officers and (ii) qualifying “performance-based compensation” was not subject to this deduction limit if specified requirements are met.

Pursuant to the Tax Cuts and Jobs Act of 2017, which was signed into law on December 22, 2017, for taxable years beginning after December 31, 2017, the remuneration of a public corporation’s chief financial officer is also subject to the deduction limit and anyone who was a named executive officer in any year after 2016 will remain a covered employee for as long as he or she (or his or her beneficiaries) receives compensation from the Company. In addition, subject to certain transition rules (which apply to remuneration provided pursuant to written binding contracts which were in effect on November 2, 2017 and which are not subsequently modified in any material respect), for taxable years beginning after December 31, 2017, the exemption from the deduction limit for “performance-based compensation” is no longer available. Consequently, for fiscal years beginning after December 31, 2017, all remuneration in excess of \$1 million paid to a specified executive will not be deductible.

In designing our executive compensation program and determining the compensation of our executive officers, including our named executive officers, the Compensation Committee considers a variety of factors, including the potential impact of the Section 162(m) deduction limit. However, the Compensation Committee will not necessarily limit executive compensation to that which is or may be deductible under Section 162(m). The deductibility of some types of compensation depends upon the timing of an executive officer’s vesting or exercise of previously granted rights. Further, interpretations of and changes in the tax laws, and other factors beyond the Compensation Committee’s control also affect the deductibility of compensation. The Compensation Committee will consider various alternatives to preserving the deductibility of compensation payments and benefits to the extent consistent with its compensation goals.

To maintain flexibility to compensate our executive officers in a manner designed to promote our short-term and long-term company goals, the Compensation Committee has not adopted a policy that all compensation must be deductible. The Compensation Committee believes that our stockholders’ interests are best served if its discretion and flexibility in awarding compensation is not restricted, even though some compensation awards may result in non-deductible compensation expense.

Taxation of “Parachute” Payments

Sections 280G and 4999 of the Internal Revenue 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 of the company that exceeds certain prescribed limits, and that the company (or a successor) may forfeit a deduction on the amounts subject to this additional tax. We have not agreed to provide any executive officer, including any named executive officers, with a “gross-up” or other reimbursement payment for any tax liability that the executive officer might owe as a result of the application of Sections 280G or 4999 of the Internal Revenue Code.

Section 409A of the Internal Revenue Code

Section 409A of the Internal Revenue Code imposes additional significant taxes in the event that an executive officer, director or service provider receives “deferred compensation” that does not satisfy the requirements of Section 409A of the Internal Revenue Code. Although we do not maintain a traditional nonqualified deferred compensation plan, Section 409A of the Internal Revenue Code may apply to certain severance arrangements, bonus arrangements and equity awards. We endeavor to structure all our severance arrangements, bonus arrangements and equity awards in a manner to either avoid the application of Section 409A or, to the extent doing so is not possible, to comply with the applicable requirements of Section 409A of the Internal Revenue Code.

Accounting for Stock-Based Compensation

We follow FASB ASC 718 for our stock-based compensation awards. FASB ASC 718 requires us to measure the compensation expense for all share-based payment awards made to our employees and non-employee directors, including options to purchase shares of our common stock and other stock awards, based on the grant date “fair value” of these awards. This calculation is performed for accounting purposes and reported in the executive compensation tables required by the federal securities laws, even though the recipient of the awards may never realize any value from their awards.

Equity Granting Practices

Currently, all of our full-time employees, including our named executive officers, are eligible to participate in our 2013 Stock Option and Incentive Plan (the 2013 Plan). All new full-time employees are granted stock options and restricted stock units when they start employment and all continuing employees are eligible for stock option and restricted stock unit awards on an annual basis based on performance and upon promotions to positions of greater responsibility. Our Compensation Committee has delegated to Mr. Leschly, our Chief Executive Officer, the authority to make equity awards under our 2013 Plan to new hires (other than to executive officers), in connection with promotions and with our annual incentive program (other than to executive officers) and in connection with certain performance-based restricted stock units (other than to executive officers). The number of shares underlying stock options and the number of restricted stock units he may grant to any one individual must be within the range specifically set by our Compensation Committee for these awards, and the aggregate number of shares underlying stock options and the number of restricted stock units that Mr. Leschly may grant within a period must be within specified limits set by our Compensation Committee for these awards. The exercise price of stock options must be equal to the closing price of our common stock on the NASDAQ Global Market on the date of grant. With respect to stock option awards and restricted stock units to new hires other than executive officers, Mr. Leschly approves the awards in connection with such hires and generally provides that the awards are to be granted to the new hires on the first business day of the calendar month following the date of such new hires’ first date of regular employment. With respect to stock option and restricted stock unit awards made in connection with promotions other than of executive officers, Mr. Leschly approves the awards in connection with such promotions and generally provides that the awards are to be granted on the first business day of the calendar month following the date of such promotions. Mr. Leschly is required to maintain a list of stock options and restricted stock units granted pursuant to such delegated authority and periodically report to our Compensation Committee regarding such awards.

Compensation Risk Assessment

We believe that our executive compensation program does not encourage excessive or unnecessary risk taking. As described more fully above, we structure our pay to consist of both fixed and variable compensation, particularly in connection with our pay-for-performance compensation philosophy. We believe this structure motivates our executives to produce superior short- and long-term results that are in the best interests of our company and our stockholders in order to attain our ultimate objective of increasing stockholder value, and we have established, and our Compensation Committee endorses, several controls to address and mitigate compensation related risk. These include stock ownership guidelines for our senior executive officers and our directors, a clawback policy that permits recovery of incentive compensation from our executive officers in the event that cash and equity incentive award amounts are based on financial results that are subsequently restated, and anti-hedging and anti-pledging policies. As a result, we do not believe that our compensation programs are reasonably likely to have a material adverse effect on us.

Report of the Compensation Committee on Executive Compensation

Our Compensation Committee has reviewed and discussed the *Compensation Discussion and Analysis* required by Item 402(b) of Regulation S-K with management. Based upon such review and discussions, our Compensation Committee recommended to our Board that such section be included in this proxy statement and incorporated by reference in our Annual Report on Form 10-K for the year ended December 31, 2020, which was filed with the SEC on February 23, 2021.

By the Compensation Committee of the Board of Directors of bluebird bio, Inc.

Daniel S. Lynch, Chairperson
Wendy L. Dixon, Ph.D.
Denice Torres

Executive Compensation

Summary Compensation Table

The following table sets forth the total compensation awarded to, earned by and paid during the fiscal years ended December 31, 2020, December 31, 2019 and December 31, 2018 for each of our named executive officers.

Name and Principal Position	Year	Salary (\$)	Bonus (\$)	Option awards (\$)(1)	Stock awards (\$)(1)	Non-equity incentive plan compensation (\$)	All other compensation (\$)	Total (\$)
Nick Leschly <i>Chief Executive Officer</i>	2020	830,554 (2)	—	2,999,893	2,399,800	—	11,400 (3)	6,241,647
	2019	660,000	—	8,698,341	3,365,750	418,275 (4)	11,200	13,153,566
	2018	610,000	—	16,719,582	6,157,500	465,888 (5)	9,250	23,962,220
William D. Baird, III <i>Chief Financial Officer</i>	2020	474,600	—	923,044	738,400	121,800 (6)	122,206 (8)	2,380,050
	2019	398,077 (7)	—	6,093,675	2,349,900	178,200 (7)	180,072	9,199,924
Philip Gregory, D. Phil. <i>Chief Scientific Officer</i>	2020	493,510 (2)	—	923,044	738,400	123,000 (6)	11,400 (3)	2,289,354
	2019	455,000	—	2,348,552	908,753	194,600 (4)	11,200	3,918,105
	2018	425,000	—	4,737,215	3,284,000	223,800 (5)	9,250	8,679,265
David Davidson, M.D. <i>Chief Medical Officer (former)</i>	2020	527,474 (2)	—	923,044	738,400	129,200 (6)	11,400 (3)	2,329,518
	2019	486,000	—	3,261,878	1,262,156	207,800 (4)	11,200	5,229,034
	2018	442,500	—	6,269,843	2,309,063	237,000 (5)	12,250	9,270,656
Joanne Smith-Farrell, Ph.D. <i>Chief Operating Officer, Oncology (former)</i>	2020	474,023 (2)	—	923,044	738,400	216,000 (6)	11,400 (3)	2,362,867

- (1) The amounts reported in the *Option awards* and *Stock awards* columns above represent the aggregate grant date fair value of the stock options and restricted stock units granted to such named executive officers during 2018, 2019 and 2020 as computed in accordance with FASB ASC 718, not including any estimates of forfeitures related to service-based vesting conditions. See note 14 of *Notes to Consolidated Financial Statements* in our Annual Report on Form 10-K filed with the SEC on February 23, 2021 for a discussion of assumptions made by the Company in determining the aggregate grant date fair value of our stock option and restricted stock unit awards. Note that the amounts reported in these columns reflect the accounting cost for these stock options and restricted stock units, and do not correspond to the actual economic value that may be received by the named executive officers from the stock options and restricted stock units.
- (2) Salary amounts reported in 2020 reflect voluntary reduction in salary paid in cash in 2020, beginning May 2020, and include the grant date fair value of restricted stock unit awards granted in 2020 equal to 80% of the voluntary salary reduction amount for each participating named executive officer, covering the 12-month period beginning May 2020. The restricted stock units granted to the named executive officers in lieu of salary are reported in the *Grants of Plan-Based Awards* table below.
- (3) Amounts represent the employer matching contribution to the executive's 401(k) plan contributions during the relevant year.
- (4) Amounts represent cash payment under our annual cash incentive program earned in 2019, and paid during 2020, based on achievement of performance goals.
- (5) Amounts represent cash incentive payment under our annual cash incentive program earned in 2018, and paid during 2019, based on achievement of performance goals.
- (6) Amounts represent incentive payments under our annual incentive program earned in 2020, and paid during 2021, based on achievement of performance goals. For Mr. Baird and Drs. Gregory and Davidson, 50% of this amount was paid in cash, and 50% of this amount was paid in fully vested common stock.
- (7) Mr. Baird's employment commenced on February 11, 2019. His annual base salary for 2019 was \$450,000. The amounts reported in the *Salary* column and the *Non-equity incentive plan compensation* column for 2019 are prorated to reflect his start date.
- (8) Amount represents the employer matching contributions to Mr. Baird's 401(k) plan contribution during the year as well as \$50,581 of lodging and travel expenses and a related tax gross-up of \$60,074 paid pursuant to the terms of his employment agreement.

Grants of Plan-Based Awards

The following table shows information regarding grants of plan-based awards to the Company's named executive officers during the fiscal year ended December 31, 2020.

Name	Grant date	Estimated future payouts under non-equity incentive plan awards (1)		All other stock awards: Number of shares of stock or units (#)	All other option awards: Number of securities underlying options (#)	Exercise or base price of option awards (\$/share)(2)	Grant date fair value of stock and option awards \$(3)
		Target \$(1)	Maximum \$(1)				
Nick Leschly		471,250	706,875				
	3/2/2020	—	—		65,000 (4)	73.84	2,999,893
	3/2/2020	—	—	32,500 (5)			2,399,800
William D. Baird, III	5/1/2020	—	—	11,384 (6)			577,966
		213,570	320,355				
	3/2/2020	—	—		20,000 (4)	73.84	923,044
Philip Gregory, D. Phil.	3/2/2020	—	—	10,000 (5)			738,400
		215,775	323,663				
	3/2/2020	—	—		20,000 (4)	73.84	923,044
David Davidson, M.D.	3/2/2020	—	—	10,000 (5)			738,400
	5/1/2020	—	—	1,511 (6)			76,713
		230,625	345,938				
Joanne Smith-Farrell, Ph.D.	3/2/2020	—	—		20,000 (4)	73.84	923,044
	3/2/2020	—	—	10,000 (5)			738,400
	5/1/2020	—	—	1,433 (6)			72,753

- (1) Represents the target and maximum amount of each executive's incentive payments under our 2020 annual incentive program as established by the Compensation Committee and described in *Compensation Discussion and Analysis* above. Actual payments made for 2020 are provided in the *Summary Compensation Table*. Incentive payments are not subject to threshold payout levels, and accordingly, that column has been omitted.
- (2) The exercise price of these stock options is equal to the closing price of our common stock on the NASDAQ Global Select Market on the grant date.
- (3) Amounts represent the grant date fair value of the named executive officer's stock options and restricted stock units, calculated in accordance with FASB ASC 718. The grant date fair value of our stock options is calculated using a Black-Scholes valuation model. For purposes of these calculations, we have disregarded the estimate of forfeitures related to service-based vesting conditions.
- (4) Options subject to time-based vesting criteria established by the Compensation Committee and described in the footnotes to the *Outstanding Equity Awards at Fiscal Year End* table below.
- (5) Restricted stock units subject to time-based vesting criteria established by the Compensation Committee and described in the footnotes to the *Outstanding Equity Awards at Fiscal Year End* table below.
- (6) Represents restricted stock units granted to the named executive officers in an amount equal to 80% of the voluntary salary reduction amount. These restricted stock units are subject to monthly time-based vesting criteria as established by the Compensation Committee and described in footnote (13) of the *Outstanding Equity Awards at Fiscal Year End* table below.

Outstanding Equity Awards at Fiscal Year End

The following table sets forth information concerning the outstanding equity awards held by each of the named executive officers as of December 31, 2020.

Name	Option Awards (1)				Stock Awards (1)	
	Number of securities underlying unexercised options ((#) exercisable)	Number of securities underlying unexercised options (#) unexercisable)	Option exercise price (\$/share)	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 (\$)
Nick Leschly	15,999	—	5.50	1/16/2023	—	—
	33,649	—	5.50	1/16/2023	—	—
	73,006	—	5.50	1/16/2023	—	—
	70,504	—	5.50	1/16/2023	—	—
	10,197	—	5.50	1/16/2023	—	—
	165,000	—	24.47	3/3/2024	—	—
	165,000	—	97.40	3/2/2025	—	—
	90,000	—	50.51	3/1/2026	—	—
	107,685	2,315 (2)	75.60	2/1/2027	—	—
	87,500	32,500 (3)	205.25	2/1/2028	—	—
	47,913	52,087 (4)	134.63	2/1/2029	—	—
	—	65,000 (5)	73.84	3/2/2030	—	—
	—	—	—	—	6,875 (7)	297,481
—	—	—	—	15,000 (8)	649,050	
—	—	—	—	18,750 (9)	811,313	
—	—	—	—	32,500 (10)	1,406,275	
—	—	—	—	4,743 (13)	205,230	
William D. Baird, III	27,500	32,500 (11)	156.66	3/1/2029	—	—
	—	20,000 (5)	73.84	3/2/2030	—	—
	—	—	—	—	11,250 (12)	486,788
	—	—	—	—	10,000 (10)	432,700
Philip Gregory	50,000	—	163.07	7/1/2025	—	—
	6,200	—	50.51	3/1/2026	—	—
	24,275	725 (2)	75.60	2/1/2027	—	—
	24,784	9,216 (3)	205.25	2/1/2028	—	—
	12,932	14,068 (4)	134.63	2/1/2029	—	—
	—	20,000 (5)	73.84	3/2/2030	—	—
	—	—	—	—	2,125 (7)	91,949
	—	—	—	—	4,250 (8)	183,898
	—	—	—	—	5,063 (9)	219,076
	—	—	—	—	10,000 (10)	432,700
—	—	—	—	630 (13)	27,260	
David Davidson	1,239	—	2.09	4/13/2022	—	—
	3,610	—	24.47	3/3/2024	—	—
	60,000	—	97.40	3/2/2025	—	—
	9,625	—	50.51	3/1/2026	—	—
	33,375	725 (2)	75.60	2/1/2027	—	—
	32,801	12,199 (3)	205.25	2/1/2028	—	—
	17,966	19,534 (4)	134.63	2/1/2029	—	—
	—	20,000 (5)	73.84	3/2/2030	—	—
	—	—	—	—	2,125 (7)	91,949
	—	—	—	—	5,626 (8)	243,437
	—	—	—	—	7,032 (9)	304,275
	—	—	—	—	10,000 (10)	432,700
	—	—	—	—	673 (13)	29,121

Name	Option Awards (1)				Stock Awards (1)			
	Number of securities underlying unexercised options ((#) exercisable)	Number of securities underlying unexercised options (#) unexercisable	Option exercise price (\$/share)	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 (\$)		
Joanne Smith-Farrell	13,125	2,500	(17)	88.55	4/3/2027	—	—	
	6,409	2,391	(3)	205.25	2/1/2028	—	—	
	6,414	4,586	(6)	203.15	3/1/2028	—	—	
	4,542	4,958	(4)	134.63	2/1/2029	—	—	
	4,750	7,250	(18)	139.62	5/1/2029	—	—	
	—	20,000	(5)	73.84	3/2/2030	—	—	
	—	—	—	—	—	1,875	(14)	81,131
	—	—	—	—	—	1,100	(8)	47,597
	—	—	—	—	—	794	(19)	34,356
	—	—	—	—	—	1,750	(15)	75,723
	—	—	—	—	—	1,782	(9)	77,107
	—	—	—	—	—	2,250	(16)	97,358
	—	—	—	—	—	10,000	(10)	432,700
	—	—	—	—	—	597	(13)	25,832

- (1) All unvested stock options and restricted stock awards were granted under our 2013 Plan. The market value of the restricted stock unit award is based on the closing price of \$43.27 per share for our common stock on December 31, 2020, as reported on the NASDAQ Global Select Market.
- (2) Represents options to purchase shares of our common stock granted on February 1, 2017. The shares underlying these options vest as follows: 25% vested on January 4, 2018, with the remainder of the shares vesting in equal monthly installments over the following three years through January 4, 2021, subject to continued service with us through each applicable vesting date.
- (3) Represents options to purchase shares of our common stock granted on February 1, 2018. The shares underlying these options vest as follows: 25% vested on January 4, 2019, with the remainder of the shares vesting in equal monthly installments over the following three years through January 4, 2022, subject to continued service with us through each applicable vesting date.
- (4) Represents options to purchase shares of our common stock granted on February 1, 2019. The shares underlying these options vest as follows: 25% vested on January 4, 2020, with the remainder of the shares vesting in equal monthly installments over the following three years through January 4, 2023, subject to continued service with us through each applicable vesting date.
- (5) Represents options to purchase shares of our common stock granted on March 2, 2020. The shares underlying these options vest as follows: 25% vested on January 4, 2021, with the remainder of the shares vesting in equal monthly installments over the following three years through January 4, 2024, subject to continued service with us through each applicable vesting date.
- (6) Represents options to purchase shares of our common stock granted on September 28, 2018 with performance-based criteria that was met on August 24, 2018. The shares underlying these options vest as follows: 25% vested on August 24, 2019, with the remainder of the shares vesting in equal monthly installments over the following three years through August 24, 2022, subject to continued service with us through each applicable vesting date.
- (7) Restricted stock unit award vests in four equal annual installments through January 4, 2021.
- (8) Restricted stock unit award vests in four equal annual installments through January 4, 2022, subject to continued service with us through each applicable vesting date.
- (9) Restricted stock unit award vests in four equal annual installments through January 4, 2023, subject to continued service with us through each applicable vesting date.
- (10) Restricted stock unit award vests in four equal annual installments through January 4, 2024, subject to continued service with us through each applicable vesting date.
- (11) Represents options to purchase shares of our common stock granted on March 1, 2019. The shares underlying these options vest as follows: 25% vested on February 11, 2020, with the remainder of the shares vesting in equal monthly installments over the following three years through February 11, 2023, subject to continued service with us through each applicable vesting date.
- (12) Restricted stock unit award vests in four equal annual installments through February 11, 2023, subject to continued service with us through each applicable vesting date.
- (13) Restricted stock unit award vests in 12 equal monthly installments through May 1, 2021.
- (14) Restricted stock unit award vests in four equal annual installments through April 3, 2021, subject to continued service with us through each applicable vesting date.
- (15) Restricted stock unit award with performance-based criteria that was met on August 24, 2018 vests in four equal annual installments through August 24, 2022, subject to continued service with us through each applicable vesting date.
- (16) Restricted stock unit award vests in four equal annual installments through May 1, 2023, subject to continued service with us through each applicable vesting date.
- (17) Represents options to purchase shares of our common stock granted on April 3, 2017. The shares underlying these options vest as follows: 25% vested on April 3, 2018, with the remainder of the shares vesting in equal monthly installments over the following three years through April 3, 2021.
- (18) Represents options to purchase shares of our common stock granted on May 1, 2019. The shares underlying these options vest as follows: 25% vested on May 1, 2020, with the remainder of the shares vesting in equal monthly installments over the following three years through May 1, 2023.
- (19) Restricted stock unit award with performance-based criteria that was met on June 3, 2019 vests as follows: 15% on June 3, 2019, 35% on June 3, 2020, and 50% on June 3, 2021.

Option Exercises and Stock Vested

The following table sets forth, for each of the named executive officers, information with respect to the exercise of stock options and the vesting of restricted stock unit awards during the year ended December 31, 2020.

Name	Option Awards		Stock Awards	
	Number of shares acquired on exercise (#)	Value realized on exercise (\$)(1)	Number of shares acquired on vesting (#)	Value realized on vesting (\$)(2)
Nick Leschly	—	—	32,891	2,656,969
William D. Baird, III	—	—	3,750	337,725
Philip Gregory, D. Phil.	600	24,054	12,568	1,065,875
David Davidson, M.D.	—	—	10,622	894,801
Joanne Smith-Farrell, Ph.D.	—	—	6,033	350,960

- (1) Value realized on exercise of stock option awards does not represent proceeds from any sale of any common stock acquired upon exercise, but is determined by multiplying the number of shares acquired upon exercise by the difference between the per share exercise price of the option and the closing price of a share of our common stock on the NASDAQ Global Select Market at each time of exercise.
- (2) 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 restricted stock units that vested.

Employment Arrangements with our Named Executive Officers

Nick Leschly. We have entered into an amended and restated employment agreement, effective as of the closing of our initial public offering on June 24, 2013, with Mr. Leschly for the position of President and Chief Executive Officer. Mr. Leschly currently receives an annual base salary of \$750,500, which is subject to adjustment at the discretion of the Compensation Committee. Mr. Leschly is also eligible for an annual cash incentive award targeted at 65% of his annual base salary. Mr. Leschly is eligible to participate in our employee benefit plans, subject to the terms of those plans.

William D. Baird, III. We have entered into an employment agreement, effective as of December 18, 2018, with Mr. Baird for the position of Chief Financial Officer. Mr. Baird currently receives an annual base salary of \$491,300, which is subject to adjustment at the discretion of the Compensation Committee. Mr. Baird is also eligible for an annual cash incentive award targeted at 45% of his annual base salary, payable at the discretion of the Compensation Committee. Mr. Baird is eligible to participate in our employee benefit plans, subject to the terms of those plans. In addition, pursuant to the terms of the employment agreement, prior to Mr. Baird's permanent relocation to the Cambridge, Massachusetts area for up to a period of three years, we have agreed to reimburse Mr. Baird for the cost of temporary living arrangements reasonably acceptable to us, grossed up for Mr. Baird's anticipated income tax liability.

Philip Gregory, D. Phil. We have entered into an employment agreement with Dr. Gregory, effective as of May 30, 2015, and amended on November 3, 2016. Dr. Gregory currently serves as our Chief Scientific Officer and receives an annual base salary of \$496,300, which is subject to adjustment at the discretion of the Compensation Committee. Dr. Gregory is also eligible for an annual cash incentive award targeted at 45% of his annual base salary, payable at the discretion of the Compensation Committee. Dr. Gregory is eligible to participate in our employee benefit plans, subject to the terms of those plans.

David Davidson, M.D. We entered into an amended and restated employment agreement, effective as of the closing of our initial public offering on June 24, 2013, with Dr. Davidson for the position of Chief Medical Officer. Dr. Davidson's annual base salary prior to his resignation was \$530,500, which was subject to adjustment at the discretion of the Compensation Committee. Dr. Davidson was also eligible for an annual cash incentive award targeted at 45% of his annual base salary, payable at the discretion of the Compensation Committee. Dr. Davidson was also eligible to participate in our employee benefit plans, subject to the terms of those plans. Dr. Davidson resigned as our Chief Medical Officer effective April 16, 2021 and the terms of his Separation Agreement are set forth below.

Joanne Smith-Farrell, Ph.D. We entered into an employment agreement with Dr. Smith-Farrell, effective as of April 8, 2019. Dr. Smith-Farrell's annual base salary prior to resignation was \$496,800, which was subject to adjustment at the discretion of the Compensation Committee. Dr. Smith-Farrell was also eligible for an annual cash incentive award targeted at 45% of her annual base salary, payable at the discretion of the Compensation Committee. Dr. Smith-Farrell was also eligible to participate in our employee benefit plans, subject to the terms of those plans. Dr. Smith-Farrell resigned as our Chief Operating Officer, Oncology, effective February 1, 2021 and continued to support the Company's preparations for the planned spinoff of the oncology programs and portfolio through April 3, 2021. She did not receive any severance payments or benefits in connection with her resignation.

These employment agreements also contain provisions that provide for certain payments and benefits in the event of an involuntary termination of employment. In addition, the named executive officers may be entitled to accelerated vesting of their outstanding and unvested awards in certain circumstances. The information below describes certain compensation that may become due as a result of certain events. These payments and benefits are in addition to benefits available generally to salaried employees, including an ability to participate in our Section 401(k) plan, and our employee stock purchase plan, accrued benefits under our health and welfare plans and arrangements and vacation pay or other accrued benefits under our medical and dental insurance plans, that are not generally described. Outstanding equity awards for the named executive officers as of December 31, 2020 are set forth under *Outstanding Equity Awards at Fiscal Year End* above.

Involuntary termination of employment

Pursuant to their employment agreements, each named executive officer is (or in the case of Drs. Davidson and Smith-Farrell was) eligible to receive certain payments and benefits in the event his or her employment is (or in the case of Drs. Davidson and Smith-Farrell was) terminated by us without “cause” (as defined in the employment agreements) or in the event he or she terminates (or in the case of Drs. Davidson and Smith-Farrell terminated) his or her employment with “good reason” (as defined in the employment agreements). Upon the timely execution of a severance agreement, including a general release of claims, each named executive officer is (or in the case of Drs. Davidson and Smith-Farrell was) eligible to receive the following payments and benefits:

- 12 months of base salary continuation; and
- if he or she elects (or in the case of Drs. Davidson and Smith-Farrell elected) to continue his or her group healthcare benefits, to the extent authorized by and consistent with COBRA, we will pay the named executive officer a monthly cash payment equal to the monthly employer contribution we would have made to provide him or her health insurance if he or she had remained employed by us until the earlier of (1) 12 months following the date of termination, or (2) the end of the named executive officer’s COBRA health continuation period.

Sale event

In addition, in the event that any of our named executive officers terminates (or in the case of Drs. Davidson and Smith-Farrell terminated) his or her employment with us for good reason or his or her employment with us is (or in the case of Drs. Davidson and Smith-Farrell was) terminated by us without cause, in either case within 12 months following a “sale event” (as defined in the 2013 Plan), he or she will be (or in the case of Drs. Davidson and Smith-Farrell would have been) entitled to receive the following payments and benefits (in lieu of the payments and benefits described above) upon the timely execution of a severance agreement, including a general release of claims:

- a lump sum cash payment equal to one times (or one and a half times in the case of Mr. Leschly) the sum of (1) the named executive officer’s then-current base salary (or base salary in effect immediately prior to the sale event, if higher) and (2) the named executive officer’s target annual cash incentive compensation; and
- if he or she elects (or in the case of Drs. Davidson and Smith-Farrell elected) to continue his or her group healthcare benefits, to the extent authorized by and consistent with COBRA, we will pay the named executive officer a monthly cash payment equal to the monthly employer contribution we would have made to provide him or her health insurance if he or she had remained employed by us until the earlier of (1) 12 months (or 18 months in the case of Mr. Leschly) following the date of termination or (2) the end of the named executive officer’s COBRA health continuation period; and
- all stock options and other stock-based awards granted to the named executive officer after the date of his or her employment agreement will (or in the case of Drs. Davidson and Smith-Farrell would have) become fully exercisable and non-forfeitable as of the date of the named executive officer’s termination.

Separation Agreement with Dr. Davidson

On March 15, 2021, we entered into a separation agreement with Dr. Davidson, pursuant to which his employment with us ended on April 16, 2021. The separation agreement provided for the benefits that he would otherwise have been entitled to as set forth in the severance provisions of his employment agreement, namely 12 months of base salary and health and dental insurance continuation. In addition, following his departure, Dr. Davidson is engaged as a consultant for a period of six months pursuant to a consulting agreement, under which we expect Dr. Davidson to provide ongoing guidance and support for our late-stage development programs in severe genetic disease, particularly as we navigate the regulatory interactions following the safety events reported to us in February 2021. We believe that Dr. Davidson’s deep understanding

of and experience with our programs, product candidates, and the gene therapy field will be important during the term of the consulting agreement as we plan further clinical development activities. In addition, we expect Dr. Davidson to assist with the transition of his duties to our interim Chief Medical Officer, and supporting our preparations for the spinoff by supporting the medical leadership for our oncology business. Under the consulting agreement, Dr. Davidson is entitled to an hourly rate for his consulting services based on his 2021 base salary, and his outstanding equity awards will continue to vest during the 6-month term. The consulting agreement also provides for customary provisions governing confidentiality and inventions assignment.

Estimated Payment and Benefits Upon Termination or Change of Control

The amount of compensation and benefits payable to each named executive officer who was employed on December 31, 2020 under our current employment agreements in various termination and change in control situations has been estimated in the tables below. The value of the equity vesting acceleration was calculated for each of the tables below based on the assumption that the change in control and the named executive officer's employment termination occurred on December 31, 2020, the last business day of the fiscal year ended December 31, 2020. The per share closing price of the Company's stock on the NASDAQ Global Select Market as of December 31, 2020, the last trading day of 2020, was \$43.27, which was used as the value of the Company's stock in the change in control. The value of the option vesting acceleration was calculated by multiplying the number of unvested option shares subject to vesting acceleration as of December 31, 2020, by the difference between the per share closing price of the Company's stock as of December 31, 2020, and the per share exercise price for such unvested option shares. The value of restricted stock unit vesting acceleration was calculated by multiplying the number of unvested restricted stock units subject to vesting acceleration as of December 31, 2020, by the per share closing price of the Company's stock as of December 31, 2020.

Nick Leschly. The following table describes the potential payments and benefits upon employment termination for Mr. Leschly, as if his employment terminated as of December 31, 2020, the last business day of the fiscal year.

Executive Benefits and Payment upon Termination	Voluntary Resignation not For Good Reason (\$)	Voluntary Resignation For Good Reason Not in Connection with a Sale Event (\$)	Termination by Company without Cause Not in Connection with a Sale Event (\$)	Termination by Company for Cause (\$)	Termination by Company without Cause or Voluntary Resignation for Good Reason within 12 Months Following a Sale Event (\$)
Compensation:					
Base salary	—	725,000 (1)	725,000 (1)	—	1,087,500 (2)
Cash incentive compensation	—	—	—	—	706,875 (3)
Acceleration of unvested and outstanding stock options and restricted stock unit awards	—	—	—	—	3,369,348 (4)
Benefits and Perquisites:					
Health care continuation	—	24,380 (5)	24,380 (5)	—	36,571 (6)
Total	—	749,380	749,380	—	5,200,294

(1) Twelve months of 2020 base salary continuation.

(2) One and a half times base salary in effect prior to the termination, payable in a lump sum.

(3) One and a half times Mr. Leschly's target bonus for 2020, payable in a lump sum.

(4) Value attributable to the acceleration of 100% of Mr. Leschly's (i) then unvested and outstanding options, determined by multiplying the number of shares underlying such options by the difference between the per share exercise price of the options and the per share closing price of our common stock on the NASDAQ Global Select Market on December 31, 2020, and (ii) then unvested restricted stock units, determined by multiplying the number of restricted stock units accelerated by the closing price of our common stock on the NASDAQ Global Select Market on December 31, 2020.

(5) Payment of the COBRA health and dental insurance premiums for Mr. Leschly and his dependents until the earlier of (a) 12 months following the date of termination, or (b) the end of the named executive officer's COBRA health continuation period.

(6) Payment of the COBRA health and dental insurance premiums for Mr. Leschly and his dependents until the earlier of (a) 18 months following the date of termination, or (b) the end of the named executive officer's COBRA health continuation period.

William D. Baird, III. The following table describes the potential payments and benefits upon employment termination for Mr. Baird, as if his employment terminated as of December 31, 2020, the last business day of the fiscal year.

Executive Benefits and Payment upon Termination	Voluntary Resignation not For Good Reason (\$)	Voluntary Resignation For Good Reason Not in Connection with a Sale Event (\$)	Termination by Company without Cause Not in Connection with a Sale Event (\$)	Termination by Company for Cause (\$)	Termination by Company without Cause or Voluntary Resignation for Good Reason within 12 Months Following a Sale Event (\$)
Compensation:					
Base salary	—	474,600 (1)	474,600 (1)	—	474,600 (2)
Cash incentive compensation	—	—	—	—	213,570 (3)
Acceleration of unvested and outstanding stock options and restricted stock unit awards	—	—	—	—	919,488 (4)
Benefits and Perquisites:					
Health care continuation	—	24,380 (5)	24,380 (5)	—	24,380 (5)
Total	—	498,980	498,980	—	1,632,038

- (1) Twelve months of 2020 base salary continuation.
- (2) One times base salary in effect prior to the termination, payable in a lump sum.
- (3) Target bonus for 2020, payable in a lump sum.
- (4) Value attributable to the acceleration of 100% of Mr. Baird's (i) then unvested options, determined by multiplying the number of shares accelerated by the difference between the exercise price of the option and the closing price of our common stock on the NASDAQ Global Select Market on December 31, 2020, and (ii) then unvested restricted stock units, determined by multiplying the number of restricted stock units accelerated by the closing price of our common stock on the NASDAQ Global Select Market on December 31, 2020.
- (5) Payment of the COBRA health and dental insurance premiums for Mr. Baird and his dependents until the earlier of (a) 12 months following the date of termination, or (b) the end of the named executive officer's COBRA health continuation period.

Philip Gregory. The following table describes the potential payments and benefits upon employment termination for Dr. Gregory, as if his employment terminated as of December 31, 2020, the last business day of the fiscal year.

Executive Benefits and Payment upon Termination	Voluntary Resignation not For Good Reason (\$)	Voluntary Resignation For Good Reason Not in Connection with a Sale Event (\$)	Termination by Company without Cause Not in Connection with a Sale Event (\$)	Termination by Company for Cause (\$)	Termination by Company without Cause or Voluntary Resignation for Good Reason within 12 Months Following a Sale Event (\$)
Compensation:					
Base salary	—	479,500 (1)	479,500 (1)	—	479,500 (2)
Cash incentive compensation	—	—	—	—	215,775 (3)
Acceleration of unvested and outstanding stock options and restricted stock unit awards	—	—	—	—	954,882 (4)
Benefits and Perquisites:					
Health care continuation	—	24,380 (5)	24,380 (5)	—	24,380 (5)
Total	—	503,880	503,880	—	1,674,537

- (1) Twelve months of 2020 base salary continuation.
- (2) Twelve months base salary in effect prior to the termination, payable in a lump sum.
- (3) Target bonus for 2020, payable in a lump sum.
- (4) Value attributable to the acceleration of 100% of Dr. Gregory's (i) then unvested options, determined by multiplying the number of shares accelerated by the difference between the exercise price of the option and the closing price of our common stock on the NASDAQ Global Select Market on December 31, 2020, and (ii) then unvested restricted stock units, determined by multiplying the number of restricted stock units accelerated by the closing price of our common stock on the NASDAQ Global Select Market on December 31, 2020.
- (5) Payment of the COBRA health and dental insurance premiums for Dr. Gregory and his dependents until the earlier of (a) 12 months following the date of termination, or (b) the end of the named executive officer's COBRA health continuation period.

David Davidson. The following table describes the potential payments and benefits upon employment termination for Dr. Davidson, as if his employment terminated as of December 31, 2020, the last business day of the fiscal year.

Executive Benefits and Payment upon Termination	Voluntary Resignation not For Good Reason (\$)	Voluntary Resignation For Good Reason Not in Connection with a Sale Event (\$)	Termination by Company without Cause Not in Connection with a Sale Event (\$)	Termination by Company for Cause (\$)	Termination by Company without Cause or Voluntary Resignation for Good Reason within 12 Months Following a Sale Event (\$)
Compensation:					
Base salary	—	512,500 (1)	512,500 (1)	—	512,500 (2)
Cash incentive compensation	—	—	—	—	230,625 (3)
Acceleration of unvested and outstanding stock options and restricted stock unit awards	—	—	—	—	1,101,481 (4)
Benefits and Perquisites:					
Health care continuation	—	24,227 (5)	24,227 (5)	—	24,227 (5)
Total	—	536,727	536,727	—	1,868,833

- (1) Twelve months of 2020 base salary continuation.
- (2) Twelve months base salary in effect prior to termination, payable in a lump sum.
- (3) Target bonus for 2020, payable in a lump sum.
- (4) Value attributable to the acceleration of 100% of Dr. Davidson's (i) then unvested options, determined by multiplying the number of shares accelerated by the difference between the exercise price of the option and the closing price of our common stock on the NASDAQ Global Select Market on December 31, 2020, and (ii) then unvested restricted stock units, determined by multiplying the number of restricted stock units accelerated by the closing price of our common stock on the NASDAQ Global Select Market on December 31, 2020.
- (5) Payment of the COBRA health and dental insurance premiums for Dr. Davidson and his dependents until the earlier of (a) 12 months following the date of termination, or (b) the end of the named executive officer's COBRA health continuation period.

Joanne Smith-Farrell. The following table describes the potential payments and benefits upon employment termination for Dr. Smith-Farrell, as if her employment terminated as of December 31, 2020, the last business day of the fiscal year.

Executive Benefits and Payment upon Termination	Voluntary Resignation not For Good Reason (\$)	Voluntary Resignation For Good Reason Not in Connection with a Sale Event (\$)	Termination by Company without Cause Not in Connection with a Sale Event (\$)	Termination by Company for Cause (\$)	Termination by Company without Cause or Voluntary Resignation for Good Reason within 12 Months Following a Sale Event (\$)
Compensation:					
Base salary	—	480,000 (1)	480,000 (1)	—	480,000 (2)
Cash incentive compensation	—	—	—	—	216,000 (3)
Acceleration of unvested and outstanding stock options and restricted stock unit awards	—	—	—	—	871,804 (4)
Benefits and Perquisites:					
Health care continuation	—	24,380 (5)	24,380 (5)	—	24,380 (5)
Total	—	504,380	504,380	—	1,592,184

- (1) Twelve months of 2020 base salary continuation.
- (2) Twelve months base salary in effect prior to the termination, payable in a lump sum.
- (3) Target bonus for 2020, payable in a lump sum.
- (4) Value attributable to the acceleration of 100% of Dr. Smith-Farrell's (i) then unvested options, determined by multiplying the number of shares accelerated by the difference between the exercise price of the option and the closing price of our common stock on the NASDAQ Global Select Market on December 31, 2020, and (ii) then unvested restricted stock units, determined by multiplying the number of restricted stock units accelerated by the closing price of our common stock on the NASDAQ Global Select Market on December 31, 2020.
- (5) Payment of the COBRA health and dental insurance premiums for Dr. Smith-Farrell and her dependents until the earlier of (a) 12 months following the date of termination, or (b) the end of the named executive officer's COBRA health continuation period.

CEO Pay Ratio

Our compensation and benefits philosophy and the overall structure of our compensation and benefit programs are broadly similar across the organization to encourage and reward all employees who contribute to our success. We strive to ensure the pay of every bluebird employee reflects the level of their job impact and responsibilities and is competitive within our peer group. Compensation rates are benchmarked and are generally set to be market-competitive in the country in which the jobs are performed. Our ongoing commitment to pay equity is critical to our success in supporting a diverse workforce with opportunities for all employees to grow, develop, and contribute. Under rules adopted pursuant to the Dodd-Frank Act, we are required to calculate and disclose the total compensation paid to our median paid employee, as well as the ratio of the total compensation paid to the median employee as compared to the total compensation paid to our Chief Executive Officer, which we refer to as the CEO Pay Ratio. The paragraphs that follow describe our methodology and the resulting CEO Pay Ratio.

Measurement Date

We identified the median employee using our employee population on October 1, 2020 (including all employees, whether employed on a full-time, part-time, seasonal or temporary basis). The measurement date used for 2020 is the same date used to identify the median employee for 2018 and 2019.

Consistently Applied Compensation Measure (CACM)

Under the relevant rules, we were required to identify the median employee by use of a “consistently applied compensation measure,” or CACM. We chose a CACM that closely approximates the annual target total direct compensation of our employees. Specifically, we identified the median employee by looking at annual base pay, annual target cash incentive opportunity, and the grant date fair value for equity awards granted as of October 1, 2020 for all active employees as of that date. Amounts paid in non-U.S. currencies were converted to U.S. Dollars based on the average 2020 exchange rate as of October 1, 2020. The value of our 401(k) plan and health and welfare benefits provided was excluded as all employees, including the Chief Executive Officer, are offered the same benefits. We did not perform adjustments to the compensation paid to part-time employees to calculate what they would have been paid on a full-time basis. In identifying the median employee, we did not exclude workers in non-U.S. countries and did not make any cost-of-living adjustments. The CACM used for 2020 is the same applied to identify the median employee for 2019.

Methodology and Pay Ratio

After applying our CACM methodology, we identified the median employee. Once the median employee was identified, we calculated the median employee’s annual target total direct compensation in accordance with the requirements of the *Summary Compensation Table*. Our median employee compensation as calculated using *Summary Compensation Table* requirements was \$183,956. Our Chief Executive Officer’s compensation as reported in the *Summary Compensation Table* was \$6,241,647. Therefore, our CEO Pay Ratio is approximately 34:1.

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 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 of the Company used the CEO Pay Ratio measure in making compensation decisions

Director Compensation

The Compensation Committee of our Board is responsible for making recommendations to our Board on appropriate compensation levels and arrangements for our non-employee directors, ensuring they are consistent with our compensation policy and remain competitive with our peer companies. The Compensation Committee reviews our non-employee director compensation on an annual basis. In making recommendations, the Compensation Committee takes various factors into consideration, including:

- Non-employee directors’ responsibilities and the form and amount of compensation paid to directors at our peer companies;

- Ability to retain and attract the most qualified and experienced non-employee directors to oversee the management of our business and operations; and
- Advice of an independent compensation consultant to review our non-employee director compensation program and promote alignment with market practice and stockholder interests.

Our goal is to appropriately compensate non-employee directors for their leadership and expertise while aligning non-employee director interests with those of our stockholders. In line with this goal, our non-employee director compensation policy is underpinned by the same philosophy and principles that govern our executive compensation program. The Compensation Committee generally targeted non-employee director compensation near the 50th percentile of compensation paid non-employee directors with the companies in our peer group.

Our non-employee director compensation program is designed to:

- ✓ Align non-employee director and stockholder interests through grants of non-statutory stock option awards and restricted stock units;
- ✓ Encourage a vested interest in our long-term business performance through stock ownership requirements;
- ✓ Align non-employee director compensation with our peer companies of comparable stage of development, market capitalization and size;
- ✓ Ensure a robust non-employee director compensation governance framework is in place; and
- ✓ Help us attract and retain talent for Board service to support the long-term value of the Company.

Based on these considerations, our Board has adopted a non-employee director compensation policy, which provides for annual cash retainers. The non-executive chair of our Board and the chair of each of our committees is entitled to greater compensation for his or her services than other members of our Board, which we believe is commensurate with the additional time commitment and additional responsibility required by the position held and is consistent with the compensation practices of our peer group companies. The table below sets forth the cash retainer applicable to our directors in 2020.

Annual cash retainers under the Non-Employee Director Compensation Policy	2020 Cash Retainer (\$)
Board:	
All non-employee members of the Board	\$ 45,000
Additional retainer for non-executive chair of the	\$ 35,000
Audit Committee:	
Additional retainer for chair of the Audit Committee	\$ 18,000
Additional retainer for other members of the Audit Committee	\$ 9,000
Compensation Committee:	
Additional retainer for chair of the Compensation Committee	\$ 15,000
Additional retainer for other members of the Compensation	\$ 7,500
Nominating and Corporate Governance Committee:	
Additional retainer for chair of the Nominating and Corporate Governance Committee	\$ 10,000
Additional retainer for other members of the Nominating and Corporate Governance Committee	\$ 5,000

In addition, under our non-employee director compensation policy, new members of our Board are eligible for an initial equity grant under our stock option plan. The initial equity grant takes the form of a grant of stock options and restricted stock units that vest in equal annual installments over a three-year period. In addition, on the date of the annual meeting of stockholders, each continuing non-employee director who has served on the Board for a minimum of six months will be eligible to receive an annual equity grant in the form of stock options and restricted stock units. These annual equity grants will vest in full upon the earlier of the first anniversary of the date of grant or the date of the following annual meeting of stockholders. The number of shares subject to the initial equity grants and the annual equity grants are summarized in the table below. The non-executive chair of our Board is eligible to receive an additional equity grant with a value that is greater than those of the other members of the Board, which we believe is commensurate with the additional time commitment and additional responsibility that the chair of our Board takes on. In the case of each initial equity grant and annual equity grant, the Board or Compensation Committee may exercise their discretion to provide for a different number of shares subject to equity awards in the event they determine a variation from the stated amount is warranted. All of the foregoing options are granted with an exercise price equal to the fair market value of our common stock on the date of grant. The equity grant policy applicable to our directors in 2020 is summarized below.

Equity grants under the Non-Employee Director Compensation Policy	Stock options (# of shares)	Restricted Stock Units (# of shares)
Initial equity grant	4,500	2,250
Annual equity grant	3,000	1,500
Additional equity grant for non-executive chair of the Board	1,200	600

As part of our comprehensive business review in the second quarter of 2020, and with the goal of ensuring our ability to execute on our strategy in light of the impact of the COVID-19 pandemic, the non-employee directors then-serving on the Board voluntarily reduced their cash retainers by 20% for a one-year period beginning July 1, 2020, and each non-employee member of the Board received an additional grant of restricted stock units with a value equal to 80% of the amount of the reduction on June 18, 2020 (the date of our 2020 annual meeting), determined using the closing market price on the NASDAQ Global Select Market of bluebird's common stock on such grant date, rounded down to the nearest whole share. These restricted stock units shall vest on the date of the 2021 annual meeting.

Going forward, non-employee director compensation (other than that for new directors or for the chair of the Board) will be limited to no more than the 75th percentile of director compensation of the peer group, as updated annually with the assistance and advice of an independent compensation consultant. At this time, our Compensation Committee is continuing to review our non-employee director compensation policy for 2021.

The following table sets forth the compensation we paid to our non-employee directors during the year ended December 31, 2020. Other than as set forth in the table we did not pay any compensation, reimburse any expense of (other than reasonable out-of-pocket expenses to attend meetings of the Board or any committee), make any equity awards or non-equity awards to, or pay any other compensation to any of the other non-employee members of our Board in the year ended December 31, 2020. Mr. Leschly, our Chief Executive Officer, receives no compensation for his service as a director, and, consequently, is not included in this table. The compensation received by Mr. Leschly as an employee during the year ended December 31, 2020 is presented in *Summary Compensation Table* above.

Name(1)	Fees earned or paid in cash\$(2)	Option awards\$(3)	Stock awards\$(3)	Total(\$)
John O. Agwunobi, M.D.	52,947	114,159	96,135	263,241
Wendy Dixon, Ph. D.	65,156	114,159	96,135	275,450
Daniel S. Lynch	110,199	159,823	134,589	404,611
Douglas A. Melton, Ph.D.	52,947	114,159	96,135	263,241
William R. Sellers, M.D.	47,678	114,159	96,135	257,972
Denice Torres (4)	13,125	180,330	147,983	341,438
Mark Vachon	66,762	114,159	96,135	277,056
David Schenkein, M.D. (5)	66,248	114,159	96,135	276,542

- (1) The aggregate number of shares of our common stock underlying stock options outstanding as of December 31, 2020 for the non-employee directors were: Dr. Agwunobi: 21,700, Dr. Dixon: 60,361, Mr. Lynch: 70,942, Dr. Melton: 18,700, Dr. Sellers: 11,000, Ms. Torres: 4,500, Mr. Vachon: 22,500, and Dr. Schenkein: 53,361. The aggregate number of restricted stock units outstanding as of December 31, 2020 for the non-employee directors was: Dr. Agwunobi: 1,624, Dr. Dixon: 1,653, Mr. Lynch: 2,359, Dr. Melton: 0, Dr. Sellers: 2,946, Ms. Torres: 2,250, Mr. Vachon: 1,657, and Dr. Schenkein: 1,656.
- (2) The amounts reported reflect voluntary reduction of cash retainer for Dr. Agwunobi, Dr. Dixon, Mr. Lynch, Dr. Melton, Dr. Sellers, Mr. Vachon, and Dr. Schenkein, and include the grant date fair value of restricted stock unit awards granted in 2020 equal to 80% of the voluntary salary reduction amount for each such director.
- (3) The amounts reported represent the aggregate grant date fair value of the stock options and restricted stock units granted to our non-employee directors during 2020 as computed in accordance with FASB ASC Topic 718, not including any estimates of forfeitures. See note 14 of *Notes to Consolidated Financial Statements* in our Annual Report on Form 10-K filed with the SEC on February 23, 2021 for a discussion of assumptions made by the Company in determining the aggregate grant date fair value of our stock option and restricted stock unit awards for the fiscal year ended December 31, 2020. Note that the amounts reported in this column reflect the accounting cost for these grants, and do not correspond to the actual economic value that may be received by the non-employee directors from the exercise of the options or vesting of the restricted stock units.
- (4) Ms. Torres was appointed to our Board effective August 10, 2020. The amounts reported for the option awards and restricted stock units granted to Ms. Torres represent the new director equity grant pursuant to the Company's Non-Executive Director Compensation Policy, which at the time of Ms. Torres's appointment provided for a grant of a stock option to purchase 4,500 shares of common stock and 2,250 restricted stock units.
- (5) Dr. Schenkein resigned from our Board effective January 9, 2021. Also on January 9, 2021, we entered into a consulting agreement with Dr. Schenkein, with a term of one year, for Dr. Schenkein to advise our oncology pipeline programs, given his deep expertise in oncology research and development and understanding of our technologies. In consideration for these ongoing consultations, Dr. Schenkein's outstanding equity grants will continue to vest during the term of the consulting agreement, and upon effectiveness of the spinoff of Oncology Newco from bluebird bio, Inc. (should it occur during the term of the consulting agreement), his outstanding equity shall be treated in the same manner as the other members of our directors then-serving on our Board.

SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The following table sets forth the amount of common stock of bluebird beneficially owned, directly or indirectly, as of April 19, 2021, by (i) each current director of bluebird, (ii) each named executive officer of bluebird, (iii) all directors and executive officers of bluebird as a group, and (iv) each person who is known to bluebird to beneficially own more than five percent (5%) of the outstanding shares of common stock of bluebird, as determined through SEC filings, and the percentage of the common stock outstanding represented by each such amount. All shares of common stock shown in the table reflect sole voting and investment power except as otherwise noted.

Beneficial ownership is determined by the rules of the SEC and includes voting or investment power of the securities. As of April 19, 2021, bluebird had 67,447,548 shares of common stock outstanding. Shares of common stock subject to options to purchase, which are now exercisable or are exercisable within 60 days after April 19, 2021, or restricted stock units vesting within 60 days after April 19, 2021 are to be considered outstanding for purposes of computing the percentage ownership of the persons holding these options or other rights but are not to be considered outstanding for the purpose of computing the percentage ownership of any other person. Unless otherwise indicated, the address for each person listed below is c/o bluebird bio, Inc., 60 Binney Street, Cambridge, Massachusetts 02142.

Name and Address of Beneficial Owner	Number of Shares Beneficially Owned	Percentage of Shares Beneficially Owned
5% Stockholders		
Wellington Management Group LLP (1)	6,915,454	10.3%
The Vanguard Group (2)	6,797,519	10.1%
BlackRock, Inc. (3)	3,861,648	5.7%
Directors and Named Executive Officers		
Nick Leschly (4)	1,129,409	1.7%
John O. Agwunobi, M.D. (5)	28,024	*
Wendy L. Dixon, Ph.D. (6)	66,014	*
Daniel S. Lynch (7)	78,901	*
Ramy Ibrahim	—	*
Denice Torres (8)	500	*
William R. Sellers, M.D. (9)	7,944	*
Mark Vachon (10)	26,157	*
Chip Baird (11)	50,109	*
Joanne Smith-Farrell, Ph.D. (12)	54,204	*
David Davidson, M.D. (13)	199,513	*
Philip Gregory, D. Phil. (14)	154,983	*
All executive officers and directors as a group (14 persons)(15)	1,975,868	2.9%

* Represents holdings of less than 1%.

- (1) Based solely on a Schedule 13G/A reporting beneficial ownership as of February 26, 2021, filed with the SEC on March 10, 2021, Wellington Management Group LLP, Wellington Group Holdings LLP, and Wellington Investment Advisors Holdings LLP each has shared voting power with respect to 6,850,320 shares and shared dispositive power with respect to 6,915,454 shares, and Wellington Management Company LLP has shared voting power with respect to 6,850,320 shares and shared dispositive power with respect to 6,850,320 shares. The address of Wellington Management Company LLP is 280 Congress Street, Boston, Massachusetts 02210.
- (2) Based solely on a Schedule 13G/A reporting beneficial ownership as of March 31, 2021, filed with the SEC on April 12, 2021, The Vanguard Group has shared voting power with respect to 46,707 shares, sole dispositive power with respect to 6,694,305 shares, and shared dispositive power with respect to 103,214 shares. The address of The Vanguard Group is 100 Vanguard Blvd., Malvern, Pennsylvania 19355.
- (3) Based solely on a Schedule 13G/A reporting beneficial ownership as of December 31, 2020, filed with the SEC on January 29, 2021, BlackRock, Inc. has sole voting power with respect to 3,622,760 shares and sole dispositive power with respect to 3,861,648 shares. The address of BlackRock, Inc. is 55 East 52nd Street, New York, New York 10055.

- (4) Consists of 412,529 shares of common stock and 716,880 shares of common stock underlying options exercisable and restricted stock units vesting within 60 days of April 19, 2021. Such shares include 168,699 shares of common stock held in the Nick Leschly 2001 Trust for which Mr. Leschly is co-trustee with his spouse, and with whom he shares voting and dispositive power.
- (5) Consists of 4,700 shares of common stock and 23,324 shares of common stock underlying options exercisable and restricted stock units vesting within 60 days of April 19, 2021.
- (6) Consists of 4,000 shares of common stock and 62,014 shares of common stock underlying options exercisable and restricted stock units vesting within 60 days of April 19, 2021.
- (7) Consists of 5,600 shares of common stock and 73,301 shares of common stock underlying options exercisable and restricted stock units vesting within 60 days of April 19, 2021.
- (8) Consists of 500 shares of common stock and 0 shares of common stock underlying options exercisable and restricted stock units vesting within 60 days of April 19, 2021.
- (9) Consists of 666 shares of common stock and 7,278 shares of common stock underlying options exercisable and restricted stock units vesting within 60 days of April 19, 2021.
- (10) Consists of 2,000 shares of common stock and 24,157 shares of common stock underlying options exercisable and restricted stock units vesting within 60 days of April 19, 2021.
- (11) Consists of 8,029 shares of common stock and 42,080 shares of common stock underlying options exercisable and restricted stock units vesting within 60 days of April 19, 2021.
- (12) Consists of 8,430 shares of common stock and 45,774 shares of common stock underlying options exercisable and restricted stock units vesting within 60 days of April 19, 2021.
- (13) Consists of 22,649 shares of common stock and 176,864 shares of common stock underlying options exercisable and restricted stock units vesting within 60 days of April 19, 2021.
- (14) Consists of 21,241 shares of common stock and 133,742 shares of common stock underlying options exercisable and restricted stock units vesting within 60 days of April 19, 2021.
- (15) Consists of 521,655 shares of common stock and 1,454,213 shares of common stock underlying options exercisable and restricted stock units vesting within 60 days of April 19, 2021.

Equity compensation plan information

The following table presents aggregate summary information as of December 31, 2020, regarding our existing equity compensation plans.

Plan Category	Column (A)	Column (B)	Column (C)
	Number of Securities to be Issued Upon Exercise of Outstanding Options, Restricted Stock Units and Other Rights	Weighted Average Exercise Price of Outstanding Options	Number of Securities Remaining Available for Future Issuance Under Equity Compensation Plans (Excluding Securities Reflected in Column A)
Equity Compensation Plans Approved by Stockholders (1)	7,756,563 (2)(3)	\$ 105.02 (3)(4)	2,612,647 (5)(6)
Equity Compensation Plans Not Approved by Stockholders	—	N/A	—
Total	7,756,563	\$ 105.02	2,612,647

- (1) Consists of the 2013 Plan and the 2013 Employee Stock Purchase Plan.
- (2) Includes 1,495,003 shares subject to restricted stock units that will entitle the holder to one share of common stock for each unit that vests over the holder's period of continued service with the company.
- (3) Excludes purchase rights accruing under the 2013 Employee Stock Purchase Plan.
- (4) The calculation does not take into account the 1,495,003 shares of common stock subject to outstanding restricted stock units. Such shares will be issued at the time the restricted stock units vest, without any cash consideration payable for those shares.
- (5) Consists of shares available for future issuance under the 2013 Employee Stock Purchase Plan and the 2013 Plan. As of December 31, 2020, 67,409 shares of common stock were available for issuance under the 2013 Employee Stock Purchase Plan, and 2,545,238 shares of common stock were available for issuance under the 2013 Plan.
- (6) Our 2013 Plan contains an "evergreen" provision, which allows for an annual increase in the number of shares of stock available for issuance under the plan on the first day of each year. The number of shares shall be increased by four percent of the number of shares of common stock issued and outstanding on the immediately preceding December 31, or such lesser number of shares determined by our Board or Compensation Committee.

PROPOSAL 4
APPROVAL OF AN AMENDMENT TO THE EMPLOYEE STOCK PURCHASE PLAN

Overview

On April 9, 2021, the Board adopted, subject to stockholder approval, the second amendment (the Amendment) to the bluebird bio, Inc. Employee Stock Purchase Plan (ESPP), to increase the number of shares of common stock authorized for issuance thereunder from 238,000 shares to 1,638,000 shares. The ESPP permits eligible employees the option to purchase shares of our common stock through payroll deductions at 85% of the fair market value of the common stock as of the applicable grant date or exercise date, whichever is lower. The ESPP is an important component of the benefits package that we offer to our employees. We believe that it is a key factor in retaining existing employees, recruiting and retaining new employees and aligning and increasing the interest of all employees in our success. As of April 19, 2021, there were no shares available for future awards under the ESPP. Our Board believes that the Amendment is in the best interest of our stockholders as it will help ensure that a sufficient number of shares of common stock are available for purchase by our employees, which will allow us to continue to utilize this equity incentive to attract and retain the services of key individuals essential to our long-term growth and success.

Based solely on the closing price of our common stock reported on the NASDAQ Global Select Market on April 19, 2021, the maximum aggregate market value of the 1,400,000 shares subject to the proposed increase under the Amendment is \$39,172,000.

Material Terms of the ESPP

The following is a brief summary of certain provisions of the ESPP. A copy of the Amendment is attached as Appendix A to this proxy statement and is incorporated herein by reference. The following description of the ESPP does not purport to be complete and is qualified in its entirety by reference to Appendix A and the ESPP filed as an exhibit to our Annual Report on Form 10-K. It is our intention that the ESPP qualify as an “employee stock purchase plan” under Section 423 of the Internal Revenue Code.

Shares Subject to the Plan. Subject to the approval of our stockholders, an aggregate of 1,638,000 shares will be reserved and available for issuance under the 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 ESPP will be appropriately adjusted.

Plan Administration. The ESPP will be administered by the Compensation Committee, which will have full authority to make, administer and interpret such rules and regulations regarding the 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 ESPP so long as they are customarily employed by the Company or a designated subsidiary for more than 20 hours a week and have completed at least six months of employment. No person who owns or holds, or as a result of participation in the ESPP would own or hold, common stock or options to purchase common stock, that together equal 5% or more of total outstanding common stock is entitled to participate in the ESPP. No employee may exercise an option granted under the 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 ESPP is limited to eligible employees who authorize payroll deductions equal to a whole percentage of base pay. Employees may authorize payroll deductions, with a minimum of 1% of base pay and a maximum of 10% of base pay. As of April 19, 2021, there are approximately 1,100 employees who would be eligible to participate in the ESPP. Once an employee becomes a participant in the ESPP, that employee will automatically participate in successive offering periods, as described below, until such time as that employee withdraws from the ESPP, becomes ineligible to participate in the ESPP, or his or her employment ceases.

Offering Periods. Unless otherwise determined by the Compensation Committee, each offering of common stock under the ESPP will be for a period of no longer than six months, which we refer to as an “offering period.” Shares are purchased on the last business day of each offering period, with that day being referred to as an “exercise date.” The Compensation Committee may establish different offering periods or exercise dates under the 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 ESPP in any offering period is 1,000 or such other lesser number of shares as determined by the Compensation Committee 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 Compensation Committee 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 at least 15 business days before 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 ESPP.

Term; Amendments and Termination. The ESPP will continue until terminated by the Board. The Board may, in its discretion, at any time, terminate or amend the ESPP, except that an amendment to increase the number of shares reserved under the ESPP requires approval by stockholders. Upon termination of the ESPP, all amounts in the accounts of participating employees will be refunded.

New Plan Benefits

Since participation in the ESPP is voluntary, the benefits or amounts that will be received by or allocated to any individual or group of individuals under the 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 ESPP. This summary does not purport to be a complete description of all federal tax implications of participation in the 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 ESPP recognizes no taxable income either as a result of participation in the ESPP or upon exercise of an option to purchase shares of our common stock under the terms of the ESPP.

If a participant disposes of shares purchased upon exercise of an option granted under the 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 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.

**THE BOARD UNANIMOUSLY RECOMMENDS THAT YOU VOTE
FOR
THE APPROVAL OF THE AMENDMENT TO THE EMPLOYEE STOCK PURCHASE PLAN
(PROPOSAL 4 ON YOUR PROXY CARD)**

CERTAIN RELATIONSHIPS AND RELATED PERSON TRANSACTIONS

Procedures for related party transactions

We have adopted a related person transaction approval policy that governs the review of related person transactions at bluebird. Pursuant to this policy, if we want to enter into a transaction with a related person or an affiliate of a related person, our Chief Operating and Legal Officer will review the proposed transaction to determine, based on applicable NASDAQ and SEC rules, if such transaction requires pre-approval by the Audit Committee and/or Board. If pre-approval is required, such matters will be reviewed at the next regular or special Audit Committee and/or Board meeting. In addition, our Compensation Committee charter requires that compensation arrangements with our executive officers be approved by our Compensation Committee. We may not enter into a related person transaction unless our Chief Operating and Legal Officer has either specifically confirmed in writing that no further reviews are necessary or has confirmed that all requisite corporate reviews have been obtained.

Transactions with related persons

Based on a review of the transactions and arrangements between us and any related person or related person affiliate, we have determined that we were not a party to any transaction or arrangement in which any related person or related person affiliate has a direct or indirect material interest during the year ended December 31, 2020.

AUDIT COMMITTEE REPORT (1)

The Audit Committee has reviewed our audited financial statements for the fiscal year ended December 31, 2020 and has discussed these statements with management and representatives of Ernst & Young LLP, the our independent registered public accounting firm. Our management is responsible for the preparation of our financial statements and for maintaining an adequate system of disclosure controls and procedures and internal control over financial reporting for that purpose. Ernst & Young LLP is responsible for expressing an opinion on the conformity of the audited financial statements with generally accepted accounting principles, their judgments as to the quality, not just the acceptability, of our accounting principles and such other matters as are required to be discussed with the Audit Committee under audit standards of the Public Company Accounting Oversight Board (PCAOB). The Audit Committee is responsible for providing independent, objective oversight of our accounting functions and internal controls.

The Audit Committee also received from, and discussed with, members of Ernst & Young LLP the written disclosures and other communications that our independent registered public accounting firm is required to provide to the Audit Committee, including the applicable requirements of the PCAOB and the SEC. PCAOB Audit Standards require our independent registered public accounting firm to discuss with the Audit Committee, among other things, the following:

- methods to account for significant unusual transactions;
- the effect of significant accounting policies in controversial or emerging areas for which there is a lack of authoritative guidance or consensus;
- the process used by management in formulating particularly sensitive accounting estimates and the basis for the independent registered public accounting firm’s conclusions regarding the reasonableness of those estimates; and
- disagreements with management regarding financial accounting and reporting matters and audit procedures.

Ernst & Young LLP also provided the Audit Committee with the written disclosures and the letter required by Rule 3526 of the PCAOB. PCAOB Rule 3526 requires independent registered public accounting firms annually to disclose in writing all relationships that in their professional opinion may reasonably be thought to bear on independence, to confirm their perceived independence and engage in a discussion of independence. The Audit Committee has reviewed this disclosure and has discussed with members of Ernst & Young LLP their independence from us.

Based on its discussions with management and our independent registered public accounting firm, and its review of the representations and information provided by management and our independent registered public accounting firm, the Audit Committee recommended to the Board that the audited financial statements be included in our Annual Report on Form 10-K for the fiscal year ended December 31, 2020, for filing with the SEC.

Respectfully submitted by the Audit Committee,

Mark Vachon, Chairperson
Wendy L. Dixon, Ph.D.
Daniel S. Lynch

(1) This Section is not “soliciting material,” is not deemed filed with the SEC and is not to be incorporated by reference in any filing of the Company under the Securities Act of 1933 or the Securities Exchange Act of 1934, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.

**PROPOSAL 5
RATIFICATION OF THE SELECTION OF INDEPENDENT REGISTERED PUBLIC
ACCOUNTING FIRM**

The firm of Ernst & Young LLP, independent registered public accounting firm, has been selected by the Audit Committee as auditors for bluebird for the fiscal year ending December 31, 2021. Ernst & Young LLP has served as the independent registered public accounting firm for bluebird since 2012. A representative of Ernst & Young LLP is expected to be present at the Annual Meeting with the opportunity to make a statement if he or she desires and to respond to appropriate questions.

Our organizational documents do not require that the stockholders ratify the selection of Ernst & Young LLP as our independent registered public accounting firm. bluebird requests such ratification as a matter of good corporate practice. The selection of Ernst & Young LLP as our independent registered public accounting firm will be ratified if the votes cast FOR exceed the votes cast AGAINST the proposal. Brokers, bankers and other nominees have discretionary voting power on this routine matter. Abstentions and broker non-votes will have no effect on the ratification. If the stockholders do not ratify the selection, the Audit Committee will reconsider whether to retain Ernst & Young LLP, but still may retain this firm. Even if the selection is ratified, the Audit Committee, in its discretion, may change the appointment at any time during the year if it determines that such a change would be in the best interests of the company and its stockholders.

The Audit Committee, or a designated member thereof, pre-approves each audit and non-audit service rendered by Ernst & Young LLP to the company consistent with our Audit and Non-Audit Services Pre-Approval Policy.

Independent Registered Public Accounting Firm Fees

The following is a summary and description of fees incurred by Ernst & Young LLP for the fiscal years ended December 31, 2020 and 2019.

	Fiscal Year 2020	Percentage of 2020 Services Approved by Audit Committee	Fiscal Year 2019	Percentage of 2019 Services Approved by Audit Committee
Audit fees (1)	\$ 1,210,003	100%	\$ 1,234,879	100%
Audit-related fees (2)	\$ 240,330	100%	\$ 139,000	100%
Tax fees (3)	\$ 528,228	100%	\$ 574,293	100%
All other fees (4)	\$ 5,790	100%	\$ 5,055	100%
Total fees	<u>\$ 1,984,351</u>	100%	<u>\$ 1,953,227</u>	100%

- (1) Audit fees in 2020 and 2019 include fees for our annual audit, including internal control attestation, and quarterly review procedures and fees in connection with our public securities offerings in 2020 and 2019, respectively, including registration statements, comfort letters and consents.
- (2) Audit-related fees are related to accounting consultations.
- (3) Tax fees are related to tax return preparation, tax advisory services and international tax compliance.
- (4) All other fees are related to licensing fees paid to Ernst & Young LLP for access to its proprietary accounting research database.

THE BOARD UNANIMOUSLY RECOMMENDS THAT YOU VOTE

FOR

**THE RATIFICATION OF THE SELECTION OF ERNST & YOUNG LLP AS THE COMPANY'S INDEPENDENT REGISTERED PUBLIC
ACCOUNTING FIRM**

(PROPOSAL 5 ON YOUR PROXY CARD)

STOCKHOLDER COMMUNICATIONS WITH THE BOARD

Stockholder Recommendations for Director Nominations

Any stockholder wishing to recommend a director candidate for consideration by the Nominating and Corporate Governance Committee should provide the following information to the chair of the Nominating and Corporate Governance Committee, bluebird bio, Inc., 60 Binney Street, Cambridge, Massachusetts 02142: (a) a brief statement outlining the reasons the candidate would be an effective director for bluebird; (b) (i) the name, age, and business and residence addresses of the candidate, (ii) the principal occupation or employment of the candidate for the past five years, as well as information about any other board of directors and board committees on which the candidate has served during that period, (iii) the number of shares of bluebird stock, if any, beneficially owned by the candidate and (iv) details of any business or other significant relationship the candidate has ever had with bluebird; and (c) (i) the stockholder's name and record address and the name and address of the beneficial owner of our shares, if any, on whose behalf the proposal is made and (ii) the number of shares of bluebird stock that the stockholder and any such other beneficial owner beneficially own. The Committee may seek further information from or about the stockholder making the recommendation, the candidate, or any such other beneficial owner, including information about all business and other relationships between the candidate and the stockholder and between the candidate and any such other beneficial owner.

Deadlines for Stockholder Proposals and Director Nominations

Stockholders who wish to present proposals for inclusion in our proxy materials for the 2022 Annual Meeting of Stockholders may do so by following the procedures prescribed in Rule 14a-8 under the Securities Exchange Act and in our By-laws. Our Secretary must receive stockholder proposals intended to be included in our proxy statement and form of proxy relating to our 2022 Annual Meeting made under Rule 14a-8 by December 31, 2021.

Under our current By-laws, proposals of business and nominations for directors other than those to be included in our proxy materials following the procedures described in Rule 14a-8 may be made by stockholders entitled to vote at the meeting if notice is timely given and if the notice contains the information required by the By-laws. To provide timely notice with respect to our 2022 Annual Meeting of Stockholders, notice must be delivered to our Secretary no earlier than February 15, 2022 (120 calendar days before the first anniversary of our 2021 Annual Meeting) and no later than March 17, 2022 (90 calendar days prior to the first anniversary of our 2021 Annual Meeting), unless the date of the 2022 Annual Meeting is advanced or delayed by more than thirty (30) days from the anniversary date of the 2021 Annual Meeting, in which event the By-laws provide different notice requirements.

Any proposal of business or nomination should be mailed to: Jason F. Cole, Secretary, bluebird bio, Inc., 60 Binney Street, Cambridge, Massachusetts 02142.

Other Stockholder Communications

Generally, stockholders who have questions or concerns should contact our Investor Relations department at investor@bluebirdbio.com. However, stockholders who wish to communicate directly with our Board, or any individual director, should direct such communications in writing to bluebird bio, Inc., 60 Binney Street, Cambridge, Massachusetts 02142, Attention: Jason F. Cole, Secretary. All such communications will be opened by our corporate secretary for the sole purpose of determining whether the contents represent a message to our directors. Any contents that are not in the nature of advertising, promotions of a product or service, or patently offensive material will be forwarded promptly to the addressee(s).

WHERE YOU CAN FIND MORE INFORMATION

bluebird files annual, quarterly and current reports, proxy statements and other information with the SEC. You may read and copy any reports, statements, or other information that bluebird files at the SEC's public reference room at the following location: 100 F Street, N.E., Washington, D.C. 20549.

Please call the SEC at 1-800-732-0330 for further information on the public reference room. The Company's SEC filings are also available to the public from commercial document retrieval services and at the website maintained by the SEC at <http://www.sec.gov>. You may also read and copy any document the Company files with the SEC on our website at <http://investor.bluebirdbio.com>.

You should rely on the information contained in this document to vote your shares at the Annual Meeting. bluebird has not authorized anyone to provide you with information that is different from what is contained in this document. This document is dated April 30, 2021. You should not assume that the information contained in this document is accurate as of any date other than that date, and the mailing of this document to stockholders at any time after that date does not create an implication to the contrary. This proxy statement does not constitute a solicitation of a proxy in any jurisdiction where, or to or from any person to whom, it is unlawful to make such proxy solicitations in such jurisdiction.

FORM 10-K

We are subject to the informational requirements of the Securities Exchange Act, and, in accordance therewith, file reports, proxy statements and other information with the SEC. Reports, proxy statements and other information filed by us may be inspected without charge and copies obtained by way of the SEC's website, <http://www.sec.gov>.

We will provide without charge to each person to whom a copy of the proxy statement is delivered, upon the written or oral request of any such persons, additional copies of our Annual Report on Form 10-K for the fiscal year ended December 31, 2020 as filed with the SEC. Requests for such copies should be addressed to:

bluebird bio, Inc.
60 Binney Street
Cambridge, Massachusetts 02142
(339) 499-9300
Attention: Jason F. Cole, Secretary

IMPORTANT NOTICE REGARDING DELIVERY OF STOCKHOLDER DOCUMENTS

Stockholders of bluebird common stock who share a single address, may receive only one copy of this proxy statement, Notice of Internet Availability and our Annual Report on Form 10-K for the fiscal year ended December 31, 2020, unless bluebird has received contrary instructions from any stockholder at that address. This practice, known as "householding," is designed to reduce the Company's printing and postage costs. However, if any stockholder residing at such an address wishes to receive a separate copy of this proxy statement, Notice of Internet Availability or our Annual Report on Form 10-K for the fiscal year ended December 31, 2020, he or she may contact bluebird bio, Inc., 60 Binney Street, Cambridge, Massachusetts 02142, (339) 499-9300, Attention: Jason F. Cole, Secretary, and bluebird will deliver those documents to such stockholder promptly upon receiving the request. Any such stockholder may also contact Jason F. Cole, Secretary, using the above contact information if he or she would like to receive separate proxy statements, notice of internet availability and annual reports in the future. If you are receiving multiple copies of our annual reports, notice of internet availability and proxy statements, you may request householding in the future by contacting Jason F. Cole, Secretary.

OTHER BUSINESS

The Board knows of no business to be brought before the 2021 Annual Meeting which is not referred to in the accompanying Notice of Annual Meeting. Should any such matters be presented, the persons named in the proxy shall have the authority to take such action in regard to such matters as in their judgment seems advisable. If you hold shares through a broker, bank or other nominee as described above, they will not be able to vote your shares on any other business that comes before the 2021 Annual Meeting unless they receive instructions from you with respect to such matter.

**APPENDIX A
TO PROXY STATEMENT**

**SECOND AMENDMENT
TO THE
BLUEBIRD BIO, INC.
2013 EMPLOYEE STOCK PURCHASE PLAN**

WHEREAS, bluebird bio, Inc., a U.S. corporation incorporated under the laws of the state of Delaware (the “**Company**”), maintains and operates the bluebird bio, Inc. 2013 Employee Stock Purchase Plan, as amended (the “**ESPP**”), which was previously adopted by the Board of Directors of the Company (the “**Board**”) and the stockholders of the Company in 2013, and amended by the Board in 2017;

WHEREAS, the Board believes that the number of shares of the Company’s common stock, par value \$0.01 per share (“**Common Stock**”), remaining available for issuance under the ESPP has become insufficient for the Company’s anticipated future needs under the ESPP;

WHEREAS, Section 18 of the ESPP provides that the Board may amend the ESPP at any time, subject to certain conditions set forth therein; and

WHEREAS, the Board has determined that it is in the best interests of the Company to amend the ESPP to increase the aggregate number of shares of Common Stock available for issuance under the ESPP from 238,000 shares to 1,638,000 shares.

NOW, THEREFORE the ESPP be and it is hereby amended, subject to approval of the Company’s stockholders, in the following particulars:

1. Amendment of ESPP to Increase Shares. By deleting the current second sentence of the first paragraph of the ESPP in its entirety and substituting the following sentence in lieu thereof:

“One million six hundred thirty-eight thousand (1,638,000) shares of Common Stock in the aggregate have been approved and reserved for this purpose.”

2. Effective Date of Amendment. This Amendment to the ESPP shall become effective upon the date that it is approved by the Company’s stockholders in accordance with applicable laws and regulations at an annual or special meeting held within twelve months of the date it is adopted by the Board.

3. Other Provisions. Except as set forth above, all other provisions of the ESPP shall remain unchanged.

ADOPTED BY THE BOARD OF DIRECTORS: April 9, 2021

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