

ARCA biopharma, Inc.  
Form 424B4  
February 17, 2015

Prospectus Supplement No. 29      Filed pursuant to Rule 424(b)(4)  
Registration No. 333-187508  
(to Prospectus dated May 30, 2013)

125,000 Shares of Series A Convertible Preferred Stock

12,500,000 Shares of Common Stock Underlying the Preferred Stock

Warrants to Purchase up to 6,250,000 Shares of Common Stock and

6,250,000 Shares of Common Stock Underlying the Warrants

ARCA biopharma, Inc.

This prospectus supplement supplements the prospectus dated May 30, 2013 (the “Prospectus”), as supplemented by that certain Prospectus Supplement No. 1 dated July 17, 2013 (“Supplement No. 1”), by that certain Prospectus Supplement No. 2 dated July 19, 2013 (“Supplement No. 2”), by that certain Prospectus Supplement No. 3 dated July 24, 2013 (“Supplement No. 3”), by that certain Prospectus Supplement No. 4 dated July 30, 2013 (“Supplement No. 4”), by that certain Prospectus Supplement No. 5 dated August 6, 2013 (“Supplement No. 5”), by that certain Prospectus Supplement No. 6 dated September 4, 2013 (“Supplement No. 6”), by that certain Prospectus Supplement No. 7 dated September 23, 2013 (“Supplement No. 7”), by that certain Prospectus Supplement No. 8 dated October 29, 2013 (“Supplement No. 8”), by that certain Prospectus Supplement No. 9 dated November 6, 2013 (“Supplement No. 9”), by that certain Prospectus Supplement No. 10 dated November 13, 2013 (“Supplement No. 10”), by that certain Prospectus Supplement No. 11 dated November 21, 2013 (“Supplement No. 11”), by that certain Prospectus Supplement No. 12 dated December 5, 2013 (“Supplement No. 12”), by that certain Prospectus Supplement No. 13 dated January 8, 2014 (“Supplement No. 13”), by that certain Prospectus Supplement No. 14 dated February 10, 2014 (“Supplement No. 14”), by that certain Prospectus Supplement No. 15 dated February 12, 2014 (“Supplement No. 15”), by that certain Prospectus Supplement No. 16 dated February 18, 2014 (“Supplement No. 16”), by that certain Prospectus Supplement No. 17 dated March 3, 2014 (“Supplement No. 17”), by that certain Prospectus Supplement No. 18 dated March 20, 2014 (“Supplement No. 18”), by that certain Prospectus Supplement No. 19 dated May 13, 2014 (“Supplement No. 19”), by that certain Prospectus Supplement No. 20 dated June 9, 2014 (“Supplement No. 20”), by that certain Prospectus Supplement No. 21 dated August 13, 2014 (“Supplement No. 21”), by that certain Prospectus Supplement No. 22 dated August 18, 2014 (“Supplement No. 22”), by that certain Prospectus Supplement No. 23 dated November 12, 2014 (“Supplement No. 23”), by that certain Prospectus Supplement No. 24 dated December 1, 2014 (“Supplement No. 24”), by that certain Prospectus Supplement No. 25 dated December 10, 2014 (“Supplement No. 25”), by that certain Prospectus Supplement No. 26 dated December 11, 2014 (“Supplement No. 26”), by that certain Prospectus Supplement No. 27 dated December 30, 2014 (“Supplement No. 27”), and by that certain Prospectus Supplement No. 28 dated February 4, 2015 (“Supplement No. 28”, and together with Supplement No. 1, Supplement No. 2, Supplement No. 3, Supplement No. 4, Supplement No. 5, Supplement No. 6, Supplement No. 7, Supplement No. 8, Supplement No. 9, Supplement No. 10, Supplement No. 11, Supplement No. 12, Supplement No. 13, Supplement No. 14, Supplement No. 15, Supplement No. 16, Supplement No. 17, Supplement No. 18, Supplement No. 19, Supplement No. 20, Supplement No. 21, Supplement No. 22, Supplement No. 23, Supplement No. 24, Supplement No. 25, Supplement No. 26, and Supplement No. 27, the “Supplements”), which form a part of our Registration Statement on Form S-1 (Registration No. 333-187508). This prospectus supplement is being filed to update and supplement the information in the Prospectus and the Supplements with the information contained in our current report on Form 8-K, filed with the Securities and Exchange Commission (the “Commission”) on February 17, 2015 (the “Current Report”). Accordingly, we

have attached the Current Report to this prospectus supplement.

The Prospectus, the Supplements and this prospectus supplement relate to the offer and sale of up to 125,000 shares of Series A Convertible Preferred Stock (“Preferred Stock”) which are convertible into 12,500,000 shares of Common Stock, warrants to purchase up to 6,250,000 shares of our Common Stock and 6,250,000 shares of Common Stock underlying the warrants.

This prospectus supplement should be read in conjunction with the Prospectus and the Supplements. This prospectus supplement updates and supplements the information in the Prospectus and the Supplements. If there is any inconsistency between the information in the Prospectus, the Supplements and this prospectus supplement, you should rely on the information in this prospectus supplement.

Our common stock is traded on the Nasdaq Global Market under the trading symbol “ABIO.” On February 17, 2015, the last reported sale price of our common stock was \$0.78 per share.

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Investing in our securities involves a high degree of risk. You should review carefully the risks and uncertainties described under the heading “Risk Factors” beginning on page 5 of the Prospectus and beginning on page 22 of our quarterly report on Form 10-Q for the period ended September 30, 2014 before you decide whether to invest in shares of our common stock.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or determined if the Prospectus or this prospectus supplement is truthful or complete. Any representation to the contrary is a criminal offense.

The date of this prospectus supplement is February 17, 2015

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Check the appropriate box below if the Form 8-K filing is intended to simultaneously satisfy the filing obligation of the registrant under any of the following provisions (see General Instruction A.2. below):

£ Written communications pursuant to Rule 425 under the Securities Act (17 CFR 230.425)

£ Soliciting material pursuant to Rule 14a-12 under the Exchange Act (17 CFR 240.14a-12)

£ Pre-commencement communications pursuant to Rule 14d-2(b) under the Exchange Act (17 CFR 240.14d-2(b))

£ Pre-commencement communications pursuant to Rule 13e-4(c) under the Exchange Act (17 CFR 240.13e-4(c))

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Item 5.02. Departure of Directors or Certain Officers; Election of Directors; Appointment of Certain Officers; Compensatory Arrangements of Certain Officers.

On February 12, 2015, the Board of Directors (the “Board”) of ARCA biopharma, Inc. (the “Company”), approved cash bonuses for each of the Company’s “named executive officers” (as defined in Item 402(a)(3) of Regulation S-K promulgated by the Securities and Exchange Commission), in the amounts set forth below, payable on or around March 13, 2015. The Committee also approved the base salaries for the Company’s named executive officers in each case as set forth below.

Name and Title	Cash Bonus	Base Salary
Michael R. Bristow	\$21,100	\$286,759
President and Chief Executive Officer		
Thomas A. Keuer	\$10,750	\$285,600
Chief Operating Officer		
Christopher D. Ozeroff	\$12,350	\$280,273
Senior Vice President, General Counsel		
Brian L. Selby	\$7,750	\$224,400

Vice President, Finance

The Committee determined the cash bonuses are to be paid in recognition of the efforts of each of the executives during the prior year. The new base salaries will become effective on March 1, 2015.

On February 12, 2015, the Compensation Committee also approved the following stock option (“Options”) and restricted stock unit (“RSUs”) grants to the executive officers listed below pursuant to the Company’s 2013 Equity Incentive Plan and the forms of Stock Option Grant Notice, Option Agreement, Restricted Stock Unit Grant Notice and Restricted Stock Unit Award Agreement for officers, as filed with the Securities and Exchange Commission as exhibits to the Company’s Current Report on Form 8-K on September 23, 2013:

Name and Title	Options Granted <sup>(1)</sup>	RSUs Granted <sup>(2)</sup>
Michael Bristow	25,900	48,100
President and Chief Executive Officer		
Thomas A. Keuer	13,650	25,350
Chief Operating Officer		
Christopher Ozeroff	12,950	24,050
Senior Vice President, General Counsel & Secretary		
Brian L. Selby	12,600	23,400

Vice President, Finance

(1) Exercise price of \$0.67 per share, the closing price of the Company's common stock on February 12, 2015. The Option vests in 36 equal monthly installments measured from February 12, 2015.

(2) The RSUs vests in three equal installments beginning on April 2, 2016 and annually thereafter.

On the same day, the Company also approved paying compensation to its existing non-employee directors by granting to Dr. Linda Grais, Mr. Robert Conway, Mr. Daniel Mitchell and Dr. Raymond Woosley options to purchase 8,000 shares of common stock at an exercise price of \$0.67 per share, the closing price of the Company's common stock on February 12, 2015. The options are subject to the terms and conditions of the Plan and the Company's standard forms of Stock Option Agreement and Option Grant Notice for the Plan. The options vest in equal monthly installments and will be fully vested as of December 31, 2015, assuming Dr. Grais', Mr. Conway's, Mr. Mitchell's and Dr. Woosley's continued service on the Board for such periods.

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SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this report to be signed on its behalf by the undersigned hereunto duly authorized.

Dated: February 17, 2015

ARCA biopharma, Inc.  
(Registrant)

By: /s/ Christopher D. Ozeroff  
Name: Christopher D. Ozeroff  
Title: SVP and General Counsel