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

DIVISION OF
CORPORATION FINANCE

May 8, 2013

Via E-mail
Nick Leschly
President and Chief Executive Officer
bluebird bio, Inc.
840 Memorial Drive, 4th Floor
Cambridge, MA 02139

Re: bluebird bio, Inc.
Amendment No. 2 to
Draft Registration Statement on Form S-1
Submitted April 24, 2013
CIK No. 0001293971

Dear Mr. Leschly:

We have reviewed your amended draft registration statement and response letter dated April 24, 2013 and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by providing the requested information and either submitting an amended draft registration statement or publicly filing your registration statement on EDGAR. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing the information you provide in response to these comments and your amended draft registration statement or filed registration statement, we may have additional comments.

Prospectus Summary
Our product candidate pipeline, page 3

1. Please expand your disclosure here and on page 95 to clarify what you mean by "CTA Open" and "IND Open."

Use of Proceeds, page 55

2. We note your disclosure and your response to our prior comment 15. You disclose that you intend to use the net proceeds of this offering for the concurrent advancement of your Phase II/III clinical study for your Lenti-D product candidate and your Phase I/II clinical studies for your LentiGlobin product candidate and for capital expenditures, working capital and other general corporate purposes. You also disclose on page 81 that you

believe that the net proceeds from this offering and your existing cash and cash equivalents will be sufficient to fund your projected operating requirements through at least the end of 2015. To the extent you intend to use any of the proceeds from your offering to fund the below studies, please expand your disclosure to estimate the amount of proceeds that will be used for each purpose as required by Item 504 of Regulation S-K:

- ALD-102 Study, a Phase II/III clinical study of Lenti-D to evaluate its safety and efficacy in subjects with childhood cerebral adrenoleukodystrophy;
- HGB-204 Study, a Phase I/II clinical study in the United States of LentiGlobin to evaluate its safety and efficacy in subjects with ß-thalassemia major; and
- HGB-205 Study, a Phase I/II clinical study in Europe of LentiGlobin to evaluate its safety and efficacy in subjects with ß-thalassemia major and sickle cell disease.

Please also disclose the stage of development that you expect the proceeds to achieve for each clinical study and product candidate.

Critical accounting policies and significant judgments and estimates
Stock-based compensation
Stock-based awards, page 66

3. We acknowledge your response to our comment 19. Regarding the discount for lack of marketability factor used in your determination of fair value of common stock, please tell us the names and dates of the empirical studies empirical studies of restricted stock by publicly traded companies used to justify the smaller discount rate.

4. We acknowledge your response to our comment 20. With regards to the company's view towards a possible IPO, please tell us if management had begun discussions or preparing for the possibility of an IPO prior to and/or at the July 23, 2012 valuation date.

Contractual obligations and commitments, page 82

5. We acknowledge your response to our comment 22. We continue to believe disclosure of your significant obligations to make future payments to third parties on the achievement of milestones is pertinent to a potential investors understanding of your business. Therefore, please quantify the amount of milestones for each material commitment (e.g. Institut Pasteur) into meaningful categories such as development, regulatory, and/or commercial milestones and the nature of the underlying events which triggers the milestone payment. For your commitments that you deem future obligations are immaterial, please indicate such in revised disclosure.

Business, page 85
Overview, page 85

6. Please specify, with respect to your Phase I/II clinical studies for LentiGlobin, that the clinical studies in the United States and Europe will evaluate safety and efficacy in

subjects with B-thalassemia major and B-thalassemia major and SCD, respectively, since your United States trial will not extend to SCD.

Director Compensation, page 154

7. We have reviewed your response to prior comment 41. Please restore your narrative description of the material terms of your letter agreements with Mr. Lynch and Dr. Maraganore. See Item 402(r)(3) of Regulation S-K. Please also expand your disclosure to note that these agreements will terminate prior to the effectiveness of this registration statement.

Notes to consolidated financial statements
Note 16. Subsequent events, page F-38

8. We acknowledge your response to our comment 52. We will evaluate your response to our comment once you have amended the registration statement to include your financial results as of March 31, 2012, that will include disclosures requested regarding your collaboration with Celgene.

General

If you intend to respond to these comments with an amended draft registration statement, please submit it and any associated correspondence in accordance with the guidance we provide in the Division's October 11, 2012 announcement on the SEC website at http://www.sec.gov/divisions/corpfin/cfannouncements/drsfilingprocedures101512.htm.

You may contact Sasha Parikh, Staff Accountant, at (202) 551-3627 or Mark Brunhofer, Staff Accountant, at (202) 551-3638 if you have questions regarding comments on the financial statements and related matters. Please contact Karen Ubell, Staff Attorney, at (202) 551-3873, Jennifer Riegel, Special Counsel, at (202) 551-3575 or me at (202) 551-2715 with any other questions.

Sincerely,

/s/ Jennifer Riegel for

Jeffrey P. Riedler
Assistant Director

cc: Via E-mail
Michael H. Bison, Esq.
Goodwin Procter LLP