AmpliPhi Biosciences Corp
Form S-1/A
October 03, 2016

As filed with the Securities and Exchange Commission on October 3, 2016

Registration No. 333-213421

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

AMENDMENT NO. 2
TO
FORM S-1
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

AmpliPhi Biosciences Corporation

(Exact Name of Registrant as Specified in Its Charter)

Washington	2836	91-1549568
(State or Other Jurisdiction of Incorporation or Organization)	**(Primary Standard Industrial Classification Code Number)**	**(I.R.S. Employer Identification Number)**

3579 Valley Centre Drive, Suite 100
San Diego, California 92130
(858) 829-0829

(Address, Including Zip Code, and Telephone Number, Including Area Code, of Registrant s Principal Executive Offices)

M. Scott Salka
Chief Executive Officer
AmpliPhi Biosciences Corporation
3579 Valley Centre Drive, Suite 100
San Diego, California 92130
(858) 829-0829

(Name, Address, Including Zip Code, and Telephone Number, Including Area Code, of Agent for Service)

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Approximate date of commencement of proposed sale to the public: As soon as practicable after the effective date of this registration statement.

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, as amended (the Securities Act), check the following box. o

If this Form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act,

check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. o

If this Form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. o

If this Form is a post-effective amendment filed pursuant to Rule 462(d) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering. o

Indicate by check mark whether the Registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of large accelerated filer, accelerated filer and smaller reporting company in Rule 12b-2 of the Exchange Act.

Large accelerated filer o	Accelerated filer o
Non-accelerated filer o (Do not check if a smaller reporting company)	Smaller reporting company x

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CALCULATION OF REGISTRATION FEE

Title of each class of securities to be registered[1]	Proposed maximum aggregate offering price[2]	Amount of registration fee
Common Stock, $0.01 par value per share		
Warrants to purchase shares of common stock		
Total	$ 10,070,000	$ 1,168 [3]

(1) The securities registered hereunder also include the shares of common stock as may be issued upon exercise of warrants registered hereby. Pursuant to Rule 416, the securities being registered hereunder include such indeterminate number of additional securities as may be issuable to prevent dilution resulting from stock splits, stock dividends or similar transactions.

(2) Estimated solely for the purpose of calculating the amount of the registration fee in accordance with Rule 457(o) under the Securities Act.

(3) $1,017 was previously paid.

The Registrant hereby amends this registration statement on such date or dates as may be necessary to delay its effective date until the Registrant shall file a further amendment that specifically states that this registration statement shall thereafter become effective in accordance with Section 8(a) of the Securities Act of 1933, as amended, or until the registration statement shall become effective on such date as the Securities and Exchange Commission, acting pursuant to said Section 8(a), may determine.

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The information in this preliminary prospectus is not complete and may be changed. We may not sell these securities until the registration statement filed with the Securities and Exchange Commission is effective. This prospectus is not an offer to sell these securities and we are not soliciting an offer to buy these securities in any jurisdiction where the offer or sale is not permitted.

Subject to completion, dated October 3, 2016

PRELIMINARY PROSPECTUS

5,300,000 Shares of Common Stock

Warrants to Purchase 1,325,000 Shares of Common Stock

We are offering 5,300,000 shares of our common stock and warrants to purchase an aggregate of 1,325,000 shares of our common stock (and the shares of common stock that are issuable from time to time upon exercise of the warrants). Each share of common stock is being sold together with a warrant to purchase up to 0.25 of a share of our common stock (which equates to 25% warrant coverage on the shares purchased in this offering), at an exercise price of $ per share. The warrants will be exercisable immediately and will expire five years from the date of issuance. The shares of common stock and warrants can only be purchased together in this offering but will be issued separately and will be immediately separable upon issuance. Our common stock is listed on the NYSE MKT under the symbol APHB. On September 30, 2016, the last reported sale price of our common stock on the NYSE MKT was $1.52 per share. There is no established public trading market for the warrants, and we do not expect a market to develop. In addition, we do not intend to apply for a listing of the warrants on any national securities exchange.

We are an emerging growth company as that term is used in the Jumpstart Our Business Startups Act of 2012 and, as such, we have elected to comply with certain reduced public company reporting requirements for this prospectus and future filings.

	Per Share and Accompanying Warrant	Total
Public offering price[1]	$	$
Underwriting discounts and commissions[2]	$	$
Proceeds, before expenses, to us	$	$

(1) The public offering price is $ per share of common stock and $0.01 per accompanying warrant.

(2) In addition, we have agreed to reimburse the underwriters for certain expenses. See Underwriting beginning on page 56 of this prospectus for additional information.

The offering is being underwritten on a firm commitment basis.

Investing in our securities involves a high degree of risk. See the section entitled Risk Factors beginning on page 8 of this prospectus and elsewhere in this prospectus for a discussion of information that should be

considered in connection with an investment in our securities.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the adequacy or accuracy of this prospectus. Any representation to the contrary is a criminal offense.

The underwriters expect to deliver the shares of common stock and warrants to purchasers on or about , 2016.

Sole Book-Running Manager

Roth Capital Partners

Co-Manager

Griffin Securities, Inc.

The date of this prospectus is , 2016

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We have not, and the underwriters have not, authorized anyone to provide any information or to make any representations other than those contained in this prospectus or in any free writing prospectuses prepared by or on behalf of us or to which we have referred you. We take no responsibility for, and can provide no assurance as to the reliability of, any other information that others may give you. This prospectus is an offer to sell only the securities offered hereby, and only under circumstances and in jurisdictions where it is lawful to do so. The information contained in this prospectus or in any applicable free writing prospectus is current only as of its date, regardless of its time of delivery or any sale of our securities. Our business, financial condition, results of operations and prospects may have changed since that date.

For investors outside the United States: We have not, and the underwriters have not, done anything that would permit this offering or possession or distribution of this prospectus in any jurisdiction where action for that purpose is required, other than in the United States. Persons outside the United States who come into possession of this prospectus must inform themselves about, and observe any restrictions relating to, the offering of the securities and the distribution of this prospectus outside the United States.

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PROSPECTUS SUMMARY

This summary highlights information contained in other parts of this prospectus or incorporated by reference into this prospectus from our filings with the Securities and Exchange Commission, or SEC, listed in the section of the prospectus entitled Incorporation of Certain Information by Reference. Because it is only a summary, it does not contain all of the information that you should consider before purchasing our securities in this offering and it is qualified in its entirety by, and should be read in conjunction with, the more detailed information appearing elsewhere or incorporated by reference into this prospectus. You should read the entire prospectus, the registration statement of which this prospectus is a part, and the information incorporated by reference herein in their entirety, including the Risk Factors and our financial statements and the related notes incorporated by reference into this prospectus, before purchasing our securities in this offering. Unless the context requires otherwise, references in this prospectus to AmpliPhi, we, us and our refer to AmpliPhi Biosciences Corporation together with its wholly owned subsidiaries.

Overview

Our Company

We are a biotechnology company focused on the discovery, development and commercialization of novel phage therapeutics. Phage therapeutics use bacteriophages, a family of viruses, to kill pathogenic bacteria. Phages have powerful and highly selective mechanisms of action that permit them to target and kill specific bacteria. We believe that phages represent a promising means to treat bacterial infections, especially those that have developed resistance to current therapies, including the so-called multi-drug-resistant or superbug strains of bacteria.

Our goal is to be the leading developer of phage therapeutics. We are combining our expertise in the manufacture of drug-quality bacteriophages and our proprietary approach and expertise in identifying, characterizing and developing naturally occurring bacteriophages with that of our collaboration partners in bacteriophage biology, synthetic biology and manufacturing, to develop second-generation bacteriophage products.

The extensive use of antibiotics since their discovery in the 1940s has resulted in drug resistance among many disease-causing bacteria. According to the U.S. Centers for Disease Control and Prevention, resistance to antibiotics threatens to reverse many of the key medical advances of the last half-century. Examples of clinically important microbes that are rapidly developing resistance to available antimicrobials include bacteria that cause skin, bone, lung and bloodstream infections (e.g., *S. aureus* and methicillin-resistant *S. aureus*, or MRSA), pneumonia and lung infections in both community and hospital settings and cystic fibrosis patients (e.g., *A. baumanii, P. aeruginosa,* and *K. pneumoniae*), meningitis (e.g., *S. pneumonia*), urinary tract and gastrointestinal infections (e.g., *E. coli* and *C. difficile*). As phages kill bacteria in ways entirely unlike the mechanisms used by traditional antibiotics, we believe that multi-drug resistant bacteria will be susceptible to phage therapy. Should resistant bacteria emerge or evolve, we believe it will remain possible to identify phages that can effectively kill these resistant bacteria. Furthermore, we have found that in some circumstances the selective pressure applied by phage use on antibiotic-resistant bacteria can result in those bacteria reverting back to being antibiotic sensitive.

Our lead product candidate is AB-SA01, for the treatment of *S. aureus* infections, including MRSA. We are currently conducting a Phase 1 clinical trial of AB-SA01 for the treatment of *S. aureus* in chronic rhinosinusitis patients and have completed enrollment of a second Phase 1 clinical trial to evaluate the safety of AB-SA01 when administered topically to the intact skin of healthy adults. We expect to report final data for both trials in the second half of 2016.

We also have another product candidate in earlier stage development, AB-PA01 for the treatment of *P. aeruginosa* infections, and an additional discovery program, AB-CD01 for the treatment of *C. difficile* infections.

We are developing our phage product candidates using a proprietary discovery and development platform, which is designed for rapid identification, characterization and manufacturing of multiple phage therapeutics. Each product candidate combines several carefully chosen phages, which target a specific disease-causing bacteria such as *S. aureus, P. aeruginosa*, and *C. difficile*. We believe that the combination of our platform, our manufacturing capability, our understanding of the regulatory and development requirements of

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bacteriophage therapeutics, and the clinical and scientific expertise of our collaboration partners may enable the rapid advancement of phage therapeutics through the clinic and the regulatory approval process.

We have a collaboration agreement and a license agreement with the University of Leicester to develop a phage therapeutic that targets and kills certain types of *C. difficile*. Pursuant to the license agreement, we may be obligated to pay the University of Leicester a percentage royalty in the single digits and an aggregate of up to £575,000 in milestone payments.

In November 2015, our Australian subsidiary, AmpliPhi Australia Pty Ltd, entered into a clinical trial agreement with the University of Adelaide and the Queen Elizabeth Hospital, both of Adelaide, SA, Australia, for the conduct of a clinical trial of AB-SA01 in patients with chronic rhinosinusitis complicated by a *S. aureus* infection. Patient screening for this clinical trial commenced in late 2015. The first patient was dosed in January 2016 and we are now enrolling the final cohort. We expect to have the complete study report before the end of 2016.

In June 2013, we entered into a cooperative research and development agreement, or Research and Development Agreement, with the United States Army Medical Research and Materiel Command focusing on developing bacteriophage therapeutics to treat *S. aureus*, *E. coli* and *P. aeruginosa* infections. In May 2016, we initiated a Phase 1 clinical trial under a U.S. investigational new drug application, or IND, to evaluate the safety of AB-SA01 administered topically to the intact skin of 12 healthy adult volunteers. The trial is now fully enrolled. In September 2016, we reported topline safety and tolerability results which demonstrated that AB-SA01 was well-tolerated with no drug-related serious adverse events. The complete study report is expected by the end of 2016.

Risks Associated with Our Business and this Offering

Our business and our ability to implement our business strategy are subject to numerous risks, as more fully described in the section entitled Risk Factors in our Quarterly Report on Form 10-Q for the quarter ended June 30, 2016, incorporated herein by reference. You should read these risks before you invest in our securities. We may be unable, for many reasons, including those that are beyond our control, to implement our business strategy. In particular, risks associated with our business include:

We have incurred losses since our inception and anticipate that we will continue to incur significant losses for the foreseeable future, and our future profitability is uncertain. Even if this offering is successful, will need to raise additional capital in the future to continue operations, which may not be available on acceptable terms, or at all. Failure to obtain this necessary capital when needed may force us to delay, limit or terminate our product development efforts or other operations, and there will be substantial doubt about our ability to continue as a going concern.

We are seeking to develop antibacterial agents using bacteriophage technology, a novel approach, which makes it difficult to predict the time and cost of development. No bacteriophage products are currently approved for human therapeutics commercial use in the United States.

Our product candidates must undergo rigorous clinical testing, such clinical testing may fail to demonstrate safety and efficacy and any of our product candidates could cause undesirable side effects, which would substantially delay or prevent regulatory approval or commercialization.

We determined that we had a material weakness as of December 31, 2014 and December 31, 2015. If we fail to maintain proper and effective internal control over financial reporting, our ability to produce accurate financial statements on a timely basis could be impaired and our public reporting may be unreliable.

We may be required to issue a significant number of additional shares of common stock for no additional consideration to certain of our stockholders in connection with the closing of this offering; we may not be able to

satisfy our contractual obligation to issue these shares.

A complaint has been filed against us and the members of our board of directors by one of our principal stockholders.

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We are dependent on patents and proprietary technology. If we fail to adequately protect this intellectual property or if we otherwise do not have exclusivity for the marketing of our products, our ability to commercialize products could suffer.

If our competitors are able to develop and market products that are more effective, safer or more affordable than ours, or obtain marketing approval before we do, our commercial opportunities may be limited.

If you purchase our securities in this offering, you will incur immediate and substantial dilution.

We will have broad discretion in the use of the net proceeds from this offering and may not use them effectively.

Corporate and Other Information

We were incorporated under the laws of the State of Washington in March 1989 as a wholly owned subsidiary of Immunex Corporation and began operations as an independent company in 1992 as Targeted Genetics Corporation.

In January 2011, we completed the acquisition of Biocontrol Ltd, an antimicrobial biotechnology company based in the United Kingdom, with the goal of developing their phage therapy programs using funding from the sale of our legacy gene therapy assets.

In February 2011, we changed our name to AmpliPhi Biosciences Corporation.

In November 2012, we completed the acquisition of Special Phage Holdings Pty Ltd, a company based in Australia, which we refer to as SPH, with the goal of combining SPH s research on addressing the rapidly escalating problem of antibiotic resistance through the development of a series of bacteriophage-based treatments into our own development programs.

In August 2015, we effected a 1-for-50 reverse split of our common stock. The share and per share information for transactions described in this prospectus that occurred prior to the reverse split have been adjusted to give retroactive effect to the reverse split.

Our principal executive offices are located at 3579 Valley Centre Drive, Suite 100, San Diego, California 92130. The telephone number at our principal executive office is (858) 829-0829. Our website address is *http://www.ampliphibio.com*. Our website and the information contained on, or that can be accessed through, our website will not be deemed to be incorporated by reference in, and are not considered part of, this prospectus. You should not rely on our website or any such information in making your decision whether to purchase our securities in this offering.

This prospectus contains references to our trademarks and to trademarks and trade names belonging to other entities. Solely for convenience, trademarks and trade names referred to in this prospectus, including logos, artwork and other visual displays, may appear without the® or ™ symbols, but such references are not intended to indicate, in any way, that their respective owners will not assert, to the fullest extent under applicable law, their rights thereto. We do not intend our use or display of other companies trade names or trademarks to imply a relationship with, or endorsement or sponsorship of us by, any other companies.

Implications of Being an Emerging Growth Company and a Smaller Reporting Company

We qualify as an emerging growth company as defined in the Jumpstart Our Business Startups Act, or JOBS Act, enacted in April 2012. An emerging growth company may take advantage of reduced reporting requirements that are

otherwise applicable to public companies. These provisions include, but are not limited to:

being permitted to present only two years of audited financial statements and only two years of related Management s Discussion and Analysis of Financial Condition and Results of Operations in the documents incorporated by reference into this prospectus;

not being required to comply with the auditor attestation requirements of Section 404 of the Sarbanes-Oxley Act of 2002, as amended, or the Sarbanes-Oxley Act;

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reduced disclosure obligations regarding executive compensation in our periodic reports, proxy statements and registration statements; and

exemptions from the requirements of holding a nonbinding advisory vote on executive compensation and stockholder approval of any golden parachute payments not previously approved.

We may use these provisions until the last day of our fiscal year following the fifth anniversary of the first sale of our equity securities pursuant to an effective registration statement under the Securities Act of 1933, as amended, or the Securities Act, after we became a reporting company under the Securities Exchange Act of 1934, as amended, or the Exchange Act, pursuant to our registration statement on Form 10 (File No. 000-23930). However, if certain events occur prior to the end of such five-year period, including if we become a large accelerated filer, our annual gross revenues exceed $1.0 billion or we issue more than $1.0 billion of non-convertible debt in any three-year period, we will cease to be an emerging growth company prior to the end of such five-year period.

We are also a smaller reporting company as defined in Exchange Act and have elected to take advantage of certain of the scaled disclosures available to smaller reporting companies.

We have elected to take advantage of certain of the reduced disclosure obligations in the registration statement of which this prospectus is a part and may elect to take advantage of other reduced reporting requirements in future filings. As a result, the information that we provide to our stockholders may be different than you might receive from other public reporting companies in which you hold equity interests.

The JOBS Act provides that an emerging growth company can take advantage of an extended transition period for complying with new or revised accounting standards. We have irrevocably elected not to avail ourselves of this exemption and, therefore, we will be subject to the same new or revised accounting standards as other public companies that are not emerging growth companies.

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The Offering

Common stock offered by us in this offering

5,300,000 shares

Warrants offered by us in this offering

Warrants to purchase up to 1,325,000 shares of common stock. Each share of our common stock is being sold together with a warrant to purchase 0.25 of a share of our common stock, which equates to 25% warrant coverage on the shares purchased in this offering. Each warrant will have an exercise price of $ per share, will be immediately exercisable and will expire on the fifth anniversary of the original issuance date. This prospectus also relates to the offering of the shares of common stock issuable upon exercise of the warrants.

Common stock to be outstanding after this offering

16,707,240 shares (assuming none of the warrants issued in this offering are exercised).

Use of proceeds

We intend to use the net proceeds from this offering for general corporate purposes, including manufacturing expenses, clinical trial expenses, research and development expenses and general and administrative expenses. See Use of Proceeds.

Risk factors

You should read the Risk Factors section of this prospectus for a discussion of certain of the factors to consider carefully before deciding to purchase any shares of our common stock and warrants in this offering.

National Securities Exchange Listing

Our common stock is listed on the NYSE MKT under the symbol APHB. We do not intend to list the warrants on any securities exchange or nationally recognized trading system.

The number of shares of our common stock to be outstanding after this offering is based on 11,120,394 shares of common stock outstanding as of June 30, 2016 and assumes:

the issuance by us of 5,300,000 shares of common stock in this offering; and

the issuance by us of 286,846 shares of common stock in connection with the closing of this offering pursuant to the Common Stock Issuance Agreement, dated April 8, 2016, or the CSIA, by and between us and certain of our stockholders, based on an assumed public offering price per share of common stock in this offering of $1.51;

and excludes, as of June 30, 2016:

739,021 shares of common stock issuable upon the exercise of outstanding stock options, at a weighted-average exercise price of $6.81 per share;

1,650,179 shares of common stock reserved for future issuance under our 2016 Equity Incentive Plan, or the 2016 plan;

120,000 shares of common stock reserved for future issuance under our 2016 Employee Stock Purchase Plan, or the ESPP; and

2,443,479 shares of common stock issuable upon the exercise of outstanding warrants, at a weighted-average exercise price of $5.87 per share.

The number of shares we will be required to issue pursuant to the CSIA in connection with the closing of this offering may be in excess of the 286,846 shares described above. See Risk Factors Risks Related to this Offering *We may be required to issue a significant number of additional shares of common stock for no additional consideration to certain of our stockholders in connection with the closing of this offering; we may not be able to satisfy our contractual obligation to issue these shares* for additional information.

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Consolidated Summary Financial Data

The following tables summarize certain of our historical financial data. We derived the consolidated summary statement of operations data for the years ended December 31, 2015 and 2014 from our audited consolidated financial statements incorporated by reference into this prospectus from our Annual Report on Form 10-K for the year ended December 31, 2015. The consolidated summary statement of operations data for the six months ended June 30, 2016 and 2015 and the consolidated summary balance sheet data as of June 30, 2016 were derived from our unaudited consolidated financial statements incorporated by reference into this prospectus from our Quarterly Report on Form 10-Q for the quarter ended June 30, 2016. The unaudited consolidated financial statements have been prepared on a basis consistent with our audited consolidated financial statements included in this prospectus and include, in our opinion, all adjustments, consisting only of normal recurring adjustments, necessary for the fair presentation of the financial information in those statements, including giving retroactive effect to the 1-for-50 reverse split of our common stock that was effected on August 7, 2015 for the presentation of per share information. Our historical results are not necessarily indicative of the results that may be expected in the future and results of interim periods are not necessarily indicative of the results for the entire year. The consolidated summary financial data should be read together with our consolidated financial statements and related notes and Management s Discussion and Analysis of Financial Condition and Results of Operations incorporated by reference in this prospectus.

	Year Ended December 31,		Six Months Ended June 30,	
	2015	2014	2016	2015
Consolidated Statements of Operations Data				
Revenue	$475,000	$409,000	$209,000	$204,000
Operating expenses:				
Research and development	3,992,000	5,805,000	3,221,000	2,049,000
General and administrative	6,710,000	8,714,000	5,095,000	3,014,000
Total operating expenses	10,702,000	14,519,000	8,316,000	5,063,000
Loss from operations	(10,227,000)	(14,110,000)	(8,107,000)	(4,859,000)
Other income (expense):				
Change in fair value of derivative liabilities	9,940,000	37,219,000	1,371,000	1,566,000
Other expense	(302,000)		(227,000)	(431,000)
Total other income (expense)	9,638,000	37,219,000	1,144,000	1,135,000
Net income (loss) before income taxes	(589,000)	23,109,000	(6,963,000)	(3,724,000)
Income tax benefit	73,000			
Net income (loss)	(516,000)	23,109,000	(6,963,000)	(3,724,000)
Excess of fair value of consideration transferred on conversion of Series B Preferred Stock			(2,366,000)	
Accretion of Series B redeemable convertible preferred stock	(10,278,000)	(1,285,000)	(1,858,000)	(2,166,000)
Net income (loss) attributable to common stockholders	$(10,794,000)	$21,824,000	$(11,187,000)	$(5,890,000)
Per share information:				
Net income (loss) per share of common stock basic	$(1.99)	$4.21	$(1.53)	$(1.19)
Weighted average number of shares of common stock outstanding basic	5,411,204	3,746,639	7,312,062	4,960,416

Net loss per share of common stock diluted	$(1.99)	$(2.33)	$(1.60)	$(1.19)
Weighted average number of shares of common stock outstanding diluted	5,411,204	5,886,730	7,325,781	4,960,416

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	As of June 30, 2016
Consolidated Balance Sheet Data:	
Cash and cash equivalents	$7,144,000
Working capital	4,414,000
Total assets	29,279,000
Total liabilities	7,795,000
Accumulated deficit	(369,485,000)
Total stockholders equity	21,484,000

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RISK FACTORS

Investing in our securities involves a high degree of risk. You should consider carefully the risks described below, together with all of the other information included or incorporated by reference in this prospectus, including the risks and uncertainties discussed under Risk Factors in our Quarterly Report on Form 10-Q for the quarter ended June 30, 2016, before deciding whether to purchase shares of our common stock and warrants in this offering. All of these risk factors are incorporated herein in their entirety. The risks described below and incorporated by reference are material risks currently known, expected or reasonably foreseeable by us. If any of these risks actually materialize, our business, prospects, financial condition, and results of operations could be seriously harmed. This could cause the trading price of our common stock and the value of the warrants to decline, resulting in a loss of all or part of your investment.

Risks Related to this Offering

You will experience immediate and substantial dilution if you purchase securities in this offering.

As of June 30, 2016, our net tangible book value was approximately $1.2 million, or $0.10 per share. Since the price per share of our common stock being offered in this offering is substantially higher than the net tangible book value per share of our common stock, you will suffer substantial dilution with respect to the net tangible book value of the common stock you purchase in this offering. Based on the assumed combined public offering price of $1.52 per share of common stock and accompanying warrant being sold in this offering, and our net tangible book value per share as of June 30, 2016, if you purchase shares of common stock in this offering, you will suffer immediate and substantial dilution of $(1.04) per share with respect to the net tangible book value of the common stock. See the section entitled Dilution for a more detailed discussion of the dilution you will incur if you purchase common stock in this offering.

We may be required to issue a significant number of additional shares of common stock for no additional consideration to certain of our stockholders in connection with the closing of this offering; we may not be able to satisfy our contractual obligation to issue these shares.

In April 2016, we entered into a Common Stock Issuance Agreement, or CSIA, with certain former holders, or the Holders, of our Series B Preferred Stock. The terms of the CSIA require us to issue shares of common stock for no additional consideration to the Holders in connection with the closing of this offering if the public offering price per share of common stock is less than $2.35 per share. Based on the assumed public offering price per share of common stock in this offering of $1.51 (which is based on the last reported sale price of our common stock on the NYSE MKT on September 30, 2016), we will be obligated under the CSIA to issue the Holders an aggregate of 994,237 shares of common stock within 15 business days following the closing of this offering. However, under the rules of the NYSE MKT, the maximum number of shares we can issue to the Holders as a result of this offering is 286,846 shares unless we obtain stockholder approval to issue shares in excess of this amount. Our inability to comply in full with our obligation under the CSIA to issue shares to the Holders in connection with the closing of this offering could have adverse consequences, including, without limitation:

the Holders may bring an action against us for breach of contract, or threaten to bring an action against us, either of which could require us to expend significant time and resources to resolve the matter, and we may not be successful;

we may need to call a special meeting of our stockholders to seek their approval of the issuance by us to the Holders of the number of shares we become obligated to issue the Holders in connection with the closing of this offering, less the 286,846 shares we are currently permitted to issue, which would require us to expend time and resources, and our stockholders may not ultimately approve such issuance; and

we may need to provide other consideration to the Holders to settle potential claims arising from our inability to satisfy our contractual obligations under the CSIA, which could involve:

cash make-whole payments, which in turn would impact our expected use of the net proceeds from this offering and deplete our cash resources faster than we would otherwise anticipate; and

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We may be required to issue a significant number of additional shares ofcommon stock for no additional consideration

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other unfavorable terms that could make it difficult for us to raise financing in the future, which would raise further doubts about our ability to continue as a going concern.

The occurrence of any of the foregoing, or even the potential for them to occur, could result in a material decline in our stock price.

The actual number of shares that we will be required to issue to the Holders pursuant to the provisions of the CSIA in connection with the closing of this offering will depend on the actual public offering price per share of common stock in this offering. A $0.25 decrease from the assumed public offering price of $1.51 per share of common stock would increase the number of shares we are required to issue to the Holders in connection with the closing of this offering by 551,886 shares, or 1,546,123 shares in the aggregate. A $0.50 decrease from the assumed public offering price of $1.51 per share of common stock would increase the number of shares we are required to issue to the Holders in connection with the closing of this offering by 1,376,981 shares, or 2,371,218 shares in the aggregate.

There is no public market for the warrants being offered in this offering.

There is no established public trading market for the warrants being offered in this offering, and we do not expect a market to develop. In addition, we do not intend to apply to list the warrants on any securities exchange or nationally recognized trading system, including the NYSE MKT. Without an active market, the liquidity of the warrants will be limited.

We will have broad discretion in the use of the net proceeds from this offering and may not use them effectively.

Our management will have broad discretion in the application of the net proceeds from this offering, including for any of the purposes described in the section entitled Use of Proceeds, and you will not have the opportunity as part of your investment decision to assess whether the net proceeds are being used appropriately. Because of the number and variability of factors that will determine our use of the net proceeds from this offering, their ultimate use may vary substantially from their currently intended use. Our management may not apply the net proceeds from this offering in ways that ultimately increase the value of your investment. The failure by our management to apply these funds effectively could harm our business. Pending their use, we may invest the net proceeds from this offering in short-term, investment-grade, interest-bearing securities. These investments may not yield a favorable return to our stockholders. If we do not invest or apply the net proceeds from this offering in ways that enhance stockholder value, we may fail to achieve expected financial results, which could cause our stock price to decline.

There may be future sales of our securities or other dilution of our equity, which may adversely affect the market price of our common stock.

We are generally not restricted from issuing additional common stock, including any securities that are convertible into or exchangeable for, or that represent the right to receive, common stock. The market price of our common stock could decline as a result of sales of common stock or securities that are convertible into or exchangeable for, or that represent the right to receive, common stock after this offering or the perception that such sales could occur.

Holders of warrants purchased in this offering will have no rights as common stockholders until such holders exercise their warrants and acquire our common stock.

Until holders of warrants acquire shares of our common stock upon exercise of the warrants, holders of warrants will have no rights with respect to the shares of our common stock underlying such warrants. Upon exercise of the warrants, the holders will be entitled to exercise the rights of a common stockholder only as to matters for which the record date occurs after the exercise date.

Even if this offering is successful, we will need to raise additional capital in the future to continue operations, which may not be available on acceptable terms, or at all. Failure to obtain this necessary capital when needed may force us to delay, limit or terminate our product development efforts or other operations.

We have had recurring losses from operations, negative operating cash flow and an accumulated deficit. We do not generate any cash from operations and must raise additional funds in order to continue operating our

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business. We expect to continue to fund our operations primarily through equity and debt financings in the future. If additional capital is not available to us when needed or on acceptable terms, we may not be able to continue to operate our business pursuant to our business plan or we may have to discontinue our operations entirely. As of June 30, 2016, we had cash and cash equivalents of $7.1 million. We estimate that we will receive net proceeds of approximately $7.2 million from the sale of the securities offered by us in this offering, based on the assumed combined public offering price of $1.52 per share and accompanying warrant (the last reported sale price of our common stock on the NYSE MKT on September 30, 2016), and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering. We currently anticipate that our existing resources, together with the expected net proceeds from this offering, will be sufficient to fund our planned operations until the end of the second quarter of 2017. In the event of a decrease in the net proceeds to us from this offering as a result of a decrease in the assumed public offering price or the number of shares offered by us, based on the assumptions discussed in Use of Proceeds , we would expect that our existing resources, together with such reduced expected net proceeds from this offering, would be sufficient to fund our planned operations until approximately mid-way through the second quarter of 2017.

Developing drugs and conducting clinical trials is expensive. Our future funding requirements will depend on many factors, including:

the costs and timing of our research and development activities;
the progress and cost of our clinical trials and other research and development activities;
the cost and timing of securing manufacturing capabilities for our clinical product candidates and commercial products, if any;
the terms and timing of any collaborative, licensing, acquisition or other arrangements that we may establish;
the costs and timing of seeking regulatory approvals;
the costs of filing, prosecuting, defending and enforcing any patent applications, claims, patents and other intellectual property rights; and
the costs of lawsuits involving us or our product candidates.

We may seek funds through arrangements with collaborators or others that may require us to relinquish rights to the products candidates that we might otherwise seek to develop or commercialize independently. We cannot be certain that we will be able to enter into any such arrangements on reasonable terms, if at all.

We may seek to raise capital through a variety of sources, including:

the public equity market;
private equity financings;
collaborative arrangements;
licensing arrangements; and/or
public or private debt.

Any additional fundraising efforts may divert our management from their day-to-day activities, which may adversely affect our ability to develop and commercialize our product candidates. Our ability to raise additional funds will depend, in part, the success of our preclinical studies and clinical trials and other product development activities, regulatory events, our ability to identify and enter into in-licensing or other strategic arrangements, and other events or conditions that may affect our value or prospects, as well as factors related to financial, economic and market conditions, many of which are beyond our control. We cannot be certain that sufficient funds will be available to us when required or on acceptable terms, if at all. Raising additional capital through the sale of securities could cause significant dilution to our stockholders. If we are unable to secure additional funds on a timely basis or on acceptable terms, we may be required to defer, reduce or

Even if this offering is successful, we will need to raise additional capital inthe future to continue operations, which r

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Even if this offering is successful, we will need to raise additional capital inthe future to continue operations, which r

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eliminate significant planned expenditures, restructure, curtail or eliminate some or all of our development programs or other operations, dispose of technology or assets, pursue an acquisition of our company by a third party at a price that may result in a loss on investment for our stockholders, enter into arrangements that may require us to relinquish rights to certain of our product candidates, technologies or potential markets, file for bankruptcy or cease operations altogether. Any of these events could have a material adverse effect on our business, financial condition and results of operations. Moreover, if we are unable to obtain additional funds on a timely basis, there will be substantial doubt about our ability to continue as a going concern and increased risk of insolvency and loss of investment by our stockholders.

Any additional fundraising efforts may divert our management from their day-to-day activities, which may adversely affect our ability to develop and commercialize our product candidates. Our ability to raise additional funds will depend, in part, the success of our preclinical studies and clinical trials and other product development activities, regulatory events, our ability to identify and enter into in-licensing or other strategic arrangements, and other events or conditions that may affect our value or prospects, as well as factors related to financial, economic and market conditions, many of which are beyond our control. We cannot be certain that sufficient funds will be available to us when required or on acceptable terms, if at all. Raising additional capital through the sale of securities could cause significant dilution to our stockholders. If we are unable to secure additional funds on a timely basis or on acceptable terms, we may be required to defer, reduce or eliminate significant planned expenditures, restructure, curtail or eliminate some or all of our development programs or other operations, dispose of technology or assets, pursue an acquisition of our company by a third party at a price that may result in a loss on investment for our stockholders, enter into arrangements that may require us to relinquish rights to certain of our product candidates, technologies or potential markets, file for bankruptcy or cease operations altogether. Any of these events could have a material adverse effect on our business, financial condition and results of operations. Moreover, if we are unable to obtain additional funds on a timely basis, there will be substantial doubt about our ability to continue as a going concern and increased risk of insolvency and loss of investment by our stockholders.

Even if this offering is successful, we will need to raise additional capital inthe future to continue operations, which r

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the documents incorporated by reference herein contain forward-looking statements. The forward-looking statements are contained principally in the sections entitled Prospectus Summary, Risk Factors, Management s Discussion and Analysis of Financial Condition and Results of Operations and Business in this prospectus or the documents incorporated herein by reference. These statements relate to future events or to our future financial performance and involve known and unknown risks, uncertainties and other factors which may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by the forward-looking statements. Forward-looking statements include, but are not limited to, statements about:

our estimates regarding anticipated operating losses, capital requirements and needs for additional funds;

our ability to raise additional capital when needed and to continue as a going concern;

our ability to manufacture, or otherwise secure the manufacture of, sufficient amounts of our product candidates for our preclinical studies and clinical trials;

our clinical development plans, including planned clinical trials;

our research and development plans, including our plans to report final data for two Phase 1 clinical trials by the end of 2016;

our ability to select combinations of phages to formulate our product candidates;

the safety and efficacy of our product candidates;

the anticipated regulatory pathways for our product candidates;

our ability to successfully complete preclinical and clinical development of, and obtain regulatory approval of our product candidates and commercialize any approved products on our expected timeframes or at all;

the content and timing of submissions to and decisions made by the U.S. Food and Drug Administration, or FDA, and other regulatory agencies;

our ability to leverage the experience of our management team;

our ability to attract and keep management and other key personnel;

the capacities and performance of our suppliers, manufacturers, contract research organizations and other third parties over whom we have limited control;

the actions of our competitors and success of competing drugs that are or may become available;

our expectations with respect to future growth and investments in our infrastructure, and our ability to effectively manage any such growth;

the size and potential growth of the markets for any of our product candidates, and our ability to capture share in or impact the size of those markets;

the benefits of our product candidates;

market and industry trends;

the number of shares we may ultimately issue to the Holders pursuant to the CSIA in connection with the closing of this offering, and the consequences of our potential inability to comply with our contractual obligations under the CSIA;

the outcome of any litigation in which we or any of our officers or directors are involved;

the effects of government regulation and regulatory developments, and our ability and the ability of the third parties with whom we engage to comply with applicable regulatory requirements;

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the accuracy of our estimates regarding future expenses, revenues, capital requirements and need for additional financing;

our expectations regarding future planned expenditures;

our ability to achieve and maintain effective internal control over financial reporting in accordance with Section 404 of the Sarbanes-Oxley Act;

our expectations regarding the period during which we qualify as an emerging growth company under the JOBS Act;

our ability to obtain, maintain and successfully enforce adequate patent and other intellectual property protection of any of our products and product candidates;

our expected use of the net proceeds from this offering; and

our ability to operate our business without infringing the intellectual property rights of others.

In some cases, you can identify these statements by terms such as anticipate, believe, could, estimate, expect, may, plan, potential, predict, project, should, will, would or the negative of those terms, and similar ex convey uncertainty of future events or outcomes. These forward-looking statements reflect our management s beliefs and views with respect to future events and are based on estimates and assumptions as of the date of this prospectus and are subject to risks and uncertainties. We discuss many of these risks in greater detail in the documents incorporated by reference herein, usually under the heading Risk Factors. Moreover, we operate in a very competitive and rapidly changing environment. New risks emerge from time to time. It is not possible for our management to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. Given these uncertainties, you should not place undue reliance on these forward-looking statements.

You should carefully read this prospectus, the documents that we incorporate by reference into this prospectus and the documents we reference in this prospectus and have filed as exhibits to the registration statement, of which this prospectus is a part, completely and with the understanding that our actual future results may be materially different from what we expect. We qualify all of the forward-looking statements in this prospectus by these cautionary statements.

Except as required by law, we assume no obligation to update these forward-looking statements publicly, or to update the reasons actual results could differ materially from those anticipated in any forward-looking statements, whether as a result of new information, future events or otherwise.

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USE OF PROCEEDS

We estimate that we will receive net proceeds of approximately $7.2 million from the sale of the securities offered by us in this offering, based on the assumed combined public offering price of $1.52 per share and accompanying warrant (the last reported sale price of our common stock on the NYSE MKT on September 30, 2016), and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering.

A $0.50 increase (decrease) in the assumed combined public offering price of $1.52 per share and accompanying warrant would increase (decrease) the net proceeds to us from this offering by approximately $2.5 million, assuming that the number of shares offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering.

Similarly, a one million share increase (decrease) in the number of shares offered by us, as set forth on the cover page of this prospectus, would increase (decrease) the net proceeds to us by $1.4 million, assuming the assumed combined public offering price of $1.52 per share and accompanying warrant remains the same, and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering.

We currently intend to use the net proceeds from this offering for general corporate purposes, including manufacturing expenses, clinical trial expenses, research and development expenses and general and administrative expense. See Risk Factors for a discussion of certain risks that may affect our intended use of the net proceeds from this offering.

We may also use a portion of the net proceeds from this offering to in-license, acquire, or invest in complementary businesses, technologies, products or assets. However, we have no current plans, commitments or obligations to do so.

Our expected use of net proceeds from this offering represents our current intentions based upon our present plans and business condition. As of the date of this prospectus, we cannot currently allocate specific percentages of the net proceeds that we may use for the purposes specified above, and we cannot predict with certainty all of the particular uses for the net proceeds to be received upon the completion of this offering, or the amounts that we will actually spend on the uses set forth above. The amounts and timing of our actual use of the net proceeds will vary depending on numerous factors, including our ability to obtain additional financing, the progress, cost and results of our preclinical and clinical development programs, and whether we are able to enter into future licensing or collaboration arrangements. We may find it necessary or advisable to use the net proceeds for other purposes, and our management will have broad discretion in the application of the net proceeds, and investors will be relying on our judgment regarding the application of the net proceeds from this offering.

Pending the use of the net proceeds from this offering, we intend to invest the net proceeds in investment-grade, interest-bearing instruments.

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PRICE RANGE OF OUR COMMON STOCK

Our common stock has been listed on the NYSE MKT since August 18, 2015 under the symbol APHB. Prior to that date, our common stock was quoted on the OTCQB market under the symbol APHB.

On September 30, 2016, the closing price for our common stock as reported on the NYSE MKT was $1.52 per share. The following table sets forth the ranges of high and low sales prices per share of our common stock as quoted on the OTCQB or, if applicable, as reported on the NYSE MKT for the periods indicated. OTCQB quotations represent inter-dealer prices without retail markup, markdown or commission and may not necessarily represent actual transactions.

	High	Low
Year Ended December 31, 2014		
First Quarter	$ 37.00	$ 22.50
Second Quarter	$ 29.50	$ 17.50
Third Quarter	$ 22.50	$ 10.00
Fourth Quarter	$ 13.50	$ 3.50

	High	Low
Year Ended December 31, 2015		
First Quarter	$ 17.00	$ 8.00
Second Quarter	$ 15.00	$ 8.00
Third Quarter	$ 11.70	$ 3.79
Fourth Quarter	$ 9.00	$ 2.75

	High	Low
Year Ending December 31, 2016		
First Quarter	$ 5.49	$ 1.92
Second Quarter	$ 4.84	$ 1.45
Third Quarter	$ 2.17	$ 1.15

As of August 1, 2016, there were 155 holders of record of our common stock. The number of stockholders of record of our common stock excludes stockholders whose shares were held in nominee or street name by brokers. The actual number of common stockholders is greater than the number of record holders, and includes stockholders who are beneficial owners, but whose shares are held in street name by brokers and other nominees. This number of holders of record also does not include stockholders whose shares may be held in trust by other entities.

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DIVIDEND POLICY

We have never declared or paid any cash dividends on our common stock. We currently intend to retain all available funds and any future earnings to support our operations and finance the growth and development of our business. Any future determination related to our dividend policy will be made at the discretion of our board of directors and will depend upon, among other factors, our results of operations, financial condition, capital requirements, contractual restrictions, business prospects and other factors our board of directors may deem relevant.

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DILUTION

Our historical net tangible book value as of June 30, 2016 was approximately $1.2 million, or $0.10 per share of common stock. Our historical net tangible book value is the amount of our total tangible assets less our liabilities. Historical net tangible book value per common share is our historical net tangible book value divided by the number of shares of common stock outstanding as of June 30, 2016.

After giving effect to (1) the sale of 5,300,000 shares of our common stock and warrants to purchase up to 1,325,000 shares of our common stock in this offering at the combined public offering price of $1.52 per share of common stock and accompanying warrant (the last reported sale price of our common stock as reported on the NYSE MKT on September 30, 2016), and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering, and (2) the issuance by us to the Holders under the CSIA of an aggregate of 994,237 shares of common stock for no additional consideration in connection with the closing of this offering (based on an assumed public offering price per share of common stock in this offering of $1.51, and without regard to any limitations on our ability to issue such shares under the rules of the NYSE MKT), our as adjusted net tangible book value as of June 30, 2016 would have been approximately $8.4 million, or $0.48 per share of common stock. This represents an immediate increase in pro forma net tangible book value of $0.38 per share to our existing stockholders, and an immediate dilution of $(1.04) per share to new investors purchasing securities in this offering at the assumed combined public offering price.

The following table illustrates this dilution on a per share basis:

Assumed combined public offering price per share and accompanying warrant		$ 1.52
Historical net tangible book value per share as of June 30, 2016	$ 0.10	
Pro forma increase in net tangible book value per share attributable to investors in this offering	0.41	
Pro forma decrease in net tangible book value per share attributable to issuance of common stock pursuant to the CSIA	(0.03)	
As adjusted net tangible book value per share after this offering		0.48
Dilution per share to investors participating in this offering		$ (1.04)

A $0.50 increase in the assumed combined public offering price of $1.52 per share and accompanying warrant would increase our as adjusted net tangible book value after this offering by $2.5 million, or $0.17 per share, and the dilution per share to investors purchasing securities in this offering would be approximately ($1.37) per share, assuming the issuance by us of an aggregate of 302,322 shares of common stock pursuant to the CSIA in connection with the closing of this offering and that the number of shares of common stock and accompanying warrants offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering. Similarly, a $0.50 decrease in the assumed combined public offering price of $1.52 per share and accompanying warrant would decrease our as adjusted net tangible book value after this offering by $2.5 million, or $0.17 per share, and the dilution per share to investors purchasing securities in this offering would be $(0.71) per share, assuming the issuance by us of an aggregate of 2,371,218 shares of common stock pursuant to the CSIA in connection with the closing of this offering and that the number of shares of common stock and accompanying warrants offered by us, as set forth on the cover page of this prospectus, remains the same and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering.

We may also increase or decrease the number of shares of common stock and accompanying warrants we are offering from the assumed number of shares of common stock and accompanying warrants set forth above. An increase of 1,000,000 shares of common stock and accompanying warrants in the number of shares of common stock and accompanying warrants offered by us from the assumed number of shares of common stock and accompanying warrants set forth on the cover page of this prospectus would increase our as adjusted net tangible book value after this offering by $1.4 million, or $0.05 per share, and the dilution per

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share to investors purchasing securities in this offering would be approximately $(0.99) per share, assuming the issuance by us of an aggregate of 994,237 shares of common stock pursuant to the CSIA in connection with the closing of this offering and that the combined public offering price remains the same and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering. Similarly, a decrease of 1,000,000 shares of common stock and accompanying warrants in the number of shares of common stock and accompanying warrants offered by us from the assumed number of shares of common stock and accompanying warrants set forth on the cover page of this prospectus would decrease our as adjusted net tangible book value after this offering by $1.4 million, or $0.06 per share, and the dilution per share to investors purchasing securities in this offering would be approximately $(1.10), assuming the issuance by us of an aggregate of 994,237 shares of common stock pursuant to the CSIA in connection with the closing of this offering and that the combined public offering price remains the same and after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, and excluding the proceeds, if any, from the exercise of the warrants issued in this offering. The information discussed above is illustrative only and will adjust based on the actual public offering price, the actual number of shares and warrants that we offer in this offering, and other terms of this offering determined at pricing.

The foregoing discussion and table does not take into account further dilution to investors in this offering that could occur upon the exercise of outstanding options and warrants, including the warrants offered in this offering, having a per share exercise price less than the public offering price per share in this offering.

The foregoing discussion and table are based on 11,120,394 shares of common stock outstanding as of June 30, 2016, and excludes as of that date:

739,021 shares of common stock issuable upon the exercise of outstanding stock options, at a weighted-average exercise price of $6.81 per share;

1,650,179 shares of common stock reserved for future issuance under the 2016 plan;

120,000 shares of common stock reserved for future issuance under the ESPP; and

2,443,479 shares of common stock issuable upon the exercise of outstanding warrants, at a weighted-average exercise price of $5.87 per share.

To the extent that options or warrants outstanding as of June 30, 2016 have been or may be exercised or other shares issued, investors purchasing securities in this offering may experience further dilution. In addition, we may seek to raise additional capital in the future through the sale of equity or convertible debt securities. To the extent that additional capital is raised through the sale of equity or convertible debt securities, the issuance of these securities could result in further dilution to our stockholders.

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BUSINESS

Company Overview

We are a biotechnology company focused on the discovery, development and commercialization of novel phage therapeutics. Phage therapeutics use bacteriophages, a family of viruses, to kill pathogenic bacteria. Phages have powerful and highly selective mechanisms of action that permit them to target and kill specific bacteria. We believe that phages represent a promising means to treat bacterial infections, especially those that have developed resistance to current therapies, including the so-called multi-drug-resistant or superbug strains of bacteria.

Our goal is to be the leading developer of phage therapeutics. We are combining our expertise in the manufacture of drug-quality bacteriophages and our proprietary approach and expertise in identifying, characterizing and developing naturally occurring bacteriophages with that of our collaboration partners in bacteriophage biology, synthetic biology and manufacturing, to develop second-generation bacteriophage products.

The extensive use of antibiotics since their discovery in the 1940s has resulted in drug resistance among many disease-causing bacteria. According to the U.S. Centers for Disease Control and Prevention, or CDC, resistance to antibiotics threatens to reverse many of the key medical advances of the last half-century. Examples of clinically important microbes that are rapidly developing resistance to available antimicrobials include bacteria that cause skin, bone, lung and bloodstream infections (e.g., *S. aureus* and methicillin-resistant *S. aureus*, or MRSA), pneumonia and lung infections in both community and hospital settings and cystic fibrosis patients (e.g., *A. baumanii, P. aeruginosa,* and *K. pneumoniae*), meningitis (e.g., *S. pneumonia*), urinary tract and gastrointestinal infections (e.g., *E. coli* and *C. difficile*). As phages kill bacteria in ways entirely unlike the mechanisms used by traditional antibiotics, we believe that multi-drug resistant bacteria will be susceptible to phage therapy. Furthermore, should resistant bacteria emerge or evolve, we believe it will remain possible to identify phages that can effectively kill these resistant bacteria.

Our lead product candidate is AB-SA01, for the treatment of *S. aureus* infections, including MRSA. We also have another product candidate in earlier stage development, AB-PA01 for the treatment of *P. aeruginosa* infections, and an additional discovery program, AB-CD01 for the treatment of *C. difficile* infections.

We are developing our phage product candidates using a proprietary discovery and development platform, which is designed for rapid identification, characterization and manufacturing of multiple phage therapeutics. Each product candidate combines several carefully chosen phages, which target a specific disease-causing bacteria such as *S. aureus, P. aeruginosa*, and *C. difficile*. We believe that the combination of our platform, our manufacturing capability, our understanding of the regulatory and development requirements of bacteriophage therapeutics, and the clinical and scientific expertise of our collaboration partners may enable the rapid advancement of phage therapeutics through the clinic and the regulatory approval process.

In June 2013, we entered into a cooperative research and development agreement, or Research and Development Agreement, with the United States Army Medical Research and Materiel Command focusing on developing bacteriophage therapeutics to treat *S. aureus*, *E. coli* and *P. aeruginosa* infections. Under this Research and Development Agreement, we completed enrollment of a Phase 1 safety study of AB-SA01 for the treatment of wounds infected with *S. aureus* in July 2016. In September 2016, we reported topline safety and tolerability results which demonstrated that AB-SA01 was well-tolerated with no drug-related serious adverse events. The complete study report is expected by the end of 2016.

In September 2013, we entered into a license agreement, or the Leicester License Agreement, with the University of Leicester to develop a phage therapy to kill certain types of *C. difficile*. Pursuant to the Leicester License Agreement, we may be obligated to pay the University of Leicester a single digit royalty and an aggregate of up to £575,000 in milestone payments.

In November 2015, our Australian subsidiary, AmpliPhi Australia Pty Ltd, entered into a clinical trial research agreement with the University of Adelaide and the Queen Elizabeth Hospital, both of Adelaide, SA, Australia, to conduct a Phase 1 clinical trial titled A Phase 1 Investigator Initiated Study to Evaluate the Safety, Tolerability and Preliminary Effectiveness of AB-SA01 in Patients with Chronic Rhinosinusitis Associated with *S. aureus* infection . The University of Adelaide will sponsor the clinical trial while we will supply

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AB-SA01 and control the trial protocol. This clinical trial will primarily measure the safety and tolerability of AB-SA01 and will secondarily examine the presence of *S. aureus* and symptoms assessed by the patient as well as by the physician using standard questionnaires used by physicians to assess treatment efficacy. We plan to enroll nine patients, divided into three cohorts. The first cohort received a twice daily dose of AB-SA01 for seven days. The second cohort received the same dose twice daily for 14 days. The third cohort will receive a higher dose of AB-SA01 twice daily for 14 days. Patients will be monitored an additional 30 days following their last day of treatment. Patient screening for this clinical trial commenced in late 2015 and the first patient was dosed in January 2016. The first and second cohorts have been completed and the first subject in the third cohort has completed dosing. Two subjects remain to be dosed in the final cohort and we expect to report data from this first clinical trial in the second half of 2016. We are planning a Phase 2 trial in chronic rhinosinusitis patients, to commence in the second half of 2017.

In January 2016, we entered into an Asset Purchase Agreement with Novolytics Ltd., which we refer to as the Novolytics Purchase Agreement, to purchase certain tangible and intangible assets. Pursuant to the Novolytics Purchase Agreement, we acquired all rights, title and interest to two families of patents. The first patent family is titled Anti-bacterial compositions and has been granted in Australia and China with prosecution pending in the United States and other countries. The second patent family is titled Novel bacteriophages and the prosecution is pending in the United States and other countries. We also received clinical isolates for *S. aureus* which will bolster our libraries of clinically relevant strains. Additionally, we received know-how relating to certain formulation processes. We also have access to all previous dialogue between Novolytics and various regulatory organizations including the United Kingdom Medicines and Healthcare Products Regulatory Agency, or MHRA.

The Need for New Anti-Infective Therapies

The rapid and continuous emergence of antibiotic-resistant bacteria has become a global crisis. Despite this crisis, the number of novel anti-infective therapies currently in development is at historically-low levels. The CDC estimates that more than two million people in the United States acquire an antibiotic-resistant infection each year and more than 23,000 of these prove fatal. It is estimated that 50% of hospital-acquired infections are resistant to first-line anti-infective therapies. The cumulative annual cost for treating resistant bacterial infections in the United States alone is estimated to be $20 billion, while the global antibiotics market opportunity was estimated to be $40.3 billion in 2015.

The CDC s latest report on the matter, *Antibiotic Resistance Threats in the United States, 2013*, notes that there are potentially catastrophic consequences of inaction and ranks *C. difficile* as belonging to the highest tier of threat, or Urgent Threats. Despite the potential market opportunity, only two New Drug Applications, or NDAs, for antibacterial drugs were approved by the FDA between 2010 and 2012 compared to 18 in the period between 1980 and 1984. One of the primary recommendations of the CDC is the development of new antimicrobials to diversify treatment options.

Product Candidates

AB-SA01: Infections Caused by S. aureus

By screening our proprietary library of phage samples against a panel of *S. aureus* bacteria, collected from around the world, we have selected a phage product candidate mix that has demonstrated, in *in vitro* studies, greater than 92% efficacy with high overlap against a global diversity panel that includes some of the most virulent isolates of *S. aureus*, including MRSA isolates. The three phage constituents of AB-SA01 were selected for their ability to target

the greatest number of bacterial isolates in the collection and maximal complementation. Complementation, defined as the percentage of *S. aureus* isolates susceptible to more than one phage, is emphasized in product selection to reduce risk of the emergence of bacterial resistance.

In connection with our Research and Development Agreement with the U.S. Army Medical Research and Materiel Command, we are developing AB-SA01 to treat acute and chronic infections caused by *S. aureus*, including infections caused by MRSA strains of the same bacterium. MRSA infections are one of the most common causes of hospital-acquired (nosocomial) infections. The CDC estimates that more than 850,000 patients were treated for *S. aureus* infections of the skin or soft tissue in 2013 and, due to failure of first line treatment, more than 50% of these patients required a second-line treatment and approximately 35% of them

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required a third-line treatment. Global Data estimates the market for MRSA infection treatments alone was more than $2.7 billion in 2007. This market is forecasted to grow to more than $3.5 billion by 2019.

Also in connection with our Research and Development Agreement with the U.S. Army, we submitted a pre-IND briefing package to the FDA to obtain their feedback on our Chemistry, Manufacturing and Controls, or CMC, program and plans for our first human clinical trial of AB-SA01 for the treatment of *S. aureus* infections of wound and skin. The FDA concurred with our plan for progressing this bacteriophage product candidate into clinical trials, specifically agreeing with the proposed manufacturing process and product specifications and not requiring non-clinical toxicology data to initiate our first Phase 1 clinical trial. We initiated the Phase 1 clinical trial in May 2016 and completed enrollment in July 2016. We expect the complete study report to be available before the end of 2016.

In December 2015, we opened a clinical trial at the University of Adelaide Queen Elizabeth Hospital to evaluate the safety and preliminary efficacy of AB-SA01 in chronic rhinosinusitis patients infected with *S. aureus*. The first patient in this clinical trial was dosed in January 2016, and we have continued to dose additional patients and completed the first two cohorts in July 2016. We expect to complete enrollment of the last two patients during the third quarter of 2016 and report data from this first clinical trial by the end of 2016. We expect to initiate a Phase 2 trial of AB-SA01 in the second half of 2017 and to complete that trial within approximately 12 months thereafter.

AB-PA01: Lung Infections in Cystic Fibrosis (CF) Patients Caused by P. aeruginosa

We are initially developing AB-PA01 for the treatment of *P. aeruginosa*, the most prevalent bacterial infection in cystic fibrosis, or CF, patients and the one that leads to the highest mortality and is the primary cause of lung infection in approximately 80% of CF patients ages 25 to 34, causing an estimated 450 deaths per year in the United States. To develop our product candidates, we have created a global diversity panel of relevant clinical isolates (bacteria isolated from patients) from clinics around the globe. These diversity panels have been screened against our phage libraries, which are isolated and characterized according to our set of proprietary discovery protocols. We have demonstrated, in *in vitro* and *in vivo* studies, that our proprietary phage mix is able to effectively kill targeted bacteria. Furthermore, our phage mixes are selected to exhibit a high degree of overlap, defined as the number of bacteria targeted by more than one phage in the product. We believe that high overlap is an important factor in preventing bacteria from developing resistance to our phage product candidates.

Similar to work described above for *S. aureus*, we have tested over 400 clinical *P. aeruginosa* clinical isolates. As an example, initial host range testing was performed with a reference panel of 67 CF isolates. AB-PA01 showed an activity of 95.5% (64/67) with 87.5% (56/64) of the positives isolates hit by more than one phage in the mix.

In collaboration with Institut Pasteur (Paris, France) and also with the Brompton Hospital, Imperial College (London, United Kingdom), we have demonstrated in the preclinical studies that phages can effectively treat infections in animal models of acute *P. aeruginosa* lung infections. In one such study, we inoculated eight mice and treated them with either PBS (control group), our phage mix, or with an antibiotic.

Bacterial counts and the number of bacteriophage infection units detected by assay, or phage titers, were measured in these animals after 24 hours, and the results demonstrated that our phage mix effectively lowered the bacterial counts, or CFU, in the mouse lung to levels comparable to antibiotic treatment (PBS vs. antibiotic, p=0.0003; PBS vs. bacteriophage, p=0.0003). A p-value is a statistical measure of the probability that the difference in two values could have occurred by chance. The smaller the p-value, the lower the likelihood is that the difference occurred by chance,

or the greater our confidence is that the results are statistically significant. Furthermore, it was evident that phage replicated to high levels in the infected lung.

An additional preclinical study conducted at the Institut Pasteur in mice (12 mice in each of the treatment and control groups) demonstrated the ability of our phage mix to reach the lung within two hours of being delivered by oral administration. The phage levels increased between two and six hours post-treatment, and the results were statistically significant (p-value <0.001). These results demonstrate that when orally administered in mice, phages not only reached the lungs, but were also able to infect and multiply in target bacteria.

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In a separate *in vivo* study of acute *P. aeruginosa* infection of the mouse lung conducted at the Brompton Clinic, results demonstrated that our phage mix reduced CFU levels upon simultaneous intranasal administration (six mice in each of the treatment and control groups) and also when administered 24 hours post-bacterial infection (seven mice in the treatment group and eight mice in the control group) using a standard strain of *P. aeruginosa*, Pa01.

We were granted an advisory meeting with the MHRA in the first quarter of 2014 to discuss our plans and intend to move the AB-PA01 compound into additional preclinical testing in preparation for a Phase 1/2 clinical trial in CF patients. We also sought advice on the acceptability of CMC plans. The MHRA concurred with our approach and plans as presented, including a first-in-man dose ranging clinical trial in CF patients. We have completed product candidate selection and are currently conducting manufacturing process development and scale-up with the goal of initiating inhalation toxicology studies in the first quarter of 2017 and completing such studies within approximately six months thereafter. We plan to initiate a Phase 1 single-ascending dose study in CF patients during the second half of 2017 and currently expect to complete that study within approximately 12 months thereafter.

We are also currently evaluating our *P. aeruginosa* phages in preclinical animal models of chronic rhinosinusitis in collaboration with the University of Adelaide. Pending the outcome of this study, we also expect to move AB-PA01 into a chronic rhinosinusitis study in Australia in the second half of 2017. We expect the study to be similar in design to our current Phase 1 study of AB-SA01 in chronic rhinosinusitis, except the AB-PA01 study will target *P. aeruginosa* in chronic rhinosinusitis patients.

If we achieve successful proof of concept studies, we may consider developing this compound for the treatment of other acute and chronic lung infections, such as ventilator associated bacterial pneumonia, or VABP, and chronic obstructive pulmonary disease, or COPD. *P. aeruginosa* is the predominant pathogen in these indications.

AB-CD01: Gastrointestinal (GI) Infection Caused by C. difficile, or CDI

From 2000 through 2007, deaths in the United States from CDI increased over 400%. Over 90% of such deaths occur in hospitalized or confined patients over the age of 65. Global Data estimates that the major European Union and United States markets for CDI therapies grew to more than $314 million in 2011 and they are expected to grow to more than $500 million by 2019.

According to the CDC almost 250,000 people each year require hospitalization for CDI and at least 14,000 people die each year in the United States from CDI. The CDC also estimates that 20 40% of CDI recurs with standard antibiotic treatment. We are actively working with researchers at the University of Leicester to develop a phage therapeutic that targets and kills *C. difficile*. We believe that orally delivered phages are well suited to treat CDI. Within this collaboration, researchers at the University of Leicester have discovered phages that have been shown to be effective *in vitro* and *in vivo* against clinically-relevant strains of *C. difficile* isolated from around the world. These same researchers have also shown phage cocktails to be effective in preventing *C. difficile* biofilm formation *in vitro*. While current pathogenic strains of *C. difficile* are not yet antibiotic-resistant, the CDC has categorized *C. difficile* as an urgent threat and has stated that CDI requires urgent and aggressive action. We believe that there is a significant market opportunity for our product in treating this infection.

Preclinical studies are underway to select and optimize our phage cocktail and manufacturing strains as well as evaluate efficacy in animal models.

Prior Clinical Development

In 2010, our wholly owned subsidiary, Biocontrol Ltd, reported a double-blind placebo-controlled, randomized Phase 1/2 clinical trial targeting chronic ear infections (otitis) caused by *P. aeruginosa*. To our knowledge, this was the first randomized placebo-controlled efficacy trial of bacteriophage therapy. Results were published demonstrating decreasing levels of *P. aeruginosa* in the ear and improvement of clinical condition with a single input dose of 2.4 nanograms of bacteriophage preparation. While this was a small trial (n=24), changes from baseline at the end of the trial in the test group (n=12) were statistically significant for both clinical condition (p=0.001) and bacterial load (p=0.016). No significant changes were seen in the control group (n=12) compared to baseline at the end of the trial. Difference between test and control groups was

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statistically significant by analysis by covariance on day 21 for bacterial count (p=0.0365). These results will need to be validated in larger well-controlled trials.

Anti-Infective Therapeutics Market

The market opportunity for antibiotics is large, with the market estimated to reach $40.3 billion in annual sales globally in 2015. Almost one in every five deaths worldwide occurs as a result of infection and, according to the World Health Organization, or WHO, many bacterial infections will become difficult or impossible to cure as the efficacy of current antibiotic drugs wanes. Despite the advances in antimicrobial and vaccine development, infectious diseases still remain as the third-leading cause of death in the United States and the second-leading cause of death worldwide.

The number of new antibiotics approved by the FDA and other global regulatory authorities has declined consistently over the last two decades. According to the PEW Charitable Trusts report, as of March 2016 there are an estimated 37 new antibiotics in clinical development for the U.S. market. Historically, the success rate from Phase 1 to marketing approval is only 1 in 5 for infectious disease products. We therefore believe there is a need for new approaches to treat serious bacterial infections. Hospital-acquired (nosocomial) infections are a major healthcare problem throughout the world, affecting developed countries as well as resource-poor countries. The WHO reports that hospital-acquired infections are among the major causes of death and increased morbidity among hospitalized patients and estimates that more than 1.4 million people per year worldwide suffer from infectious complications from a hospital stay.

A recent CDC report also cites that in the United States, between 5 and 10% of all patients admitted to a hospital will be affected by a hospital-acquired infection during their stay, typically requiring extended stays and additional care. There is also a significant risk of death from such infections. In the United States, the CDC estimates that approximately 99,000 people die from hospital-acquired infections each year. The Cystic Fibrosis Foundation estimates that *P. aeruginosa* accounts for 10% of all hospital-acquired infections.

Compounding the above situations is the alarming and continuing rise in the prevalence of antibiotic-resistant bacterial infections. This, coupled with the lack of new antibiotics in current discovery and development pipelines, has generated a significant clinical management problem worldwide, leading to increases in morbidity and mortality due to these antibiotic-resistant bacteria as well as increases in healthcare costs.

The first of these antibiotic-resistant infections to reach epidemic proportions was caused by the Gram-positive bacterium *S. aureus*. *S. aureus* resistance to a broad range of antibiotics has necessitated the use of expensive and potentially toxic drugs of last resort , most notably vancomycin. Antibiotic-resistant forms of *S. aureus*, usually termed MRSA, VISA (vancomycin-intermediate *S. aureus*), or VRSA (vancomycin-resistant *S. aureus*), can be extremely challenging to treat. Although several antibiotics targeting *S. aureus* have been developed, rapidly developing bacterial resistance has been noted for all of these including linezolid, daptomycin and tigecycline. On the basis of historical evidence, resistance to these existing products is likely to increase over time, and this picture is further complicated by the reduced efficacy of conventional antibiotics against *Staphylococcus* biofilms.

Typically, *S. aureus* infection causes a variety of suppurative (pus-forming) infections and toxinoses (lesions) in humans. It causes superficial skin lesions such as boils, styes and furuncles; more serious infections such as pneumonia, mastitis, phlebitis, meningitis and urinary tract infections; and deep-seated infections, such as osteomyelitis and endocarditis. *S. aureus* is the leading cause of wound infections, in particular, hospital-acquired (nosocomial) infection of surgical wounds and infections associated with indwelling medical devices. *S. aureus* is the leading pathogen in healthcare-associated infections in the United States as a whole, accounting for 30.4% of surgical

site infections, or SSI, and 15.6% of such infections overall.

Infections also occur in connection with CF, which is a genetic disease affecting primarily Caucasians of northern European descent. According to the Cystic Fibrosis Foundation, there are approximately 50,000 cases of CF in North America and Europe. *P. aeruginosa* opportunistically infects the mucous membranes, primarily the lungs, of CF patients and quickly grows out of control, resulting in pneumonia. *P. aeruginosa* infections are notoriously resistant to known antibiotics, and treatment may be further complicated by the formation of biofilms. Biofilms are organized structures of microorganisms growing on solid surfaces (such as lung tissue) and often limit access of antibiotics to the covered tissues. Since phages attack bacteria in a manner

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independent of chemical antibiotic resistance mechanisms and can infect bacteria growing in biofilms, we believe that *P. aeruginosa* infection among CF patients represents a compelling indication to pursue. The availability of *Pseudomonas*-specific phages along with validated animal models of *P. aeruginosa* lung infections has contributed to the development of our bacteriophage program in CF.

Anti-Infective Treatments with Bacteriophages

Background

The dramatic rise in antibiotic resistance, the appearance of an increasing number of new superbugs and the lack of new antibiotics in the pipeline has prompted calls to action from many of the world s major health bodies such as the CDC and the WHO, who warn of an antibiotic cliff and a post-antibiotic era. In 2009, the European Antimicrobial Resistance Surveillance System, or EARSS, concluded that the loss of effective antimicrobial therapy increasingly threatens the delivery of crucial health services in hospitals and in the community. This conclusion was reinforced by The Antimicrobial Availability Task Force, or AATF, of the Infectious Diseases Society of America, or IDSA, and the European Centre for Disease Prevention and Control, or ECDC, in conjunction with the European Medicine Agency, or EMA. Clearly, there is a pressing need to find alternative antibacterial therapies.

Bacteriophage therapy has the potential to be an alternative method of treating bacterial infection. Phages are ubiquitous environmental viruses that grow only within bacteria. The name bacteriophage translates as eaters of bacteria and reflects the fact that as they grow, phages kill the bacterial host by multiplying inside and then bursting through the cell membrane in order to release the next generation of phages. Phages can differ substantially in morphology and each phage is active against a specific range of a given bacterial species. Phages were first discovered in 1915 at the Institut Pasteur and were shown to kill bacteria taken from patients suffering from dysentery. Furthermore, it was noted that phage numbers rose as patients recovered from infection, suggesting a direct association.

Life Cycle of a Bacteriophage

Until the discovery of effective antibiotics, phages were used as an effective means of combating bacterial infection. When broad-spectrum antibiotics came into common use in the early 1940s, phages were considered unnecessary, with antibiotics being seen for many years as the answer to bacterial disease. This attitude persisted until the development of the wide-ranging, and in some cases total, resistance to antibiotics seen within the last 10 years.

Phages have the potential to provide both an alternative to, and a synergistic approach with, antibiotic therapy. Since they use different mechanisms of action, phages are unaffected by resistance to conventional antibiotics. Phages containing certain enzymes also have the ability to disrupt bacterial biofilms, thus potentiating the effect of chemical antibiotics when used in combination with them.

Our Strategy

Our strategy is to use techniques of modern biotechnology and current state-of-the-art practices for drug development in concert with existing regulatory guidance to develop a pipeline of bacteriophage products that will destroy bacteria such as MRSA, which are resistant to antibiotics. Our business strategy will apply state-of-the-art techniques in molecular biology and in clinical trial design to build upon the long successful history of using phages therapeutically to treat and cure infections.

We supplement our internal resources with world-class scientific and medical collaborations throughout the world. For example, through a collaboration with The University of Adelaide in Australia, we conducted

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preclinical studies showing the ability of *S. aureus* phage preparations to kill clinical isolates from 61 patients demonstrating efficacy of greater than 90%. Furthermore, a *S. aureus* mixture was shown to be safe and efficacious in a preclinical sheep model of chronic rhinosinusitis. This program continues to progress and a clinical trial of patients at the University of Adelaide s Queen Elizabeth Hospital with treatment refractory chronic rhinosinusitis patients infected with *S. aureus* commenced in late 2015 and the first patient was dosed in January 2016. More recently, we tested 90 *S. aureus* clinical isolates from chronic rhinosinusitis patients located in Belgium and showed similar efficacy to isolates obtained from Australian patients, highlighting the diverse geographic activity of our phage cocktail.

In collaboration with the U.S. Army, we completed enrollment of a Phase 1 safety study in July 2016 that we believe will support the further development of a treatment for *S. aureus* infections for wound and skin infections.

We collaborate with the Royal Brompton Hospital in London where we have demonstrated that a candidate phage product can survive nebulization, was effective in killing over 83% of recent clinical *P. aeruginosa* isolates, and in preclinical mouse models demonstrated that a phage mixture dose-dependently clears *P. aeruginosa* infection from the lung and reduced inflammation.

We have completed selection of the phages for drug product selection for AB-PA01, and in conjunction with the Brompton Hospital, we would expect to conduct a Phase 1/2 study using AB-PA01 to treat CF patients with *P. aeruginosa* lung infections.

Acquisitions

In January 2011, we completed the acquisition of Biocontrol Ltd, with the goal of developing their phage therapy programs using funding from the sale of our legacy gene therapy assets. Under the terms of our acquisition of Biocontrol Ltd, we issued 456,344 shares of our common stock to the stockholders of Biocontrol Ltd with a total fair value of approximately $8.6 million as of January 6, 2011, resulting in Biocontrol s former stockholders owning approximately 50% of our outstanding equity securities at the time. As a condition to closing the acquisition, Biocontrol Ltd raised approximately £200,000 (US$310,000) in working capital for use by us.

In November 2012, we completed the acquisition of Special Phage Holdings Pty Ltd, a company based in Australia, which we refer to as SPH, with the goal of combining SPH s research on addressing the rapidly escalating problem of antibiotic resistance through the development of a series of bacteriophage-based treatments into our own development programs. We acquired SPH in exchange for shares of our common stock pursuant to the terms of a Stockholder Sale Agreement and a Managers Warranty Deed.

In connection with our acquisition of SPH, we entered into certain other arrangements, including the repayment under a Loan Repayment Deed (as amended) of a $770,000 loan originally made by Cellabs Pty Ltd, or Cellabs, an Australian company, to SPH, a consulting agreement with Dr. Anthony Smithyman and the payment of $3,017 per month to Cellabs for our laboratory space in Australia through December 31, 2015. Under the terms of the Loan Repayment Deed, the loan from Cellabs to SPH was to be repaid and fully satisfied partly in cash and partly by issuing 40,000 shares of our common stock to Cellabs. As of December 31, 2015, $350,000 has been paid by us to Cellabs and all 40,000 shares have been issued. We paid the remaining balance of $200,000 under the terms of the Loan Repayment Deed in December 2013. The SPH acquisition also included several phage therapy projects which had reached the pre-clinical or animal study stage, including the Brompton Hospital CF study, the Adelaide University MRSA chronic rhinosinusitis study and the University of Leicester *C. difficile* project. We believe that acquisition of SPH brought substantial phage scientific expertise and know-how to us.

In January 2016, we entered the Novolytics Purchase Agreement, pursuant to which we acquired all rights, title and interest to two families of patents. The first patent family is titled Anti-bacterial compositions and has been granted in Australia and China, with prosecution pending in the United States and other countries. The second patent family is titled Novel bacteriophages and the prosecution is pending in the United States and other countries. We also received clinical isolates for *S. aureus* which will bolster our libraries of

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clinically relevant strains. Additionally, we received know-how relating to certain formulation processes. We also have access to all previous dialogue between Novolytics and various regulatory organizations including the MHRA.

In connection with the Novolytics Purchase Agreement, we paid cash to Novolytics to cover expenses incurred in connection with winding up its phage-related business, as well as warrants to the stockholders of Novolytics to purchase up to an aggregate of 170,000 shares of our common stock, each with an exercise price of $12.00 per share. Pursuant to the terms of the Novolytics Purchase Agreement, we granted certain registration rights covering the resale of the shares of common stock underlying such warrants.

Strategic Alliances and Research and License Agreements

As discussed below, we have established collaborations with the U.S. Army and the University of Leicester, which provide us with access to the considerable scientific, developmental, and regulatory capabilities of our collaborators. We believe that our collaborations contribute to our ability to rapidly advance our product candidates, build our product platform and concurrently progress a wide range of discovery and development programs.

Global R&D Agreement with U.S. Army

In June 2013, we entered into a Research and Development Agreement with the U.S. Army Medical Research and Materiel Command. The Research and Development Agreement focuses on developing bacteriophage therapeutics to treat at least three types of infections: *S. aureus*, *E. coli* and *P. aeruginosa*. The initial indication will be wounds and skin infections from *S. aureus*, which is the leading pathogen in healthcare-associated infections in the United States as a whole, accounting for 30.4% of surgical site infections.

We retain global regulatory ownership and commercial rights to all products developed by us under the Research and Development Agreement. The U.S. Army Medical Research and Materiel Command will have the right to retain a non-exclusive license to use any products developed by or on behalf of the U.S. Government for non-commercial uses. We also have the rights to exclusively license any intellectual property developed by the U.S. Army Medical Research and Materiel Command under the collaboration on terms to be agreed upon.

The Research and Development Agreement expires in June 2018 and can be terminated by either the U.S. Army Medical Research and Materiel Command or us upon 60 days written notice to the other party at any time.

University of Leicester Development Agreements

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