

INITIAL STATEMENT OF BENEFICIAL OWNERSHIP OF SECURITIES

| OMB APPROVAL | |
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Filed pursuant to Section 16(a) of the Securities Exchange Act of 1934 or Section 30(h) of the Investment Company Act of 1940

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| 1. Name and Address of Reporting Person* <u>Finer Mitchell H.</u> (Last) (First) (Middle) <u>C/O BLUEBIRD BIO, INC.</u> <u>840 MEMORIAL DRIVE, 4TH FLOOR</u> (Street) <u>CAMBRIDGE MA 02139</u> (City) (State) (Zip) | 2. Date of Event Requiring Statement (Month/Day/Year) <u>06/18/2013</u> | 3. Issuer Name and Ticker or Trading Symbol <u>bluebird bio, Inc. [BLUE]</u> | |
| | | 4. Relationship of Reporting Person(s) to Issuer (Check all applicable) Director _____ 10% Owner _____ <input checked="" type="checkbox"/> Officer (give title below) _____ Other (specify below) _____ <u>Chief Scientific Officer</u> | 5. If Amendment, Date of Original Filed (Month/Day/Year) 6. Individual or Joint/Group Filing (Check Applicable Line) <input checked="" type="checkbox"/> Form filed by One Reporting Person <input type="checkbox"/> Form filed by More than One Reporting Person |

Table I - Non-Derivative Securities Beneficially Owned

| 1. Title of Security (Instr. 4) | 2. Amount of Securities Beneficially Owned (Instr. 4) | 3. Ownership Form: Direct (D) or Indirect (I) (Instr. 5) | 4. Nature of Indirect Beneficial Ownership (Instr. 5) |
|---------------------------------|---|--|---|
|---------------------------------|---|--|---|

Table II - Derivative Securities Beneficially Owned (e.g., puts, calls, warrants, options, convertible securities)

| 1. Title of Derivative Security (Instr. 4) | 2. Date Exercisable and Expiration Date (Month/Day/Year) | | 3. Title and Amount of Securities Underlying Derivative Security (Instr. 4) | 4. Conversion or Exercise Price of Derivative Security | 5. Ownership Form: Direct (D) or Indirect (I) (Instr. 5) | 6. Nature of Indirect Beneficial Ownership (Instr. 5) |
|--|--|-----------------|---|--|--|---|
| | Date Exercisable | Expiration Date | | | | |
| Stock Option (right to buy) | (1) | 09/15/2020 | Common Stock | 109,769 | 0.95 | D |
| Stock Option (right to buy) | (2) | 07/13/2021 | Common Stock | 43,170 | 2.09 | D |
| Stock Option (right to buy) | (3) | 07/13/2021 | Common Stock | 25,500 | 2.09 | D |
| Stock Option (right to buy) | (4) | 06/04/2022 | Common Stock | 26,361 | 2.09 | D |
| Stock Option (right to buy) | (5) | 01/16/2023 | Common Stock | 165,047 | 5.5 | D |
| Stock Option (right to buy) | (6) | 04/29/2023 | Common Stock | 527 | 8.16 | D |

Explanation of Responses:

- This option vests in 48 equal monthly installments, commencing on March 8, 2010.
- This option vests at a rate of twenty-five percent (25%) on April 15, 2012 and in 36 equal monthly installments thereafter.
- This option vests as follows: (i) 12,750 shares vest at a rate of twenty-five percent (25%) on April 15, 2012 and in 36 equal monthly installments thereafter; and (ii) 12,750 shares vest at a rate of twenty-five percent (25%) on May 1, 2013 and in 36 equal monthly installments thereafter.
- This option vests at a rate of twenty-five percent (25%) on May 1, 2013 and in 36 equal monthly installments thereafter.
- This option vests as follows: (i) 107,281 shares vest at a rate of twenty-five percent (25%) on January 1, 2014 and in 36 equal monthly installments thereafter; (ii) 16,504 shares vest at a rate of twenty-five percent (25%) on April 1, 2014 and in 36 equal monthly installments thereafter; and (iii) 41,262 shares vest at a rate of twenty-five percent (25%) on May 1, 2014 and in 36 equal monthly installments thereafter.
- This option is fully vested.

Remarks:

/s/ Linda C. Bain, Attorney-in-Fact 06/18/2013

** Signature of Reporting Person Date

Reminder: Report on a separate line for each class of securities beneficially owned directly or indirectly.

* If the form is filed by more than one reporting person, see Instruction 5 (b)(v).

** Intentional misstatements or omissions of facts constitute Federal Criminal Violations See 18 U.S.C. 1001 and 15 U.S.C. 78ff(a).

Note: File three copies of this Form, one of which must be manually signed. If space is insufficient, see Instruction 6 for procedure.

Persons who respond to the collection of information contained in this form are not required to respond unless the form displays a currently valid OMB Number.

LIMITED POWER OF ATTORNEY

The undersigned hereby constitutes and appoints Jeffrey T. Walsh and Linda C. Bain, and each of them individually, and with full power of substitution, the undersigned's true and lawful attorney-in-fact to:

(1) Complete and execute for and on behalf of the undersigned, in the undersigned's capacity as an officer, director and/or ten percent (10%) shareholder of bluebird bio, Inc., a Delaware corporation (the "Company") any and all instruments, certificates and documents required to be executed on behalf of the undersigned as an individual or on behalf of the undersigned's company or partnership, as the case may be, pursuant to Section 13 and Section 16 of the Securities Exchange Act of 1934, as amended (the "Exchange Act") or the rules and regulations thereunder;

(2) Do and perform any and all acts for and on behalf of the undersigned which may be necessary or desirable to complete and execute any such instruments, certificates or documents required to be filed pursuant to Sections 13 and 16 of the Exchange Act or the rules or regulations thereunder and timely file such forms with the United States Securities and Exchange Commission and any stock exchange or similar authority; and

(3) Take any other action of any type whatsoever in connection with the foregoing which, in the opinion of such attorney-in-fact, may be of benefit to, in the best interest of, or legally required by, the undersigned, it being understood that the documents executed by any such attorney-in-fact on behalf of the undersigned pursuant to this Power of Attorney shall be in such form and shall contain such terms and conditions as such attorney-in-fact may approve in such attorney-in-fact's discretion.

The undersigned hereby grants to each such attorney-in-fact, acting singly, full power and authority to do and perform any and every act which is necessary, proper or desirable to be done in the exercise of any of the rights and powers herein granted, as fully to all intents and purposes as the undersigned might or could do if personally present, with full power of substitution or revocation, hereby ratifying and confirming all that any such attorney-in-fact, or any such attorney-in-fact's substitute or substitutes, shall lawfully do or cause to be done by virtue of this Power of Attorney and the rights and powers herein granted.

The undersigned acknowledges that each of the foregoing attorneys-in-fact, in serving in such capacity at the request of the undersigned, are not assuming, nor is the Company assuming, any of the undersigned's responsibilities to comply with Section 13 or Section 16 of the Exchange Act or the rules or regulations thereunder. The undersigned hereby agrees to indemnify each attorney-in-fact and the Company from and against any demand, damage, loss, cost or expense arising from any false or misleading information provided by the undersigned to such attorney-in fact.

This Power of Attorney shall remain in full force and effect until the undersigned is no longer required to file any instruments, certificates and documents pursuant to Section 13 and 16 of the Exchange Act or the rules or regulations thereunder with respect to the undersigned's holdings of and transactions in securities issued by the Company, unless earlier revoked by the undersigned in a signed writing delivered to the foregoing attorneys-in-fact.

IN WITNESS WHEREOF, the undersigned has caused this Power of Attorney to be executed as of May 31, 2013.

/s/ Mitchell H. Finer
Mitchell H. Finer