

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

SCHEDULE 13G

Under the Securities Exchange Act of 1934

(Amendment No. __)*

bluebird bio, Inc.

(Name of Issuer)

Common Stock, \$0.01 par value per share

(Title of Class of Securities)

09609G100

(CUSIP Number)

December 31, 2013

(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).

1	NAMES OF REPORTING PERSONS I.R.S. IDENTIFICATION NOS. OF ABOVE PERSONS (ENTITIES ONLY)	
	Third Rock Ventures, L.P.	
2	CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP (SEE INSTRUCTIONS)	
	(a) <input type="checkbox"/>	
	(b) <input type="checkbox"/>	
3	SEC USE ONLY	
4	CITIZENSHIP OR PLACE OF ORGANIZATION	
	Delaware limited partnership	
NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH	5	SOLE VOTING POWER
		0
	6	SHARED VOTING POWER
		3,313,974
	7	SOLE DISPOSITIVE POWER
		0
	8	SHARED DISPOSITIVE POWER
		3,313,974
9	AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON	
	3,313,974	
10	CHECK IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES (SEE INSTRUCTIONS) <input type="checkbox"/>	
11	PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9)	
	13.9%	
12	TYPE OF REPORTING PERSON (SEE INSTRUCTIONS)	
	PN	

1	NAMES OF REPORTING PERSONS I.R.S. IDENTIFICATION NOS. OF ABOVE PERSONS (ENTITIES ONLY) Third Rock Ventures GP, L.P.	
2	CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP (SEE INSTRUCTIONS) (a) <input type="checkbox"/> (b) <input type="checkbox"/>	
3	SEC USE ONLY	
4	CITIZENSHIP OR PLACE OF ORGANIZATION Delaware limited partnership	
NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH	5	SOLE VOTING POWER 0
	6	SHARED VOTING POWER 3,313,974
	7	SOLE DISPOSITIVE POWER 0
	8	SHARED DISPOSITIVE POWER 3,313,974
9	AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON 3,313,974	
10	CHECK IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES (SEE INSTRUCTIONS) <input type="checkbox"/>	
11	PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9) 13.9%	
12	TYPE OF REPORTING PERSON (SEE INSTRUCTIONS) PN	

1	NAMES OF REPORTING PERSONS I.R.S. IDENTIFICATION NOS. OF ABOVE PERSONS (ENTITIES ONLY)	
	TRV GP, LLC	
2	CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP (SEE INSTRUCTIONS)	
	(a) <input type="checkbox"/>	
	(b) <input type="checkbox"/>	
3	SEC USE ONLY	
4	CITIZENSHIP OR PLACE OF ORGANIZATION	
	Delaware limited liability company	
NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH	5	SOLE VOTING POWER
		0
	6	SHARED VOTING POWER
		3,313,974
	7	SOLE DISPOSITIVE POWER
		0
	8	SHARED DISPOSITIVE POWER
		3,313,974
9	AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON	
	3,313,974	
10	CHECK IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES (SEE INSTRUCTIONS) <input type="checkbox"/>	
11	PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9)	
	13.9%	
12	TYPE OF REPORTING PERSON (SEE INSTRUCTIONS)	
	OO	

1	NAMES OF REPORTING PERSONS I.R.S. IDENTIFICATION NOS. OF ABOVE PERSONS (ENTITIES ONLY) Robert I. Tepper		
2	CHECK THE APPROPRIATE BOX IF A MEMBER OF A GROUP (SEE INSTRUCTIONS) (a) <input type="checkbox"/> (b) <input type="checkbox"/>		
3	SEC USE ONLY		
4	CITIZENSHIP OR PLACE OF ORGANIZATION United States		
NUMBER OF SHARES BENEFICIALLY OWNED BY EACH REPORTING PERSON WITH	5	SOLE VOTING POWER 0	
	6	SHARED VOTING POWER 3,313,974	
	7	SOLE DISPOSITIVE POWER 0	
	8	SHARED DISPOSITIVE POWER 3,313,974	
9	AGGREGATE AMOUNT BENEFICIALLY OWNED BY EACH REPORTING PERSON 3,313,974		
10	CHECK IF THE AGGREGATE AMOUNT IN ROW (9) EXCLUDES CERTAIN SHARES (SEE INSTRUCTIONS) <input type="checkbox"/>		
11	PERCENT OF CLASS REPRESENTED BY AMOUNT IN ROW (9) 13.9%		
12	TYPE OF REPORTING PERSON (SEE INSTRUCTIONS) IN		

Item 1(a). Name of Issuer:

bluebird bio, Inc.

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

840 Memorial Drive, 4th Floor, Cambridge, MA 02139.

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.

- (a) Amount Beneficially Owned: TRV is the record owner of 3,313,974 shares of Common Stock as of December 31, 2013 (the "Shares"). As the sole general partner of TRV, TRV GP may be deemed to own beneficially the Shares. As the sole general partner of TRV GP, TRV GP LLC likewise may be deemed to own beneficially the Shares. As a managing member of TRV GP LLC, Tepper also may be deemed to own beneficially the Shares.
 - (b) Percent of Class: See Line 11 of cover sheets. The percentages set forth on the cover sheet for each Reporting Person are calculated based on 23,780,211 shares of Common Stock reported by the Issuer to be outstanding as of October 31, 2013 on Form 10-Q as filed with the Securities and Exchange Commission on November 14, 2013.
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- (c) Number of shares as to which such person has:
- (i) sole power to vote or to direct the vote: See Line 5 of cover sheets.
 - (ii) shared power to vote or to direct the vote: See Line 6 of cover sheets.
 - (iii) sole power to dispose or to direct the disposition of: See Line 7 of cover sheets.
 - (iv) shared power to dispose or to direct the disposition of: See Line 8 of cover sheets.

Each Reporting Person disclaims beneficial ownership of such Securities except for the shares, if any, such Reporting Person holds of record.

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

Not applicable.

Item 6. Ownership of More than Five Percent on Behalf of Another Person.

Not applicable.

Item 7. Identification and Classification of the Subsidiary Which Acquired the Security Being Reported on By the Parent Holding Company or Control Person.

Not applicable.

Item 8. Identification and Classification of Members of the Group.

Not applicable. The Reporting Persons expressly disclaim membership in a “group” as used in Rule 13d-5(b).

Item 9. Notice of Dissolution of Group.

Not applicable.

Item 10. Certification.

Not applicable. This Schedule 13G is not filed pursuant to Rule 13d-1(b) or Rule 13d-1(c).

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 12, 2014

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 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 12th day of February, 2014.

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