

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

SCHEDULE 13G

Under the Securities Exchange Act of 1934

(Amendment No. 1)*

bluebird bio, Inc.

(Name of Issuer)

Common Stock, \$0.01 par value per share

(Title of Class of Securities)

09609G100

(CUSIP Number)

December 31, 2014

(Date of Event which Requires Filing of this Statement)

Check the appropriate box to designate the rule pursuant to which this Schedule is filed:

- Rule 13d-1(b)
- Rule 13d-1(c)
- Rule 13d-1(d)

*The remainder of this cover page shall be filled out for a reporting person's initial filing on this form with respect to the subject class of securities, and for any subsequent amendment containing information which would alter the disclosures provided in a prior cover page.

The information required in the remainder of this cover page shall not be deemed to be "filed" for the purpose of Section 18 of the Securities Exchange Act of 1934 ("Act") or otherwise subject to the liabilities of that section of the Act but shall be subject to all other provisions of the Act (however, see the Notes).

Item 1(a). Name of Issuer:

bluebird bio, Inc.

Item 1(b). Address of Issuer's Principal Executive Offices:

150 Second Street, Cambridge, MA 02141.

Item 2(a). Names of Persons Filing:

This statement is being filed by Third Rock Ventures, L.P. ("TRV"); Third Rock Ventures GP, L.P. ("TRV GP"), which is the sole general partner of TRV; TRV GP, LLC ("TRV GP LLC"), which is the sole general partner of TRV GP; and Robert I. Tepper ("Tepper"), a managing member of TRV GP LLC. TRV, TRV GP, TRV GP LLC and Tepper are sometimes referred to collectively herein as the "Reporting Persons".

Item 2(b). Address of Principal Business Office or, if none, Residence:

The address of the principal business office of each Reporting Person is Third Rock Ventures, LLC, 29 Newbury Street, 3rd Floor, Boston, MA 02116.

Item 2(c). Citizenship:

Each of TRV and TRV GP is a Delaware limited partnership. TRV GP LLC is a Delaware limited liability company. Tepper is a United States citizen.

Item 2(d). Title of Class of Securities:

Common Stock, \$0.01 par value ("Common Stock").

Item 2(e). CUSIP Number:

09609G100.

Item 3. If this statement is filed pursuant to §§ 240.13d-1(b) or 240.13d-2(b) or (c), check whether the person filing is a:

Not applicable.

Item 4. Ownership.

Not applicable.

Item 5. Ownership of Five Percent or Less of a Class.

Each Reporting Person has ceased to beneficially own five percent (5%) or more of the Issuer's outstanding Common Stock.

Material to be Filed as Exhibits.

Exhibit 1 – Agreement regarding filing of joint Schedule 13G.

Exhibit 2 – Power of Attorney regarding filings under the Securities Exchange Act of 1934, as amended.

SIGNATURE

After reasonable inquiry and to the best of its knowledge and belief, each of the undersigned certifies that the information set forth in this statement is true, complete and correct.

Date: February 13, 2015

THIRD ROCK VENTURES, L.P.

By: THIRD ROCK VENTURES GP, L.P.
General Partner

By: TRV GP, LLC
General Partner

By: _____
*
Kevin Gillis
Chief Financial Officer

THIRD ROCK VENTURES GP, L.P.

By: TRV GP, LLC
General Partner

By: _____
*
Kevin Gillis
Chief Financial Officer

TRV GP, LLC

By: _____
*
Kevin Gillis
Chief Financial Officer

*
Robert I. Tepper

*By: /s/ Kevin Gillis
Kevin Gillis
As attorney-in-fact

This Amendment No. 1 to Schedule 13G was executed by Kevin Gillis on behalf of the individual listed above pursuant to a Power of Attorney, a copy of which is attached as Exhibit 2.

AGREEMENT

Pursuant to Rule 13d-1(k)(1) under the Securities Exchange Act of 1934, the undersigned hereby agree that only one statement containing the information required by Schedule 13G need be filed with respect to the ownership by each of the undersigned of shares of stock of bluebird bio, Inc.

EXECUTED this 13th day of February, 2015.

THIRD ROCK VENTURES, L.P.

By: THIRD ROCK VENTURES GP, L.P.
General Partner

By: TRV GP, LLC
General Partner

By: _____
*
Kevin Gillis
Chief Financial Officer

THIRD ROCK VENTURES GP, L.P.

By: TRV GP, LLC
General Partner

By: _____
*
Kevin Gillis
Chief Financial Officer

TRV GP, LLC

By: _____
*
Kevin Gillis
Chief Financial Officer

*
Robert I. Tepper

*By: /s/ Kevin Gillis
Kevin Gillis
As attorney-in-fact

This Agreement was executed by Kevin Gillis on behalf of the individual listed above pursuant to a Power of Attorney, a copy of which is attached as Exhibit 2.

POWER OF ATTORNEY

KNOW ALL MEN BY THESE PRESENTS, that the undersigned hereby constitutes and appoints Kevin Gillis his true and lawful attorney-in-fact, with full power of substitution, to sign any and all instruments, certificates and documents that may be necessary, desirable or appropriate to be executed on behalf of himself as an individual or in his capacity as a direct or indirect general partner, director, officer, member or manager of any partnership, corporation or limited liability company, pursuant to section 13 or 16 of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and any and all regulations promulgated thereunder, and to file the same, with all exhibits thereto, and any other documents in connection therewith, with the Securities and Exchange Commission, and with any other entity when and if such is mandated by the Exchange Act or by the Financial Industry Regulatory Authority, granting unto said attorney-in-fact full power and authority to do and perform each and every act and thing necessary, desirable or appropriate, fully to all intents and purposes as he might or could do in person, thereby ratifying and confirming all that said attorney-in-fact, or his substitutes, may lawfully do or cause to be done by virtue hereof.

IN WITNESS WHEREOF, this Power of Attorney has been signed as of the 16th day of January, 2014.

/s/ Mark Levin
Mark Levin

/s/ Kevin P. Starr
Kevin P. Starr

/s/ Robert I. Tepper
Robert I. Tepper