

STATEMENT OF CHANGES IN BENEFICIAL OWNERSHIP

Check this box if no longer subject to Section 16. Form 4 or Form 5 obligations may continue. See Instruction 1(b).

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

| OMB APPROVAL | |
|--|-----------|
| OMB Number: | 3235-0287 |
| Estimated average burden hours per response: | 0.5 |

| | | |
|--|---|---|
| 1. Name and Address of Reporting Person* <u>Cole Jason</u> (Last) (First) (Middle) <u>C/O BLUEBIRD BIO, INC.</u> <u>150 SECOND STREET</u> (Street) <u>CAMBRIDGE MA 02141</u> (City) (State) (Zip) | 2. Issuer Name and Ticker or Trading Symbol <u>bluebird bio, Inc. [BLUE]</u> | 5. 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>SVP, Secy. & General Counsel</u> |
| | 3. Date of Earliest Transaction (Month/Day/Year) <u>05/11/2015</u> | |
| 4. If Amendment, Date of Original Filed (Month/Day/Year) | | |

Table I - Non-Derivative Securities Acquired, Disposed of, or Beneficially Owned

| 1. Title of Security (Instr. 3) | 2. Transaction Date (Month/Day/Year) | 2A. Deemed Execution Date, if any (Month/Day/Year) | 3. Transaction Code (Instr. 8) | | 4. Securities Acquired (A) or Disposed Of (D) (Instr. 3, 4 and 5) | | | 5. Amount of Securities Beneficially Owned Following Reported Transaction(s) (Instr. 3 and 4) | 6. Ownership Form: Direct (D) or Indirect (I) (Instr. 4) | 7. Nature of Indirect Beneficial Ownership (Instr. 4) |
|---------------------------------|--------------------------------------|--|--------------------------------|---|---|------------|---------------------------|---|--|---|
| | | | Code | V | Amount | (A) or (D) | Price | | | |
| Common Stock | 05/11/2015 | | M | | 9,000 | A | \$22.53 | 9,000 | D | |
| Common Stock | 05/11/2015 | | S ⁽¹⁾ | | 920 | D | \$160.8029 ⁽²⁾ | 8,080 | D | |
| Common Stock | 05/11/2015 | | S ⁽¹⁾ | | 2,128 | D | \$161.9571 ⁽³⁾ | 5,952 | D | |
| Common Stock | 05/11/2015 | | S ⁽¹⁾ | | 1,403 | D | \$162.8308 ⁽⁴⁾ | 4,549 | D | |
| Common Stock | 05/11/2015 | | S ⁽¹⁾ | | 1,066 | D | \$164.0585 ⁽⁵⁾ | 3,483 | D | |
| Common Stock | 05/11/2015 | | S ⁽¹⁾ | | 920 | D | \$165.2356 ⁽⁶⁾ | 2,563 | D | |
| Common Stock | 05/11/2015 | | S ⁽¹⁾ | | 1,560 | D | \$166.4064 ⁽⁷⁾ | 1,003 | D | |
| Common Stock | 05/11/2015 | | S ⁽¹⁾ | | 1,003 | D | \$167.2585 ⁽⁸⁾ | 0 | D | |

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

| 1. Title of Derivative Security (Instr. 3) | 2. Conversion or Exercise Price of Derivative Security | 3. Transaction Date (Month/Day/Year) | 3A. Deemed Execution Date, if any (Month/Day/Year) | 4. Transaction Code (Instr. 8) | | 5. Number of Derivative Securities Acquired (A) or Disposed of (D) (Instr. 3, 4 and 5) | | 6. Date Exercisable and Expiration Date (Month/Day/Year) | | 7. Title and Amount of Securities Underlying Derivative Security (Instr. 3 and 4) | 8. Price of Derivative Security (Instr. 5) | 9. Number of derivative Securities Beneficially Owned Following Reported Transaction(s) (Instr. 4) | 10. Ownership Form: Direct (D) or Indirect (I) (Instr. 4) | 11. Nature of Indirect Beneficial Ownership (Instr. 4) | |
|--|--|--------------------------------------|--|--------------------------------|---|--|-------|--|-----------------|---|--|--|---|--|-------|
| | | | | Code | V | (A) | (D) | Date Exercisable | Expiration Date | | | | | | Title |
| Stock Option (right to buy) | \$22.53 | 05/11/2015 | | M | | | 9,000 | (9) | 02/10/2024 | Common Stock | 9,000 | \$0.00 | 81,000 | D | |

Explanation of Responses:

- The sales reported in the Form 4 were effected pursuant to a Rule 10b5-1 trading plan adopted by the reporting person on August 7, 2014
- The range in prices for the transaction reported on this line was \$160.41 to \$161.41. The average weighted price was \$160.8029. The reporting person will provide, upon request by the SEC, the issuer or security holder of the issuer, full information regarding the number of shares sold at each separate price.
- The range in prices for the transaction reported on this line was \$161.43 to \$162.43. The average weighted price was \$161.9571. The reporting person will provide, upon request by the SEC, the issuer or security holder of the issuer, full information regarding the number of shares sold at each separate price.
- The range in prices for the transaction reported on this line was \$162.44 to \$163.32. The average weighted price was \$162.8308. The reporting person will provide, upon request by the SEC, the issuer or security holder of the issuer, full information regarding the number of shares sold at each separate price.
- The range in prices for the transaction reported on this line was \$163.47 to \$164.46. The average weighted price was \$164.0585. The reporting person will provide, upon request by the SEC, the issuer or security holder of the issuer, full information regarding the number of shares sold at each separate price.
- The range in prices for the transaction reported on this line was \$164.78 to \$165.56. The average weighted price was \$165.2356. The reporting person will provide, upon request by the SEC, the issuer or security holder of the issuer, full information regarding the number of shares sold at each separate price.
- The range in prices for the transaction reported on this line was \$166.01 to \$166.95. The average weighted price was \$166.4064. The reporting person will provide, upon request by the SEC, the issuer or security holder of the issuer, full information regarding the number of shares sold at each separate price.
- The range in prices for the transaction reported on this line was \$167.0250 to \$167.52. The average weighted price was \$167.2585. The reporting person will provide, upon request by the SEC, the issuer or security holder of the issuer, full information regarding the number of shares sold at each separate price.
- This option vests over a four-year period, at a rate of twenty-five percent (25%) on March 6, 2015 and in 36 equal monthly installments thereafter.

Remarks:

/s/ Jason F. Cole

05/13/2015

** 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 4 (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.