As filed with the Securities and Exchange Commission on April 9, 2019.

Registration Statement No. 333-

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

FORM S-1

REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

PHASEBIO PHARMACEUTICALS, INC.

(Exact name of registrant as specified in its charter)

Delaware	**2834**	**03-0375697**
(State or other jurisdiction of incorporation or organization)	(Primary Standard Industrial Classification Code Number)	(I.R.S. Employer Identification Number)

1 Great Valley Parkway, Suite 30
Malvern, Pennsylvania 19355
(610) 981-6500
(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

Jonathan P. Mow
Chief Executive Officer
PhaseBio Pharmaceuticals, Inc.
11260 El Camino Real,
Suite 100
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(610) 981-6500
(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, check the following box. ☐

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. ☐

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. ☐

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 number of the earlier effective registration statement for the same offering. ☐

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

Large Accelerated Filer ☐ Accelerated Filer ☐ Non-accelerated Filer ☒ Smaller Reporting Company ☒
Emerging Growth Company ☒

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 7(a)(2)(B) of the Securities Act. ☒

CALCULATION OF REGISTRATION FEE

Title of Each Class of Securities to be Registered	**Amount to be Registered(1)**	**Proposed Maximum Aggregate Offering Price Per Share(2)**	**Proposed Maximum Aggregate Offering Price(2)**	**Amount of Registration Fee**
Common stock, $0.001 par value per share	3,450,000	$11.73	$40,468,500	$4,904.78

(1) Includes 450,000 shares of common stock that the underwriters have the option to purchase.
(2) Estimated solely for purposes of calculating the amount of the registration fee pursuant to Rule 457(c) under the Securities Act on the basis of the average of the high and low prices of the Registrant's common shares as reported on the Nasdaq Global Market on April 8, 2019.

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.

Table of Contents

The information in this 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 offers to buy these securities in any state where the offer or sale is not permitted.

SUBJECT TO COMPLETION, DATED APRIL 9, 2019

PRELIMINARY PROSPECTUS

3,000,000 Shares

Common Stock

We are offering 3,000,000 shares of our common stock. Our common stock is listed on the Nasdaq Global Market under the symbol "PHAS." The last reported sale price of our common stock on the Nasdaq Global Market on April 8, 2019 was $12.57 per share. The final public offering price will be determined through negotiation between us and the lead underwriters in the offering and the recent market price used throughout the prospectus may not be indicative of the actual offering price.

We have granted the underwriters an option to purchase up to an additional 450,000 shares of common stock.

Investing in our common stock involves a high degree of risk. See "Risk Factors" beginning on page 10 as well as in the documents incorporated by reference.

We are an "emerging growth company" as defined under the U.S. federal securities laws and, as such, may elect to comply with certain reduced public company reporting requirements for this and future filings.

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

	Per Share	Total
Public offering price	$	$
Underwriting discounts and commissions(1)	$	$
Proceeds to PhaseBio Pharmaceuticals, Inc. (before expenses)	$	$

(1) We refer you to "Underwriting" beginning on page 33 for additional information regarding underwriting compensation.

The underwriters expect to deliver the shares to purchasers against payment in New York, New York on or about , 2019 through the book-entry facilities of The Depositary Trust Company.

Citigroup **Cowen** **Stifel**

Needham & Company

, 2019

You should rely only on the information contained in this prospectus and any free writing prospectus prepared by or on behalf of us or to which we have referred you. We have not authorized anyone to provide you with different information, and we take no responsibility for any other information others may give you. We are not, and the underwriters are not, making an offer to sell these securities in any jurisdiction where the offer or sale is not permitted. You should not assume that the information contained in this prospectus is accurate as of any date other than the date on the front of this prospectus.

TABLE OF CONTENTS

For investors outside the United States: We and the underwriters have not done anything that would permit this offering or the possession or distribution of this prospectus in any jurisdiction where action for those purposes 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 shares of common stock and the distribution of this prospectus outside of the United States.

This prospectus contains trade names, trademarks and service marks of others, which are the property of their respective owners. Solely for convenience, trademarks and trade names referred to in this prospectus may appear without the ® or TM symbols.

PROSPECTUS SUMMARY

This summary highlights information contained elsewhere in this prospectus and does not contain all of the information that you should consider in making your investment decision. Before investing in our common stock, you should carefully read this entire prospectus, including the information incorporated by reference herein, especially the matters discussed in the information set forth under the section titled "Risk Factors" included elsewhere in this prospectus and in the section titled "Risk Factors" and our audited financial statements and notes thereto included in our Annual Report on Form 10-K for the year ended December 31, 2018, which is incorporated by reference herein. Unless the context otherwise requires, we use the terms "PhaseBio," "company," "our," "us" and "we" in this prospectus to refer to PhaseBio Pharmaceuticals, Inc.

Overview

We are a clinical-stage biopharmaceutical company focused on the development and commercialization of novel therapies to treat orphan diseases, with an initial focus on cardiopulmonary indications. Our lead product candidate, PB2452, is a novel reversal agent for the antiplatelet drug ticagrelor, which we are developing for the treatment of patients on ticagrelor who are experiencing a major bleeding event or those who require urgent surgery. We recently completed a Phase 1 clinical trial of PB2452 in healthy subjects and intend to initiate a Phase 2a clinical trial in healthy older subjects in the first half of 2019. The United States Food and Drug Administration, or FDA, granted breakthrough therapy designation for PB2452 in April 2019. Our second product candidate, PB1046, is a once-weekly fusion protein currently in a Phase 2b clinical trial for the treatment of pulmonary arterial hypertension, or PAH. PB1046 utilizes our proprietary half-life extending elastin-like polypeptide, or ELP, technology, which also serves as the engine for our preclinical pipeline. We retain worldwide rights to all of our product candidates.

PB2452 is a novel recombinant human monoclonal antibody antigen-binding fragment, or Fab fragment, designed to reverse the antiplatelet activity of ticagrelor. Ticagrelor is an antiplatelet therapy widely prescribed to reduce the rates of death, heart attack and stroke in patients with acute coronary syndrome, or ACS, or who have previously experienced a heart attack. The American College of Cardiology, American Heart Association and European Society of Cardiology guidelines recognize ticagrelor as the preferred antiplatelet therapy for ACS. In 2018, ticagrelor, currently marketed by AstraZeneca plc, or AstraZeneca, under the brand names Brilinta and Brilique, had worldwide sales of $1.3 billion, an increase of 22% over 2017 sales. In the fourth quarter of 2018, ticagrelor had worldwide sales of $376 million, an increase of 26% over sales in the fourth quarter of 2017. Ticagrelor binds and inhibits the platelet P2Y12 receptor to prevent platelets from forming obstructive blood clots, which could block blood flow to critical organs in these patients, causing heart attacks or strokes. Due to ticagrelor's antiplatelet activity, patients on ticagrelor have an elevated risk of spontaneous bleeding. In addition, patients on ticagrelor who need urgent surgery cannot wait the recommended five days for ticagrelor's effect to dissipate and are at increased risk of major bleeding during and after surgery. There are currently no known reversal agents approved or in clinical development for ticagrelor or any of the other antiplatelet drugs. In our Phase 1 clinical trial, PB2452 achieved immediate and sustained reversal of ticagrelor's antiplatelet activity, with potential customizable duration of reversal based on the dosing regimen, which we believe has the potential to bring life-saving therapeutic benefit to these patients by increasing the safety of ticagrelor. We believe the availability of a reversal agent could expand ticagrelor's use by mitigating concerns regarding bleeding risk and uniquely position ticagrelor as the only oral antiplatelet drug with a reversal agent.

We recently completed a Phase 1 dose escalation clinical trial of PB2452 in healthy subjects ages 18 to 50 who had been pre-dosed with ticagrelor. In this trial, we observed immediate and complete reversal of ticagrelor's antiplatelet activity within five minutes following initiation of infusion, and sustained reversal for over 20 hours in dosing cohorts in which we administered PB2452 over an extended infusion period.

Based on our observations in our Phase 1 trial, duration of reversal may be controlled by duration of the infusion, which may allow for customization based on patient needs. There were no PB2452-related adverse

events, or AEs, or serious adverse events, or SAEs, in any of the dose cohorts. We believe that the results of the Phase 1 trial support the continued development of PB2452 to treat ticagrelor patients who are experiencing a major bleeding event or those who require urgent surgery.

We intend to initiate a Phase 2a clinical trial of PB2452 in generally healthy older and elderly subjects in the first half of 2019 in order to evaluate safety and efficacy of the potentially therapeutic doses and dosing regimens from the Phase 1 trial in this population. Older adults exhibit more variability in drug response to ticagrelor and higher levels of baseline platelet reactivity compared to younger subjects, and they resemble the patient population most likely to be treated with ticagrelor and potentially benefit from PB2452, if approved. We intend to design the Phase 2a trial to identify the most appropriate dose and dosing regimen of PB2452 for our planned Phase 2b and Phase 3 clinical trials.

The FDA granted breakthrough therapy designation for PB2452 in April 2019. In mid-2019, we intend to request a meeting with the FDA to review the clinical profile of and confirm the regulatory pathway for PB2452. Subject to discussions with the FDA, we intend to initiate a multi-center Phase 2b clinical trial of PB2452 in healthy older adults in the second half of 2019 and an international, multi-center Phase 3 clinical trial in patients on ticagrelor who are experiencing a major bleeding event or require urgent surgery in 2020. The FDA's accelerated approval regulations allow drugs that are being developed to treat an unmet medical need for serious conditions to be approved substantially based on evidence of an effect on a surrogate biomarker endpoint that is considered reasonably likely to predict clinical benefit, rather than a clinical endpoint such as survival or irreversible morbidity. If considered appropriate by the FDA, we intend to pursue accelerated approval, which would allow us to submit a biologics license application, or BLA, prior to completion of the Phase 3 clinical trial based on biomarker data from an initial subset of the Phase 3 patients. If we were to receive accelerated approval, the completion of the Phase 3 trial would be a post-marketing commitment.

PB1046 is being developed as a once-weekly, novel treatment for PAH, a progressive, life-threatening, orphan disease caused by vasoconstriction and structural deterioration of the pulmonary arteries, which can lead to heart failure and, eventually, death. PB1046 is a subcutaneously-injected, sustained release analogue of the native human peptide vasoactive intestinal peptide, or VIP. VIP is a neurohormone that relaxes the muscles surrounding blood vessels, causing them to dilate, which results in improved blood flow. In contrast to the currently approved therapies for PAH, which only target vasodilation, we believe that VIP also suppresses the adverse remodeling of blood vessels and increases cardiac contractility and relaxation. We believe that PB1046 has the potential to be disease-modifying and complementary to current standard of care therapies for PAH.

We have completed two clinical trials of subcutaneously-injected PB1046 in subjects with cardiovascular diseases. In these trials, PB1046 was observed to be well tolerated, with no drug-related SAEs. In both trials, we observed that patients who received PB1046 experienced statistically significant reductions in blood pressure that were sustained for at least one week, with no reported episodes of symptomatic hypotension. We have also completed enrollment of an exploratory Phase 1b/2a clinical trial to evaluate the effects of PB1046 on pulmonary arterial pressure in PAH patients with a CardioMEMS device, an implanted hemodynamic monitor that continuously reports pulmonary arterial pressure and cardiac function. In preliminary results from this trial, we have observed reductions in pulmonary arterial pressure and increases in cardiac output, which we believe are consistent with potential beneficial effects of PB1046. As of the date of this prospectus, we have observed one drug-related SAE of vasodilation in one patient in the extension portion of the open-label pilot study of this trial. We have begun dosing patients in a randomized, double-blinded, parallel group Phase 2b clinical trial in approximately 60 PAH patients to assess the safety, tolerability and efficacy of PB1046. This clinical trial will evaluate the effects of PB1046 on pulmonary arterial pressure and exercise tolerance, including the distance the patient can walk in six minutes, which is an important clinical endpoint that the FDA has previously used as the basis for approval of other PAH drugs. We expect to report results from this trial in 2020.

PB1046 and our preclinical product candidates are based on our proprietary ELP technology. Our ELP technology extends the circulating half-life of proteins and peptides and also provides a sustained-release

mechanism, resulting in exposure of active molecules for periods of a week or longer from a single subcutaneous injection. We believe that our ELP technology enhances solubility, stability and bioavailability, provides extended drug exposure and creates product candidates that are straightforward to manufacture and administer. Our strategy is to apply our ELP technology to proteins and peptides with well-characterized therapeutic activities but suboptimal half-lives to improve their pharmacokinetics, enable their use as pharmaceutical products and allow for more convenient dosing regimens. To date, we have not observed any drug-related SAEs in any of the over 500 subjects in clinical trials of our ELP product candidates.

We have an experienced management team that includes individuals with experience in translational research, orphan and cardiopulmonary drug discovery, development and commercialization. We are led by our Chief Executive Officer, Jonathan P. Mow, who brings more than 25 years of experience in biotechnology management, including previous executive experience at Amylin Pharmaceuticals, Corus Pharma, PathoGenesis and Bristol-Myers Squibb.

Pipeline

Our clinical-stage and pre-clinical pipeline is set forth below:

Risks Associated with Our Business

Our business is subject to a number of risks of which you should be aware before making a decision to invest in our common stock. These risks are more fully described in the sections titled “Risk Factors” included elsewhere in this prospectus and in our Annual Report on Form 10-K for the year ended December 31, 2018, which is incorporated by reference herein, including the following:

- We have incurred significant losses since our inception. We expect to incur losses over the next several years and may never achieve or maintain profitability.
- Even if this offering is successful, we will need substantial additional funding to meet our financial obligations and to pursue our business objectives. If we are unable to raise capital when needed, we could be forced to curtail our planned operations and the pursuit of our growth strategy.
- We have only two clinical-stage product candidates, PB2452, a ticagrelor reversal agent, and PB1046 for the treatment of PAH. If we are unable to successfully develop, receive regulatory approval for and commercialize our product candidates for these or any other indications, or successfully develop any other product candidates, or experience significant delays in doing so, our business will be harmed.
- If considered appropriate by the FDA, we intend to seek regulatory approval of PB2452 in the United States through an accelerated approval process with the FDA. If we are not successful with this process, the development or commercialization of PB2452 could be delayed, abandoned or significantly more costly.

- ELP is a novel technology, which makes it difficult to predict the time, risks and cost of development and of subsequently obtaining regulatory approval of our ELP product candidates.
- Market acceptance of PB2452, if approved, will depend heavily on the continued market acceptance and use of ticagrelor.
- We contract with third parties for the manufacture of PB2452 and PB1046 for preclinical and clinical testing and expect to continue to do so for commercialization. This reliance on third parties increases the risk that we will not have sufficient quantities of our product candidates or such quantities at an acceptable cost, which could delay, prevent or impair our development or commercialization efforts.
- If we are unable to obtain or protect intellectual property rights related to any of our product candidates, we may not be able to compete effectively in our market.
- If we fail to comply with our obligations in our current and future intellectual property licenses and funding arrangements with third parties, we could lose rights that are important to our business.

Recent Developments

Breakthrough Therapy Designation

In April 2019, the FDA granted breakthrough therapy designation for PB2452 for the reversal of ticagrelor's antiplatelet activity. The breakthrough therapy designation was supported by our Phase 1 trial results, in which we observed immediate and complete reversal of ticagrelor's antiplatelet activity within five minutes following initiation of infusion, and sustained reversal for over 20 hours in dosing cohorts in which we administered PB2452 over an extended infusion period.

ImmunoForge License Agreement

In April 2019, we entered into a license agreement with ImmunoForge, Co. Ltd. for the exclusive, worldwide license of PB1023 for the treatment of certain diseases, including conditions related to sarcopenia. PB1023 is a long-acting, recombinant glucagon-like peptide-1 analogue. We previously ceased development of PB1023 for the treatment of hyperglycemia associated with type 2 diabetes. We retained the right to develop PB1023 for the treatment of diabetes, obesity and non-alcoholic steatohepatitis. Pursuant to the agreement, we will receive a nominal upfront payment and are eligible to receive development milestone payments and mid-single digit royalty payments on net sales of licensed products, a percentage of which Duke University is entitled to receive pursuant to the terms of our existing license agreement.

Corporate Information

We were incorporated under the laws of the State of Delaware in January 2002. Our principal executive offices are located at 1 Great Valley Parkway, Suite 30, Malvern, Pennsylvania 19355. Our telephone number is (610) 981-6500. Our website address is *www.phasebio.com*. We have included our website address in this prospectus solely as an inactive textual reference.

Implications of Being an Emerging Growth Company and Smaller Reporting Company

We qualify as an "emerging growth company" as defined in the Jumpstart Our Business Startups Act of 2012, or the JOBS Act. An emerging growth company may take advantage of specified reduced reporting and other burdens that are otherwise applicable generally to public companies. These provisions include:

- an exemption from the auditor attestation requirement in the assessment of our internal control over financial reporting pursuant to the Sarbanes-Oxley Act of 2002;

- an exemption from implementation of new or revised financial accounting standards until they would apply to private companies and from compliance with any new requirements adopted by the Public Company Accounting Oversight Board requiring mandatory audit firm rotation;
- reduced disclosure obligations regarding executive compensation arrangements; and
- no requirement to seek nonbinding advisory votes on executive compensation or golden parachute arrangements.

We may take advantage of some or all these provisions until we are no longer an emerging growth company. We will remain an emerging growth company until the earlier to occur of (1) the last day of the fiscal year (a) following the fifth anniversary of the closing of our initial public offering in October 2018, (b) in which we have total annual gross revenues of at least $1.07 billion or (c) in which we are deemed to be a "large accelerated filer," under the rules of the U.S. Securities and Exchange Commission which means the market value of our equity securities that is held by non-affiliates exceeds $700 million as of the prior June 30th, and (2) the date on which we have issued more than $1.0 billion in non-convertible debt during the prior three-year period.

Finally, we are a "smaller reporting company" (and may continue to qualify as such even after we no longer qualify as an emerging growth company) and accordingly may provide less public disclosure than larger public companies, including the inclusion of only two years of audited financial statements and only two years of related selected financial data and management's discussion and analysis of financial condition and results of operations disclosure. 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 OFFERING

Common stock to be offered	3,000,000 shares
Common stock to be outstanding after this offering	27,498,275 shares
Option to purchase additional shares	450,000 shares
Use of proceeds	We estimate that the net proceeds from this offering will be approximately $35.1 million (or approximately $40.4 million if the underwriters exercise in full their option to purchase up to 450,000 additional shares of common stock), based on an assumed offering price of $12.57 per share, which was the last reported sales price of our common stock on the Nasdaq Global Market on April 8, 2019, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. We intend to use the net proceeds from this offering, together with our existing cash and cash equivalents, to advance PB2452, advance PB1046, fund the development of our ELP technology and preclinical programs and for general working capital and other general corporate purposes. These expectations are subject to change. See “Use of Proceeds” for additional information.
Risk factors	See “Risk Factors” and the other information included in this prospectus and incorporated by reference herein for a discussion of factors you should carefully consider before deciding to invest in our common stock.
Nasdaq Global Market symbol	“PHAS”

The number of shares of our common stock that will be outstanding after this offering is based on 24,498,275 shares of common stock outstanding as of December 31, 2018, and excludes:

- 1,545,403 shares of common stock issuable upon the exercise of options outstanding as of December 31, 2018, at a weighted-average exercise price of $2.48 per share;
- 75,597 shares of common stock issuable upon the exercise of warrants outstanding as of December 31, 2018, at a weighted-average exercise price of $9.66 per share;
- 37,606 shares of common stock issuable upon the exercise of warrants issued subsequent to December 31, 2018, with an exercise price of $4.73 per share;
- 979,800 shares of common stock issuable upon the exercise of options issued subsequent to December 31, 2018, with a weighted-average exercise price of $3.22 per share;
- 1,432,746 shares of common stock reserved for future issuance under our 2018 Equity Incentive Plan; and

- 440,983 shares of common stock reserved for future issuance pursuant to our 2018 Employee Stock Purchase Plan.

Unless otherwise indicated, this prospectus reflects and assumes the following:

- no issuances or exercises of any other outstanding options or warrants after December 31, 2018; and
- no exercise by the underwriters of their option to purchase up to 450,000 additional shares of our common stock.

SUMMARY FINANCIAL DATA

You should read the following summary financial data together with the "Selected Financial Data" section of this prospectus and "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our financial statements and the related notes thereto included in our Annual Report on Form 10-K for the year ended December 31, 2018, which is incorporated by reference herein. We have derived the statements of operations data for the years ended December 31, 2017 and 2018 and the balance sheet data as of December 31, 2018 from our audited financial statements included in our Annual Report on Form 10-K for the year ended December 31, 2018, which is incorporated by reference herein. Our historical results are not necessarily indicative of the results that should be expected in the future.

	Year Ended December 31,	
	2017	2018
	(in thousands, except share and per share data)	
Statement of Operations Data:		
Grant revenues	$ —	$ 668
Operating expenses:		
Research and development	$ 6,210	$ 15,455
General and administrative	2,328	4,857
Total operating expenses	8,538	20,312
Loss from operations	(8,538)	(19,644)
Other income (expense):		
Interest income	52	387
Interest expense	(2,723)	(3,924)
Change in fair value of warrant liability	1,019	11
Change in fair value of derivative liability	(57)	(676)
Total other income (expense)	(1,709)	(4,202)
Net loss	$ (10,247)	$ (23,846)
Net loss per common share, basic and diluted	$ (13.78)	$ (4.49)
Weighted-average common shares outstanding, basic and diluted	743,470	5,305,062

The following table presents our summary balance sheet data as of December 31, 2018:

- on an actual basis; and
- on an as adjusted basis to give effect to our issuance and sale of 3,000,000 shares of common stock in this offering at an assumed public offering price of $12.57 per share, which was the last reported sales price of our common stock on the Nasdaq Global Market on April 8, 2019.

	As of December 31, 2018	
	Actual	As Adjusted
	(in thousands)	
Balance Sheet Data:		
Cash and cash equivalents	$ 61,031	$ 96,128
Working capital(1)	58,051	93,148
Total assets	63,026	98,123
Total stockholders' equity	50,927	86,024

(1) We define working capital as total current assets less total current liabilities. See our audited financial statements included in our Annual Report on Form 10-K for the year ended December 31, 2018, which are incorporated by reference herein, for further details regarding our current assets and current liabilities.

Each $1.00 increase (decrease) in the assumed public offering price of $12.57 per share, which was the last reported sale price of our common stock on the Nasdaq Global Market on April 8, 2019, would increase (decrease) the as adjusted amount of each of cash and cash equivalents, working capital, total assets, and total stockholders' equity by $2.8 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 estimated underwriting discounts and commissions and estimated offering expenses payable by us. Similarly, each increase (decrease) of 1.0 million shares in the number of shares offered by us at the assumed public offering price would increase (decrease) each of cash and cash equivalents, working capital, total assets, and total stockholders' equity by $11.8 million.

RISK FACTORS

Investing in our common stock involves a high degree of risk. You should consider carefully the risks and uncertainties described below, as well as the risks and uncertainties set forth under the heading "Risk Factors" in our Annual Report on Form 10-K for the year ended December 31, 2018, which is incorporated by reference herein, and all of the other information in this prospectus and the documents incorporated by reference herein before deciding whether to purchase shares of our common stock. The risks and uncertainties described below are not the only ones we face. Additional risks and uncertainties that we are unaware of, or that we currently believe are not material, may also become important factors that affect us. If any of the following risks are realized, our business, financial condition, results of operations and prospects could be materially and adversely affected. In that event, the price of our common stock could decline, and you could lose part or all of your investment.

Risks Related to This Offering and Ownership of our Common Stock

If you purchase common shares in this offering, you will suffer immediate dilution of your investment.

The assumed public offering price of our common stock is substantially higher than the net tangible book value per share. Therefore, if you purchase common shares in this offering, you will pay a price per share that substantially exceeds our net tangible book value per share after this offering. Based on an assumed public offering price of $12.57 per share, which was the last reported sale price of our common shares on the Nasdaq Global Market on April 8, 2019, you will experience immediate dilution of $9.44 per share, representing the difference between our as adjusted net tangible book value per share after giving effect to this offering and the assumed public offering price.

In addition, as of December 31, 2018, we had outstanding stock options to purchase an aggregate of 1,545,403 shares of common stock at a weighted-average exercise price of $2.48 per share and outstanding warrants to purchase an aggregate of 75,597 shares of common stock at a weighted-average exercise price of $9.66 per share. In addition, we issued stock options to purchase an additional 979,800 shares of common stock, at a weighted-average exercise price of $3.22 per share, and warrants to purchase an aggregate of 37,606 shares of common stock at an exercise price of $4.73 per share, subsequent to December 31, 2018. To the extent these outstanding options or warrants are exercised, there will be further dilution to investors in this offering.

A significant portion of our total outstanding shares are restricted from immediate resale but may be sold into the market in the near future. This could cause the market price of our common stock to drop significantly, even if our business is doing well.

Sales of a substantial number of shares of our common stock in the public market could occur at any time. If our stockholders sell, or the market perceives that our stockholders intend to sell, substantial amounts of our common stock in the public market, the market price of our common stock could decline significantly.

Upon the closing of this offering, based on the number of shares outstanding as of December 31, 2018, we will have outstanding 27,498,275 shares of common stock. Of these shares, approximately 12.9 million shares, including the 3.0 million shares sold in this offering and the approximately 9.9 million shares sold in our initial public offering in October 2018 will be freely tradable. Approximately 14.6 million of the remaining shares of common stock will become available for sale in the public market beginning in April 2019 following the scheduled expiration of lock-up agreements between some of our stockholders and the underwriters for our initial public offering. Citigroup Global Markets Inc. and Cowen and Company, LLC may release these stockholders from their lock-up agreements with the underwriters at any time and without notice, which would allow for earlier sales of shares in the public market. The remaining approximately 10.1 million shares of common stock will become available for sale in the public market beginning 60 days following the completion of this offering upon the scheduled expiration of the lock-up agreements between some of our stockholders and the underwriters for this offering. Citigroup Global Markets Inc. and Cowen and Company, LLC may release these stockholders from their lock-up agreements with the underwriters at any time and without notice, which would allow for earlier sales of shares in the public market.

In addition, we have filed registration statements on Form S-8 registering the issuance of common stock subject to options or other equity awards issued or reserved for future issuance under our equity incentive plans. Shares registered under these registration statements on Form S-8 will be available for sale in the public market subject to vesting arrangements and exercise of options, the lock-up agreements described above and the restrictions of Rule 144 in the case of our affiliates.

Additionally, the holders of approximately 13.9 million shares of our common stock, or their transferees, will have rights, subject to some conditions, to require us to file one or more registration statements covering their shares or to include their shares in registration statements that we may file for ourselves or other stockholders. If we were to register the resale of these shares, they could be freely sold in the public market. If these additional shares are sold, or if it is perceived that they will be sold, in the public market, the trading price of our common stock could decline.

We will have broad discretion in the use of our existing cash and cash equivalents, including the proceeds from this offering, and may invest or spend our cash in ways with which you do not agree and in ways that may not increase the value of your investment.

We will have broad discretion over the use of our cash and cash equivalents, including the proceeds from this offering. You may not agree with our decisions, and our use of cash may not yield any return on your investment. We expect to use the net proceeds from this offering, together with our existing cash and cash equivalents, to advance PB2452, advance PB1046, fund development of our ELP technology and preclinical programs and for working capital and general corporate purposes. Our failure to apply the net proceeds from this offering effectively could compromise our ability to pursue our growth strategy and we might not be able to yield a significant return, if any, on our investment of these net proceeds. You will not have the opportunity to influence our decisions on how to use our net proceeds from this offering.

An active trading market for our common stock may not be sustained.

Our shares of common stock began trading on the Nasdaq Global Market on October 18, 2018. Given the limited trading history of our common stock, there is a risk that an active trading market for our shares will not be sustained, which could put downward pressure on the market price of our common stock and thereby affect the ability of our stockholders to sell their shares.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS AND INDUSTRY AND MARKET DATA

This prospectus contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act, which are subject to the "safe harbor" created by those sections. These forward-looking statements involve substantial risks and uncertainties. In some cases, you can identify forward-looking statements by the words "anticipate," "believe," "continue," "could," "estimate," "expect," "intend," "may," "might," "objective," "ongoing," "plan," "predict," "project," "potential," "should," "will," or "would," or the negative of these terms, or other comparable terminology intended to identify statements about the future. These statements involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to be materially different from the information expressed or implied by these forward-looking statements. These statements are inherently uncertain and investors are cautioned not to unduly rely upon these statements. In addition, statements that "we believe" and similar statements reflect our beliefs and opinions on the relevant subject. Forward-looking statements include statements regarding:

- the timing, progress and results of our clinical trials of PB2452, PB1046 and any other product candidates, including statements regarding the timing of initiation and completion of studies or trials and related preparatory work, the period during which the results of the trials will become available and our research and development programs;
- the timing of any submission of filings for regulatory approval of PB2452, PB1046 and any other product candidates and our ability to obtain and maintain regulatory approvals for PB2452 and PB1046 for any indication;
- our expectations regarding the size of the patient populations, market acceptance and opportunity for and clinical utility of our product candidates, if approved for commercial use;
- our manufacturing capabilities and strategy, including the scalability and commercial viability of our manufacturing methods and processes and our ability to maintain agreements with third parties;
- our expectations regarding the scope of any approved indication for PB2452 and PB1046;
- our ability to successfully commercialize our product candidates;
- our ability to leverage our proprietary ELP technology to identify and develop future product candidates;
- our estimates regarding future revenue, expenses and needs for additional financing; the impact of laws and regulations;
- our estimates of our expenses, ongoing losses, future revenue, capital requirements and our needs for or ability to obtain additional funding;
- our ability to establish or maintain collaborations or strategic relationships;
- our ability to identify, recruit and retain key personnel;
- our ability to protect and enforce our intellectual property position for our product candidates, and the scope of such protection;
- our financial performance;
- our expected use of proceeds from this offering;

- our competitive position and the development of and projections relating to our competitors or our industry;
- the impact of laws and regulations; and
- our expectations regarding the time during which we will be an emerging growth company under the JOBS Act.

We caution you that the foregoing list may not contain all of the forward-looking statements made in this prospectus.

You should refer to the "Risk Factors" section of this prospectus, and the "Risk Factors" section of our Annual Report on Form 10-K for the year ended December 31, 2018, which is incorporated by reference herein, for a discussion of important factors that may cause our actual results to differ materially from those expressed or implied by our forward-looking statements. We have based the forward-looking statements contained in this prospectus primarily on our current expectations and projections about future events and trends that we believe may affect our business, financial condition, results of operations and prospects. While we believe that our internal assumptions are reasonable, no independent source has verified such assumptions, as a result we cannot assure you that the forward-looking statements in this prospectus will prove to be accurate. Furthermore, if our forward-looking statements prove to be inaccurate, the inaccuracy may be material. In light of the significant uncertainties in these forward-looking statements, you should not regard these statements as a representation or warranty by us or any other person that we will achieve our objectives and plans in any specified time frame or at all. We undertake no obligation to publicly update any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by law.

You should read this prospectus and the documents that 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 our forward- looking statements by these cautionary statements.

We obtained the industry, statistical and market data in this prospectus and in the documents incorporated by reference herein from our own internal estimates and research as well as from industry and general publications and research, surveys and studies conducted by third parties. All of the market data used in this prospectus and in the documents incorporated by reference herein involves a number of assumptions and limitations, and you are cautioned not to give undue weight to such data. While we believe that each of these studies and publications is reliable, the industry in which we operate is subject to a high degree of uncertainty and risk due to a variety of important factors, including those described in the section titled "Risk Factors" in this prospectus and in the section titled "Risk Factors" in our Annual Report on Form 10-K for the year ended December 31, 2018, which is incorporated by reference herein. These and other factors could cause results to differ materially from those expressed in the estimates made by third parties and by us.

USE OF PROCEEDS

We estimate that the net proceeds from our issuance and sale of 3,000,000 shares of our common stock in this offering will be approximately $35.1 million (or $40.4 million if the underwriters exercise in full their option to purchase additional shares), assuming a public offering price of $12.57 per share, which was the last reported sale price of our common stock on the Nasdaq Global Market on April 8, 2019, and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us.

Each $1.00 increase (decrease) in the assumed public offering price of $12.57 per share would increase (decrease) the net proceeds to us from this offering by approximately $2.8 million, assuming 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. Each increase (decrease) of 1.0 million in the number of shares we are offering would increase (decrease) the net proceeds to us from this offering, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us, by approximately $11.8 million, assuming the assumed public offering price stays the same.

As of December 31, 2018, we had $61.0 million in cash and cash equivalents. We intend to use the net proceeds from this offering, together with our existing cash and cash equivalents, as follows:

- approximately $52.0 million to $54.0 million to advance PB2452;
- approximately $14.0 million to $16.0 million to advance PB1046;
- approximately $1.0 million to $3.0 million to fund development of our ELP technology and preclinical programs; and
- the remainder for working capital and other general corporate purposes.

We believe that the net proceeds of this offering, together with our existing cash and cash equivalents, will enable us to fund our operations into the third quarter of 2020. Based on our current operational plans and assumptions, we expect our cash and cash equivalents, together with the net proceeds from this offering, will be sufficient to: complete our Phase 2a clinical trial for PB2452, initiate and enroll a significant number of patients in our Phase 2b clinical trial for PB2452, initiate enrollment of our Phase 3 clinical trial for PB2452, manufacture drug supply for our planned Phase 2 and Phase 3 clinical trials and related commercial manufacturing activities for PB2452, including scale-up, process characterization and validation; complete enrollment of our Phase 2b clinical trial for PB1046; and complete certain IND-enabling activities and late-stage research for one or more additional preclinical product candidates. We have based this estimate on assumptions that may prove to be wrong, and we could use our available capital resources sooner than we expect.

This expected use of net proceeds from this offering and our existing cash and cash equivalents represents our intentions based upon our current plans and business conditions, which could change in the future as our plans and business conditions evolve. Predicting the costs necessary to develop product candidates can be difficult. The amounts and timing of our actual expenditures may vary significantly depending on numerous factors, including the progress of our development, the status of and results from clinical trials, as well as any collaborations that we may enter into with third parties for our product candidates, and any unforeseen cash needs.

Our management will have broad discretion in the application of the net proceeds from this offering, and investors will be relying on the judgment of our management regarding the application of those net proceeds. The timing and amount of our actual expenditures will be based on many factors, including cash flows from operations and the anticipated growth of our business. Pending these uses, we plan to invest these net proceeds in short-term, interest bearing investments, investment-grade instruments, certificates of deposit or direct or guaranteed obligations of the United States.

DIVIDEND POLICY

We have never declared or paid, and do not anticipate declaring or paying, in the foreseeable future, any cash dividends on our capital 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.

CAPITALIZATION

The following table sets forth our cash and cash equivalents and our capitalization as of December 31, 2018:

- on an actual basis; and
- on an as adjusted basis to give effect to our issuance and sale of 3,000,000 shares of common stock in this offering at an assumed public offering price of $12.57 per share, which was the last reported sales price of our common stock on the Nasdaq Global Market on April 8, 2019, after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us.

You should read this table together with "Selected Financial Data" elsewhere in this prospectus and "Management's Discussion and Analysis of Financial Condition and Results of Operations" and our financial statements and the related notes included in our Annual Report on Form 10-K for the year ended December 31, 2018, which is incorporated by reference herein.

	As of December 31, 2018	
	Actual	As Adjusted
	(in thousands, except share and per share data)	
(in thousands, except share and per share data)		
Cash and cash equivalents	$ 61,031	$ 96,128
Long-term debt	7,500	7,500
Stockholders' equity:		
Common stock, $0.001 par value; 200,000,000 shares authorized, actual and as adjusted; 24,498,275 shares outstanding, actual; 27,498,275 shares outstanding, as adjusted	25	28
Treasury stock, at cost, 29,967 shares	(24)	(24)
Additional paid-in capital	173,837	208,931
Accumulated deficit	(122,911)	(122,911)
Total stockholders' equity	$ 50,927	$ 86,024
Total capitalization	$ 58,427	$ 93,524

The as adjusted capitalization information discussed above is illustrative only and will change based on the actual public offering price. Each $1.00 increase (decrease) in the assumed public offering price of $12.57 per share, which was the last reported sale price of our common stock on the Nasdaq Global Market on April 8, 2019, would increase (decrease) the as adjusted amount of each of cash and cash equivalents, additional paid-in capital, total stockholders' equity and total capitalization by $2.8 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 estimated underwriting discounts and commissions and estimated offering expenses payable by us. We may also increase or decrease the number of shares we are offering. A 1.0 million share increase in the number of shares offered by us, as set forth on the cover page of this prospectus, would increase the as adjusted amount of each of cash and cash equivalents, additional paid-in capital, total stockholders' equity and total capitalization by $11.8 million, assuming the assumed public offering price of $12.57 per share, which was the last reported sale price of our common stock on the Nasdaq Global Market on April 8, 2019, remains the same and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us.

The outstanding share information in the table above excludes:

- 1,545,403 shares of common stock issuable upon the exercise of options outstanding as of December 31, 2018, at a weighted-average exercise price of $2.48 per share;
- 75,597 shares of common stock issuable upon the exercise of warrants outstanding as of December 31, 2018, at a weighted-average exercise price of $9.66 per share;

- 37,606 shares of common stock issuable upon the exercise of warrants issued subsequent to December 31, 2018, with an exercise price of $4.73 per share;
- 979,800 shares of common stock issuable upon the exercise of options issued subsequent to December 31, 2018, with a weighted-average exercise price of $3.22 per share;
- 1,432,746 shares of common stock reserved for future issuance under our 2018 Equity Incentive Plan; and
- 196,000 shares of common stock reserved for future issuance pursuant to our 2018 Employee Stock Purchase Plan.

DILUTION

If you invest in our common stock, your ownership interest will be diluted to the extent of the difference between the public offering price per share of our common stock and the as adjusted net tangible book value per share of our common stock immediately after the closing of this offering.

Our historical net tangible book value as of December 31, 2018 was $50.9 million, or $2.08 per share of common stock.

After giving effect to the sale of 3,000,000 shares of common stock in this offering at an assumed public offering price of $12.57 per share, which was the last reported sale price of our common stock on the Nasdaq Global Market on April 8, 2019, and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us, our as adjusted net tangible book value as of December 31, 2018 would be $86.0 million, or $3.13 per share of common stock. This amount represents an immediate increase in as adjusted net tangible book value of $1.05 per share to our existing stockholders and an immediate dilution of $9.44 per share to investors participating in this offering. We determine dilution per share to investors participating in this offering by subtracting as adjusted net tangible book value per share after this offering from the assumed public offering price per share paid by investors participating in this offering.

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

Assumed public offering price per share		$12.57
Historical net tangible book value per share as of December 31, 2018	$2.08	
Increase in as adjusted net tangible book value per share attributable to this offering	1.05	
As adjusted net tangible book value per share after giving effect to this offering		3.13
Dilution per share to new investors in this offering		$ 9.44

The as adjusted dilution information discussed above is illustrative only and will change based on the actual public offering price. Each $1.00 increase (decrease) in the assumed public offering price of $12.57 per share, which was the last reported sale price of our common stock on the Nasdaq Global Market on April 8, 2019, would increase (decrease) the as adjusted net tangible book value per share by $0.10 per share and the dilution per share to investors participating in this offering by $0.90 per share, 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 estimated underwriting discounts and commissions and estimated offering expenses payable by us. We may also increase or decrease the number of shares we are offering. A 1.0 million share increase in the number of shares offered by us, as set forth on the cover page of this prospectus, would increase the as adjusted net tangible book value per share by $0.30 and decrease the dilution per share to new investors participating in this offering by $0.30, assuming the assumed public offering price of $12.57 per share, which was the last reported sale price of our common stock on the Nasdaq Global Market on April 8, 2019, remains the same and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us. A 1.0 million share decrease in the number of shares offered by us, as set forth on the cover page of this prospectus, would decrease the as adjusted net tangible book value per share after this offering by $0.33 and increase the dilution per share to new investors participating in this offering by $0.33, assuming the assumed public offering price of $12.57 per share, which was the last reported sale price of our common stock on the Nasdaq Global Market on April 8, 2019, remains the same and after deducting estimated underwriting discounts and commissions and estimated offering expenses payable by us.

If the underwriters exercise their option in full to purchase an additional 450,000 shares of our common stock in this offering, the as adjusted net tangible book value of our common stock would be $3.27 per share, the increase in net tangible book value per share would be $0.14 per share and the dilution per share to new investors would be $9.30 per share, in each case assuming a public offering price of $12.57 per share, which was the last reported sale price of our common stock on the Nasdaq Global Market on April 8, 2019.

The outstanding share information used in the computations above excludes:

- 1,545,403 shares of common stock issuable upon the exercise of options outstanding as of December 31, 2018, at a weighted-average exercise price of $2.48 per share;
- 75,597 shares of common stock issuable upon the exercise of warrants outstanding as of December 31, 2018, at a weighted-average exercise price of $9.66 per share;
- 37,606 shares of common stock issuable upon the exercise of warrants issued subsequent to December 31, 2018, with an exercise price of $4.73 per share;
- 979,800 shares of common stock issuable upon the exercise of options issued subsequent to December 31, 2018, with a weighted-average exercise price of $3.22 per share;
- 1,432,746 shares of common stock reserved for future issuance under our 2018 Equity Incentive Plan; and
- 196,000 shares of common stock reserved for future issuance pursuant to our 2018 Employee Stock Purchase Plan.

To the extent that outstanding options or warrants are exercised, new options or other securities are issued under our equity incentive plans, or we issue additional shares of common stock in the future, there will be further dilution to investors participating in this offering. In addition, we may choose to raise additional capital because of market conditions or strategic considerations, even if we believe that we have sufficient funds for our current or future operating plans. If we raise additional capital through the sale of equity or convertible debt securities, the issuance of these securities could result in further dilution to our stockholders.

SELECTED FINANCIAL DATA

You should read the following selected financial data together with our financial statements and the related notes thereto and the "Management's Discussion and Analysis of Financial Condition and Results of Operations" section included in our Annual Report on Form 10-K for the year ended December 31, 2018, which is incorporated by reference herein. We have derived the statements of operations data for the years ended December 31, 2017 and 2018 and the balance sheet data as of December 31, 2017 and 2018 from our audited financial statements appearing in our Annual Report on Form 10-K for the year ended December 31, 2018, which is incorporated by reference herein. Our historical results are not necessarily indicative of the results that should be expected in the future.

	Year Ended December 31,	
	2017	2018
	(in thousands)	
Statement of Operations Data:		
Grant revenues	$ —	$ 668
Operating expenses:		
Research and development	$ 6,210	$ 15,455
General and administrative	2,328	4,857
Total operating expenses	8,538	20,312
Loss from operations	(8,538)	(19,644)
Other income (expense):		
Interest income	52	387
Interest expense	(2,723)	(3,924)
Change in fair value of warrant liability	1,019	11
Change in fair value of derivative liability	(57)	(676)
Total other income (expense)	(1,709)	(4,202)
Net loss	$ (10,247)	$ (23,846)
Net loss per common share, basic and diluted	$ (13.78)	$ (4.49)
Weighted-average common shares outstanding, basic and diluted	743,470	5,305,062

	As of December 31,	
	2017	2018
	(in thousands)	
Balance Sheet Data:		
Cash and cash equivalents	$ 13,406	$ 61,031
Working capital (deficit)(1)	(3,829)	58,051
Total assets	14,099	63,026
Convertible promissory notes, net of discount	12,095	—
Long-term debt, including current portion	3,386	7,500
Redeemable convertible preferred stock	89,634	—
Total stockholders' (deficit) equity	(97,416)	50,927

(1) We define working capital (deficit) as total current assets less total current liabilities. See our financial statements included in our Annual Report on Form 10-K for the year ended December 31, 2018, which are incorporated by reference herein, for further details regarding our current assets and current liabilities.

PRINCIPAL STOCKHOLDERS

The following table sets forth the beneficial ownership of our common stock as of March 15, 2019 and as adjusted to reflect the sale of common stock offered by us in this offering, for:

- each person, or group of affiliated persons, who is known by us to beneficially own more than 5% of our common stock;
- our chief executive officer and each of our two next most highly compensated executive officers for 2018, or our named executive officers;
- each of our directors; and
- all of our executive officers and directors as a group.

The percentage ownership information shown in the table prior to this offering is based upon 24,498,425 shares of common stock outstanding as of March 15, 2019. The percentage ownership information shown in the table after this offering is based upon 27,498,425 shares of common stock outstanding as of March 15, 2019, assuming the sale of 3,000,000 shares of common stock by us in the offering and no exercise of the underwriters' option to purchase additional shares.

We have determined beneficial ownership in accordance with the rules of the SEC. These rules generally attribute beneficial ownership of securities to persons who possess sole or shared voting power or investment power with respect to those securities. In addition, the rules include shares of common stock issuable pursuant to the exercise of stock options or warrants that are either immediately exercisable or exercisable on or before May 14, 2019, which is 60 days after March 15, 2019. These shares are deemed to be outstanding and beneficially owned by the person holding those options or warrants for the purpose of computing the percentage ownership of that person, but they are not treated as outstanding for the purpose of computing the percentage ownership of any other person. The information contained in the following table is not necessarily indicative of beneficial ownership for any other purpose, and the inclusion of any shares in the table does not constitute an admission of beneficial ownership of those shares. Unless otherwise indicated, the persons or entities identified in this table have sole voting and investment power with respect to all shares shown as beneficially owned by them, subject to applicable community property laws.

Except as otherwise noted below, the address for persons listed in the table is c/o PhaseBio Pharmaceuticals, Inc., 1 Great Valley Parkway, Suite 30, Malvern, Pennsylvania 19355.

Name of Beneficial Owner	Number of Shares Beneficially Owned	Percentage of Shares Beneficially Owned	
		Prior to the Offering (%)	After the Offering (%)(1)
5% or greater stockholders:			
Entities Affiliated with Wellington Management Group LLP(2)	3,370,960	13.8	12.3
Entities Affiliated with New Enterprise Associates(3)	6,643,704	27.1	24.2
Zeneca, Inc.(4)	3,004,554	12.3	10.9
Entities Affiliated with Hatteras Venture Partners(5)	2,466,665	10.1	9.0
Entities Affiliated with Johnson & Johnson(6)	1,625,491	6.6	5.9
Named executive officers and directors:			
Jonathan P. Mow(7)	426,184	1.7	1.5
John Sharp(8)	121,232	*	*
John Lee, M.D., Ph.D.(9)	118,492	*	*
Edmund P. Harrigan(10)	9,578	*	*
Nancy J. Hutson, Ph.D.(11)	10,393	*	*
Peter Justin Klein, M.D., J.D.(12)	8,303	*	*
Caroline Loewy(13)	1,483	*	*
Bibhash Mukhopadhyay, Ph.D.(14)	6,000	*	*
Clay B. Thorp(15)	2,488,464	10.2	9.0
Linda Tufts(16)	945,320	3.9	3.4
Richard A. van den Broek(17)	2,499	*	*
All current executive officers and directors as a group (14 persons)(18)	4,312,903	17.2	15.7

* Represents ownership of less than one percent.

(1) Assumes no exercise of the underwriters' option to purchase additional shares of common stock.

(2) This information has been obtained from a Schedule 13G/A filed on February 12, 2019 by entities and individuals associated with Wellington Management Group LLP. Consists of shares of common stock, which are owned of record by clients of the Wellington Investment Advisers. Wellington Investment Advisors Holdings LLP controls directly, or indirectly through Wellington Management Global Holdings, Ltd., the Wellington Investment Advisers. Wellington Investment Advisors Holdings LLP is owned by Wellington Group Holdings LLP. Wellington Group Holdings LLP is owned by Wellington Management Group LLP. The principal business address for all entities and individuals affiliated with Wellington Management Group LLP is c/o Wellington Management Company LLP, 280 Congress Street, Boston, MA 02210.

(3) This information has been obtained from a Schedule 13D filed on October 31, 2018 by entities and individuals associated with New Enterprise Associates 13 L.P., or NEA 13 and the Company's records. Consists of (a) 6,641,634 shares of common stock held directly by NEA 13 and (b) 2,070 shares of common stock held directly by NEA Ventures 2009, L.P., or Ven 2009. NEA Partners 13, L.P., or NEA Partners 13, is the sole general partner of NEA 13 and NEA 13 GP, LTD, or NEA 13 LTD, is the sole general partner of NEA Partners 13. The shares directly held by Ven 2009 are indirectly held by Karen P. Welsh, the general partner of Ven 2009. The principal business address for all entities and individuals affiliated with NEA 13 and Ven 2009 is New Enterprise Associates, 1954 Greenspring Drive, Suite 600, Timonium, MD 21093.

(4) This information has been obtained from a Schedule 13D filed on October 29, 2018 by entities and individuals associated with AstraZeneca PLC, or AstraZeneca. Shares beneficially owned consists of 3,004,554 shares directly held by Zeneca Inc., a wholly-owned subsidiary of AstraZeneca, or Zeneca. The principal business address of AstraZeneca is 1 Francis Crick Avenue, Cambridge, CB2 0AA, United Kingdom, and the principal business address of Zeneca is 1800 Concord Pike, Wilmington, Delaware, 19803, United States.

(5) This information has been obtained from a Schedule 13D/A filed on November 8, 2018 by entities and individuals associated with Hatteras Venture Partners. Consists of (a) 1,820,929 shares of common stock and 7,909 shares of common stock issuable upon the exercise of warrants held directly by Hatteras Venture Partners III, LP, or HVP III, (b) 163,813 shares of common stock and 718 shares of common stock issuable upon the exercise of warrants held directly by Hatteras Venture Affiliates III, LP, or HV Affiliates, (c) 416,481 shares of common stock held directly by Venture Capital Multiplier Fund, LP, Series B, or Multiplier Fund, (d) 4,846 shares of common stock held directly by Catalysta Ventures, LLC, or Catalysta and (e) 52,687 shares of common stock held directly by Hatteras Venture Partners I, LP, or HVP I. Catalysta is under common control with HVA III. Catalysta is the general partner of HVP I. The securities held directly by HVP I are indirectly held by Catalysta, which may be deemed to share voting and dispositive power with

regard to the securities directly held by HVP I. The individual managers of Catalysta are Clay B. Thorp and John Crumpler, who may be deemed to share voting and dispositive power with regard to the securities held directly by Catalysta and HVP I. Hatteras Venture Advisors III, LLC, or HVA III, is the general partner of HVP III, HV Affiliates and Multiplier Fund. The securities held directly by HVP III, HV Affiliates and Multiplier Fund are indirectly held by HVA III. The individual managers of HVA III are Clay B. Thorp, Robert A. Ingram, Kenneth B. Lee, Douglas Reed, MD and John Crumpler, or the GP Directors. HVA III and the GP Directors may be deemed to share voting and dispositive power with regard to the securities directly held by HVP III, HV Affiliates and Multiplier Fund. The principal business address for all entities and individuals affiliated with Hatteras Venture Partners is 280 S. Mangum Street, Suite 350 Durham, North Carolina 27701.

(6) This information has been obtained from a Schedule 13G filed on January 22, 2019 by entities and individuals associated with Johnson & Johnson, a New Jersey corporation, or J&J, and Johnson & Johnson Innovation-JJDC, Inc., a New Jersey corporation, or JJDC. JJDC is a wholly-owned subsidiary of J&J. Consists of (a) 1,616,863 shares of common stock and 8,628 shares of common stock issuable upon the exercise of warrants held directly by JJDC. The principal business address of J&J is One Johnson & Johnson Plaza, New Brunswick, NJ 08933 and the principal business address of JJDC is 410 George Street, New Brunswick, NJ 08901.

(7) Consists of (a) 51,199 shares of common stock held by the Mow Trust dated April 17, 2008 and (b) 374,985 shares of common stock issuable upon the exercise of options within 60 days of March 15, 2019. Mr. Mow and his wife Diana Mow are joint trustees of the Mow Trust dated April 17, 2008 and share voting and dispositive power for such shares.

(8) Consists of (a) 5,000 shares of common stock and (b) 116,232 shares of common stock issuable upon the exercise of options within 60 days of March 15, 2019.

(9) Consists of 118,492 shares of common stock issuable upon the exercise of options within 60 days of March 15, 2019.

(10) Consists of 9,578 shares of common stock issuable upon the exercise of options within 60 days of March 15, 2019.

(11) Consists of (a) 1,000 shares of common stock and (b) 9,393 shares of common stock issuable upon the exercise of options within 60 days of March 15, 2019.

(12) Consists of (a) 2,303 shares of common stock and (b) 6,000 shares of common stock issuable upon the exercise of options within 60 days of March 15, 2019.

(13) Consists of 1,483 shares of common stock issuable upon the exercise of options within 60 days of March 15, 2019.

(14) Consists of 6,000 shares of common stock issuable upon the exercise of options within 60 days of March 15, 2019.

(15) Consists of (a) 15,799 shares of common stock held by Mr. Thorp and (b) 6,000,000 shares of common stock issuable upon the exercise of options within 60 days of March 15, 2019. Also, consists of (a) 1,820,929 shares of common stock and 7,909 shares of common stock issuable upon the exercise of warrants held directly by Hatteras Venture Partners III, LP, or HVP III, (b) 163,813 shares of common stock and 718 shares of common stock issuable upon the exercise of warrants held directly by Hatteras Venture Affiliates III, LP, or HV Affiliates, (c) 416,481 shares of common stock held directly by Venture Capital Multiplier Fund, LP, Series B, or Multiplier Fund, (d) 4,846 shares of common stock held directly by Catalysta Ventures, LLC, or Catalysta and (e) 52,687 shares of common stock held directly by Hatteras Venture Partners I, LP, or HVP I. Catalysta is under common control with HVA III. Catalysta is the general partner of HVP I. The securities held directly by HVP I are indirectly held by Catalysta, which may be deemed to share voting and dispositive power with regard to the securities directly held by HVP I. The individual managers of Catalysta are Clay B. Thorp and John Crumpler, who may be deemed to share voting and dispositive power with regard to the securities held directly by Catalysta and HVP I. Hatteras Venture Advisors III, LLC, or HVA III, is the general partner of HVP III, HV Affiliates and Multiplier Fund. The securities held directly by HVP III, HV Affiliates and Multiplier Fund are indirectly held by HVA III. The individual managers of HVA III are Clay B. Thorp, Robert A. Ingram, Kenneth B. Lee, Douglas Reed, MD and John Crumpler, or the GP Directors. HVA III and the GP Directors may be deemed to share voting and dispositive power with regard to the securities directly held by HVP III, HV Affiliates and Multiplier Fund. The principal business address for all entities and individuals affiliated with Hatteras Venture Partners is 280 S. Mangum Street, Suite 350 Durham, North Carolina 27701.

(16) Consists of 6,000 shares of common stock issuable upon the exercise of options within 60 days of March 15, 2019. Also, consists of (a) 590,168 shares of common stock and 5,471 shares of common stock issuable upon the exercise of warrants held directly by Fletcher Spaght Ventures II, LP, or Fletcher Spaght Ventures II, (b) 59,429 shares of common stock and 551 shares of common stock issuable upon the exercise of warrants held directly by FSV II, LP, or FSV II and (c) 281,096 shares of common stock and 2,605 shares of common stock issuable upon the exercise of warrants held directly by FSV II-B, LP, or FSV II-B. FSA II, LLC, or FSA II, is the general partner of the general partner of Fletcher Spaght Ventures II and FSV II-B and the manager of the general partner of FSV II. The members of FSA II are R. John Fletcher, Pearson M. Spaght and Linda Tufts, or the FSA II Members. FSA II and the FSA II members may share voting and dispositive power with regard to the securities owned directly by Fletcher Spaght Ventures II, FSV II-B, and FSV II. The principal business address for all entities and individuals affiliated with Fletcher Spaght Ventures is 222 Berkeley Street Boston, MA 02116.

(17) Consists of 2,499 shares of common stock issuable upon the exercise of options within 60 days of March 15, 2019.

(18) Consists of (a) 3,475,438 shares of common stock, (b) 820,211 shares of common stock issuable upon the exercise of options within 60 days of March 15, 2019 and (c) 17,254 shares of common stock issuable upon the exercise of warrants.

DESCRIPTION OF CAPITAL STOCK

The following descriptions of our capital stock, certain provisions of our amended and restated certificate of incorporation and amended and restated bylaws and certain provisions of Delaware law are summaries. You should also refer to the amended and restated certificate of incorporation and the amended and restated bylaws, which are filed as exhibits to the registration statement of which this prospectus is a part.

General

Our amended and restated certificate of incorporation authorizes us to issue up to 200,000,000 shares of common stock, $0.001 par value per share, and 10,000,000 shares of preferred stock, $0.001 par value per share, all of which shares of preferred stock will be undesignated. Our board of directors may establish the rights and preferences of the preferred stock from time to time.

As of December 31, 2018, there were outstanding 24,498,275 shares of our common stock held by 93 stockholders of record.

Common Stock

Voting Rights

Each holder of our common stock is entitled to one vote for each share on all matters submitted to a vote of the stockholders, including the election of directors. Our stockholders do not have cumulative voting rights. Because of this, the holders of a majority of the shares of common stock entitled to vote in any election of directors can elect all of the directors standing for election, if they should so choose.

Dividends

Subject to preferences that may be applicable to any then-outstanding preferred stock, holders of common stock are entitled to receive ratably those dividends, if any, as may be declared from time to time by the board of directors out of legally available funds.

Liquidation

In the event of our liquidation, dissolution or winding up, holders of common stock will be entitled to share ratably in the net assets legally available for distribution to stockholders after the payment of all of our debts and other liabilities and the satisfaction of any liquidation preference granted to the holders of any then-outstanding shares of preferred stock.

Rights and Preferences

Holders of common stock have no preemptive, conversion or subscription rights and there are no redemption or sinking fund provisions applicable to the common stock. The rights, preferences and privileges of the holders of common stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of preferred stock that we may designate in the future.

Stock Options

As of December 31, 2018, options to purchase an aggregate of 1,545,403 shares of common stock were outstanding at a weighted-average exercise price of $2.48 per share. We issued options to purchase an aggregate of 979,800 shares of common stock at a weighted-average exercise price of $3.22 per share subsequent to December 31, 2018.

Warrants

As of December 31, 2018, there were outstanding warrants to purchase an aggregate of 75,597 shares of common stock at a weighted-average exercise price of $9.66 per share. We issued warrants to purchase an aggregate of 37,606 shares of common stock at an exercise price of $4.73 per share subsequent to December 31, 2018.

Preferred Stock

Our board of directors has the authority under our amended and restated certificate of incorporation, without further action by our stockholders, to issue up to 10,000,000 shares of preferred stock in one or more series, to establish from time to time the number of shares to be included in each such series, to fix the rights, preferences and privileges of the shares of each wholly unissued series and any qualifications, limitations or restrictions thereon, and to increase or decrease the number of shares of any such series, but not below the number of shares of such series then outstanding.

Our board of directors may authorize the issuance of preferred stock with voting or conversion rights that could adversely affect the voting power or other rights of the holders of our common stock. The purpose of authorizing our board of directors to issue preferred stock and determine its rights and preferences is to eliminate delays associated with a stockholder vote on specific issuances. The issuance of preferred stock, while providing flexibility in connection with possible acquisitions and other corporate purposes, could, among other things, have the effect of delaying, deferring or preventing a change in control of us and may adversely affect the market price of our common stock and the voting and other rights of the holders of our common stock. It is not possible to state the actual effect of the issuance of any shares of preferred stock on the rights of holders of common stock until the board of directors determines the specific rights attached to that preferred stock.

Registration Rights

Certain holders of our common stock are entitled to certain rights with respect to registration of such shares under the Securities Act pursuant to the terms of an investor rights agreement. These shares are collectively referred to herein as registrable securities.

The investor rights agreement provides the holders of registrable securities with demand, piggyback and S-3 registration rights as described more fully below. As of December 31, 2018, there were an aggregate of 13,832,226 registrable securities that were entitled to registration rights.

Demand Registration Rights

At any time beginning on April 16, 2019, the holders of at least 60% of the registrable securities then outstanding have the right to make a demand that we file a registration statement under the Securities Act covering registrable securities then outstanding, subject to specified exceptions.

Piggyback Registration Rights

If we register any securities for public sale, the holders of our registrable securities then outstanding will each be entitled to notice of the registration and will have the right to include their shares in the registration statement.

The underwriters of any underwritten offering will have the right to limit the number of shares having registration rights to be included in the registration statement, but not below 25% of the total number of securities included in such registration.

These piggyback registration rights were waived in connection with this offering.

Registration on Form S-3

If we are eligible to file a registration statement on Form S-3, the holders of our registrable securities have the right to demand that we file registration statements on Form S-3; provided, that the aggregate price to the public of the securities to be sold under the registration statement is at least $2.5 million. The right to have such shares registered on Form S-3 is further subject to other specified conditions and limitations.

Expenses of Registration

We will pay all expenses relating to any demand, piggyback or Form S-3 registration, other than stock transfer taxes or underwriting discounts and commissions, subject to specified conditions and limitations.

Termination of Registration Rights

The registration rights will terminate upon the earlier of a liquidation event or a written agreement between us and holders of at least 60% of the outstanding registrable securities. The registration rights will terminate with respect to any particular stockholder when such stockholder (a) is able to sell all of its shares pursuant to Rule 144 under the Securities Act or (b) holds one percent or less of our common stock and such stockholder is able to sell all registrable securities during a 90-day period pursuant to Rule 144 under the Securities Act.

Anti-Takeover Provisions

Section 203 of the Delaware General Corporation Law

We are subject to Section 203 of the Delaware General Corporation Law, which prohibits a Delaware corporation from engaging in any business combination with any interested stockholder for a period of three years after the date that such stockholder became an interested stockholder, with the following exceptions:

- before such date, the board of directors of the corporation approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder;
- upon completion of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction began, excluding for purposes of determining the voting stock outstanding, but not the outstanding voting stock owned by the interested stockholder, those shares owned (1) by persons who are directors and also officers and (2) employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or
- on or after such date, the business combination is approved by the board of directors and authorized at an annual or special meeting of the stockholders, and not by written consent, by the affirmative vote of at least 66⅔% of the outstanding voting stock that is not owned by the interested stockholder.

In general, Section 203 defines a “business combination” to include the following:

- any merger or consolidation involving the corporation or any direct or indirect majority-owned subsidiary of the corporation and the interested stockholder;
- any sale, transfer, pledge or other disposition of 10% or more of the assets of the corporation involving the interested stockholder (in one transaction or a series of transactions);
- subject to certain exceptions, any transaction that results in the issuance or transfer by the corporation or by any direct or indirect majority-owned subsidiary of the corporation of any stock of the corporation or of such subsidiary to the interested stockholder;
- any transaction involving the corporation or any direct or indirect majority-owned subsidiary of the corporation that has the effect of increasing the proportionate share of the stock or any class or series of the corporation beneficially owned by the interested stockholder; or
- the receipt by the interested stockholder of the benefit of any loans, advances, guarantees, pledges or other financial benefits by or through the corporation.

In general, Section 203 defines an “interested stockholder” as an entity or person who, together with the person’s affiliates and associates, beneficially owns, or within three years prior to the time of determination of interested stockholder status did own, 15% or more of the outstanding voting stock of the corporation.

Certificate of Incorporation and Bylaws

Our amended and restated certificate of incorporation provides for our board of directors to be divided into three classes with staggered three-year terms. Only one class of directors is elected at each annual meeting of our stockholders, with the other classes continuing for the remainder of their respective three-year terms. Because our stockholders do not have cumulative voting rights, stockholders holding a majority of the shares of common stock outstanding are able to elect all of our directors. Our amended and restated certificate and our amended and restated bylaws, or our restated bylaws, also provide that directors may be removed by the stockholders only for cause upon the vote of 66⅔% or more of our outstanding common stock. Furthermore, the authorized number of directors may be changed only by resolution of the board of directors, and vacancies and newly created directorships on the board of directors may, except as otherwise required by law or determined by the board of directors, only be filled by a majority vote of the directors then serving on the board of directors, even though less than a quorum.

Our amended and restated certificate and restated bylaws also provide that all stockholder actions must be effected at a duly called meeting of stockholders and eliminate the right of stockholders to act by written consent without a meeting. Our restated bylaws also provide that only our Chairman of the board of directors, Chief Executive Officer or the board of directors pursuant to a resolution adopted by a majority of the total number of authorized directors may call a special meeting of stockholders.

Our restated bylaws also provide that stockholders seeking to present proposals before a meeting of stockholders or to nominate candidates for election as directors at a meeting of stockholders must provide timely advance notice in writing, and specify requirements as to the form and content of a stockholder's notice.

Our restated certificate and restated bylaws provide that the stockholders cannot amend many of the provisions described above except by a vote of 66⅔% or more of our outstanding common stock. As described in "—Preferred Stock" above, our restated certificate gives our board of directors the authority, without further action by our stockholders, to issue up to 10,000,000 shares of preferred stock in one or more series.

The combination of these provisions makes it more difficult for our existing stockholders to replace our board of directors as well as for another party to obtain control of us by replacing our board of directors. Since our board of directors has the power to retain and discharge our officers, these provisions could also make it more difficult for existing stockholders or another party to effect a change in management. In addition, the authorization of undesignated preferred stock makes it possible for our board of directors to issue preferred stock with voting or other rights or preferences that could impede the success of any attempt to change our control.

These provisions are intended to enhance the likelihood of continued stability in the composition of our board of directors and its policies and to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed to reduce our vulnerability to hostile takeovers and to discourage certain tactics that may be used in proxy fights. However, such provisions could have the effect of discouraging others from making tender offers for our shares and may have the effect of delaying changes in our control or management. As a consequence, these provisions may also inhibit fluctuations in the market price of our stock that could result from actual or rumored takeover attempts. We believe that the benefits of these provisions, including increased protection of our potential ability to negotiate with the proponent of an unfriendly or unsolicited proposal to acquire or restructure our company, outweigh the disadvantages of discouraging takeover proposals, because negotiation of takeover proposals could result in an improvement of their terms.

Choice of Forum

Our amended and restated certificate of incorporation provides that the Court of Chancery of the State of Delaware will be the exclusive forum for:

- any derivative action or proceeding brought on our behalf;
- any action asserting a breach of fiduciary duty;

- any action asserting a claim against us arising pursuant to the Delaware General Corporation Law, our restated certificate, or our amended and restated bylaws; or
- any action asserting a claim against us that is governed by the internal affairs doctrine.

The provision would not apply to suits brought to enforce a duty or liability created by the Exchange Act.

The enforceability of choice of forum provisions in other companies' certificates of incorporation has been challenged in legal proceedings, and it is possible that, in connection with any action, a court could find the choice of forum provisions contained in our restated certificate to be inapplicable or unenforceable in such action.

Our restated certificate further provides that the federal district courts of the United States of America will be the exclusive forum for resolving any complaint asserting a cause of action arising under the Securities Act. Recently, the Court of Chancery of the State of Delaware issued an opinion invalidating the federal district court exclusive forum provision. In light of that recent decision, we will not attempt to enforce this provision of our restated certificate to the extent it is not permitted by applicable law. However, if the decision is reviewed on appeal and ultimately overturned by the Delaware Supreme Court, we would enforce the federal district court exclusive forum provision.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is Computershare Trust Company, N.A. The transfer agent's address is 250 Royall Street, Canton, Massachusetts 02021.

Listing

Our common stock is listed on the Nasdaq Global Market under the symbol "PHAS."

MATERIAL U.S. FEDERAL INCOME TAX CONSIDERATIONS FOR NON-U.S. HOLDERS

The following summary describes the material U.S. federal income tax consequences of the acquisition, ownership and disposition of our common stock acquired in this offering by Non-U.S. Holders (as defined below). This discussion does not address all aspects of U.S. federal income taxation and does not address any non-U.S., state or local tax consequences that may be relevant to Non-U.S. Holders in light of their particular circumstances, nor does it address U.S. federal tax consequences other than income taxes, such as gift or estate taxes. Rules different from those described below may apply to certain Non-U.S. Holders that are subject to special treatment under the Code such as financial institutions, insurance companies, tax-exempt organizations, broker-dealers and traders in securities, government organizations, certain foreign citizens or long-term residents of the United States, "controlled foreign corporations," "passive foreign investment companies," corporations that accumulate earnings to avoid U.S. federal income tax, persons that hold our common stock as part of a "straddle," "hedge," "conversion transaction," "synthetic security" or integrated investment or other risk reduction strategy, persons subject to the alternative minimum tax or federal Medicare contribution tax on net investment income, persons who have a functional currency other than the U.S. dollar, accrual method taxpayers subject to special tax accounting rules under Section 451(b) of the Code, partnerships and other pass-through entities and investors in such pass-through entities. Such Non-U.S. Holders are urged to consult their own tax advisors to determine the U.S. federal, state, local and other tax consequences that may be relevant to them. Furthermore, the discussion below is based upon the provisions of the Code and Treasury regulations, rulings and judicial decisions promulgated thereunder as of the date hereof, and such authorities may be repealed, revoked or modified, perhaps retroactively, so as to result in U.S. federal income tax consequences different from those discussed below. We have not requested a ruling from the U.S. Internal Revenue Service, or IRS, with respect to the statements made and the conclusions reached in the following summary, and there can be no assurance that the IRS will agree with such statements and conclusions. This discussion assumes that the Non-U.S. Holder holds our common stock as a "capital asset" within the meaning of Section 1221 of the Code (generally, property held for investment).

Persons considering purchasing our common stock pursuant to this offering should consult their own tax advisors concerning the U.S. federal income, estate and other tax consequences of acquiring, owning and disposing of our common stock in light of their particular situations as well as any consequences arising under the laws of any other taxing jurisdiction, including any state, local or non-U.S. tax consequences. You should also consult with your tax advisor with respect to recently enacted changes in U.S. tax law as well as potential conforming changes in state tax laws.

For the purposes of this discussion, a "Non-U.S. Holder" is, for U.S. federal income tax purposes, a beneficial owner of our common stock that is neither a U.S. Holder nor a partnership (or other entity treated as a partnership for U.S. federal income tax purposes regardless of its place of organization or formation). A "U.S. Holder" means a beneficial owner of our common stock that is, for U.S. federal income tax purposes. (1) an individual who is a citizen or resident of the United States, (2) a corporation or other entity treated as a corporation created or organized in or under the laws of the United States, any state thereof or the District of Columbia, (3) an estate the income of which is subject to U.S. federal income taxation regardless of its source or (4) a trust if it (a) is subject to the primary supervision of a court within the United States and one or more U.S. persons have the authority to control all substantial decisions of the trust or (b) has a valid election in effect under applicable Treasury regulations to be treated as a U.S. person.

Distributions on Our Common Stock

Distributions, if any, made on our common stock to a Non-U.S. Holder to the extent made out of our current or accumulated earnings and profits (as determined under U.S. federal income tax principles) generally will constitute dividends for U.S. tax purposes. Subject to the discussion below regarding backup withholding and foreign accounts, such dividends will be subject to withholding tax at a 30% rate or such lower rate as may be specified by an applicable income tax treaty. To obtain a reduced rate of withholding tax under a treaty, a Non-U.S. Holder generally will be required to provide us with a properly executed IRS Form W-8BEN (in the

case of individuals), IRS Form W-8BEN-E (in the case of entities) or other appropriate form, including a U.S. taxpayer identification number and certifying the Non-U.S. Holder's entitlement to benefits under that treaty. This certification must be provided to us or our paying agent prior to the payment of dividends and must be updated periodically. In the case of a Non-U.S. Holder that is an entity, Treasury regulations and the relevant tax treaty provide rules to determine whether, for purposes of determining the applicability of a tax treaty, dividends will be treated as paid to the entity or to those holding an interest in that entity. If a Non-U.S. Holder holds stock through a financial institution or other agent acting on the holder's behalf, the holder will be required to provide appropriate documentation to such agent. The holder's agent will then be required to provide certification to us or our paying agent, either directly or through other intermediaries. If you are eligible for a reduced rate of U.S. federal withholding tax under an income tax treaty and you do not timely provide the required certification, you may be able to obtain a refund or credit of any excess amounts withheld by timely filing an appropriate claim for a refund with the IRS.

We generally are not required to withhold tax on dividends paid to a Non-U.S. Holder that are effectively connected with the Non-U.S. Holder's conduct of a trade or business within the United States (and, if required by an applicable income tax treaty, are attributable to a permanent establishment that such holder maintains in the United States) if a properly executed IRS Form W-8ECI, stating that the dividends are so connected, is furnished to us (or, if stock is held through a financial institution or other agent, to such agent). In general, such effectively connected dividends will be subject to U.S. federal income tax, on a net income basis at the regular graduated rates applicable to U.S. residents. A corporate Non-U.S. Holder receiving effectively connected dividends may also be subject to an additional "branch profits tax" which is imposed, under certain circumstances, at a rate of 30% (or such lower rate as may be specified by an applicable treaty) on the corporate Non-U.S. Holder's effectively connected earnings and profits, subject to certain adjustments. Non-U.S. Holders should consult their tax advisors regarding any applicable income tax treaties that may provide for different rules.

To the extent distributions on our common stock, if any, exceed our current and accumulated earnings and profits, they will first reduce the Non-U.S. Holder's adjusted basis in our common stock, but not below zero, and then will be treated as gain to the extent of any excess and taxed in the same manner as gain realized from a sale or other disposition of common stock as described in the next section.

Gain on Disposition of Our Common Stock

Subject to the discussion below regarding backup withholding and foreign accounts, a Non-U.S. Holder generally should not be subject to U.S. federal income tax with respect to gain realized on a sale or other disposition of our common stock unless (1) the gain is effectively connected with a trade or business of such holder in the United States (and, if required by an applicable income tax treaty, is attributable to a permanent establishment that such holder maintains in the United States), (2) the Non-U.S. Holder is a nonresident alien individual and is present in the United States for 183 or more days in the taxable year of the disposition and certain other conditions are met or (3) we are or have been a "United States real property holding corporation" within the meaning of Section 897(c)(2) of the Code at any time within the shorter of the five-year period preceding such disposition or such holder's holding period. In general, we would be a U.S. real property holding corporation if interests in U.S. real estate comprised at least half of the fair market value of our business assets. We believe that we are not, and do not anticipate becoming, a U.S. real property holding corporation. However, because the determination of whether we are a U.S. real property holding corporation depends on the fair market value of our U.S. real property relative to the fair market value of our other business assets, there can be no assurance that we will not become a U.S. real property holding corporation in the future. Even if we are treated as a U.S. real property holding corporation, gain realized by a Non-U.S. Holder on a disposition of our common stock will not be subject to U.S. federal income tax so long as (a) the Non-U.S. Holder owned, directly, indirectly and constructively, no more than five percent of our common stock at all times within the shorter of (1) the five- year period preceding the disposition or (2) the holder's holding period and (b) our common stock is regularly traded on an established securities market. There can be no assurance that our common stock will qualify as regularly traded on an established securities market. If any gain on your disposition is taxable because we are a U.S. real property holding corporation and your ownership of our common stock exceeds 5%, you will be taxed

on such disposition generally in the manner applicable to U.S. persons and, in addition, a purchaser of your common stock may be required to withhold tax with respect to that obligation.

If you are a Non-U.S. Holder described in (1) above, you will be required to pay tax on the net gain derived from the sale at regular graduated U.S. federal income tax rates, and corporate Non-U.S. Holders described in (1) above may be subject to the additional branch profits tax at a 30% rate or such lower rate as may be specified by an applicable income tax treaty. If you are an individual Non-U.S. Holder described in (2) above, you will be required to pay a flat 30% tax on the gain derived from the sale, and such gain may be offset by U.S.-source capital losses if you timely file U.S. tax returns reporting the losses (even though you are not considered a resident of the U.S.).

Information Reporting Requirements and Backup Withholding

Generally, we must report information to the IRS with respect to any dividends we pay on our common stock (even if the payments are not subject to withholding) including the amount of any such dividends, the name and address of the recipient and the amount, if any, of tax withheld. A similar report is sent to dividend recipients. The IRS may make its reports available to tax authorities in the recipient's country of residence pursuant to tax treaties or certain other agreements.

Dividends paid by us or by our paying agents to a Non-U.S. Holder may also be subject to U.S. backup withholding. U.S. backup withholding generally will not apply to a Non-U.S. Holder who provides a properly executed IRS Form W-8BEN (in the case of individuals) or IRS Form W-8BEN-E (in the case of entities), IRS Form W-8ECI or otherwise establishes an exemption. Notwithstanding the foregoing, backup withholding may apply if the payor has actual knowledge, or reason to know, that the holder is a U.S. person who is not an exempt recipient.

Under current U.S. federal income tax law, U.S. information reporting and backup withholding requirements generally will apply to the proceeds of a disposition of our common stock effected by or through a U.S. office of any broker, U.S. or foreign, except that information reporting and such requirements may be avoided if the holder provides a properly executed IRS Form W-8BEN (in the case of individuals) or IRS Form W-8BEN-E (in the case of entities) or otherwise satisfies documentary evidence requirements for establishing Non- U.S. Holder status or otherwise establishes an exemption. Generally, U.S. information reporting and backup withholding requirements will not apply to a payment of disposition proceeds to a Non-U.S. Holder where the transaction is effected outside the U.S. through a non-U.S. office of a non-U.S. broker. Information reporting and backup withholding requirements may, however, apply to a payment of disposition proceeds if the broker has actual knowledge, or reason to know, that the holder is, in fact, a U.S. person. For information reporting purposes, certain brokers with substantial U.S. ownership or operations will generally be treated in a manner similar to U.S. brokers.

Any amounts of tax withheld under the backup withholding rules may be credited against the tax liability of persons subject to backup withholding, provided that the required information is timely furnished to the IRS.

Foreign Accounts

Sections 1471 through 1474 of the Code (commonly referred to as FATCA) impose a U.S. federal withholding tax of 30% on dividends on and the gross proceeds of a disposition of our common stock paid to a foreign financial institution (as specifically defined by applicable rules), unless such institution enters into an agreement with the U.S. government to withhold on certain payments and to collect and provide to the U.S. tax authorities substantial information regarding U.S. account holders of such institution (which includes certain equity holders of such institution, as well as certain account holders that are foreign entities with U.S. owners). FATCA also imposes a U.S. federal withholding tax of 30% on dividends on and the gross proceeds of a disposition of our common stock to a non-financial foreign entity, unless such entity provides the withholding agent with either a certification that it does not have any substantial direct or indirect U.S. owners or provides information regarding substantial direct and indirect U.S. owners of the entity. The withholding tax described

above will not apply if the foreign financial institution or non-financial foreign entity otherwise qualifies for an exemption from the rules. Under certain circumstances, a Non-U.S. Holder might be eligible for refunds or credits of such taxes. Holders are encouraged to consult with their own tax advisors regarding the possible implications of these rules to their investment in our common stock.

The withholding provisions described above apply currently to payments of dividends and, and, subject to the recently released proposed Treasury Regulations described below, will apply to payments of gross proceeds from a sale or other disposition of common stock on or after January 1, 2019. The U.S. Treasury Department recently released proposed regulations which, if finalized in their present form, would eliminate the federal withholding tax of 30% applicable to the gross proceeds of a disposition of our common stock. In its preamble to such proposed regulations, the U.S. Treasury Department stated that taxpayers may generally rely on the proposed regulations until final regulations are issued.

EACH PROSPECTIVE INVESTOR SHOULD CONSULT ITS OWN TAX ADVISOR REGARDING THE TAX CONSEQUENCES OF PURCHASING, HOLDING AND DISPOSING OF OUR COMMON STOCK, INCLUDING THE CONSEQUENCES OF ANY RECENT AND PROPOSED CHANGE IN APPLICABLE LAW.

UNDERWRITING

Citigroup Global Markets Inc., Cowen and Company, LLC and Stifel, Nicolaus & Company, Incorporated are acting as book-running managers of this offering and as representatives of the underwriters named below. Subject to the terms and conditions stated in the underwriting agreement dated the date of this prospectus, the underwriters named below have severally agreed to purchase, and we have agreed to sell to them, the number of shares of our common stock indicated below:

Underwriter	Number of Shares
Citigroup Global Markets Inc.	
Cowen and Company, LLC	
Stifel, Nicolaus & Company, Incorporated	
Needham & Company, LLC	
Total	3,000,000

The underwriting agreement provides that the obligations of the underwriters to purchase the shares of our common stock included in this offering are subject to approval of legal matters by counsel and to other conditions. The underwriters are obligated to purchase all of the shares of our common stock (other than those covered by the option to purchase additional shares described below) if they purchase any of the shares.

Shares of our common stock sold by the underwriters to the public will be offered at the public offering price set forth on the cover of this prospectus. Any shares of our common stock sold by the underwriters to securities dealers may be sold at a discount from the public offering price not to exceed $ per share. After the initial offering of the shares of our common stock to the public, if all the shares of our common stock are not sold at the public offering price, the underwriters may change the offering price and the other selling terms. The representatives have advised us that the underwriters do not intend to make sales to discretionary accounts.

If the underwriters sell more shares of our common stock than the total number set forth in the table above, we have granted to the underwriters an option, exercisable for 30 days from the date of this prospectus, to purchase up to 450,000 additional shares of our common stock at the public offering price less the underwriting discount. The underwriters may exercise the option solely for the purpose of covering the underwriters' option to purchase additional shares, if any, in connection with this offering. To the extent the option is exercised, each underwriter must purchase a number of additional shares of our common stock approximately proportionate to that underwriter's initial purchase commitment set forth in the table above. Any shares of our common stock issued or sold under the option will be issued and sold on the same terms and conditions as the other shares of our common stock that are the subject of this offering.

We, our officers and directors and some of our stockholders have agreed that, subject to specified limited exceptions, for a period of 60 days from the date of this prospectus, we and they will not, without the prior written consent of Citigroup Global Markets Inc. and Cowen and Company, LLC, offer, sell, contract to sell, pledge or otherwise dispose of, including the filing of a registration statement in respect of, or hedge any shares of our common stock or any securities convertible into, or exercisable or exchangeable for, our common stock. Citigroup Global Markets Inc. and Cowen and Company, LLC in their sole discretion may release any of the securities subject to these lock-up agreements at any time.

Our common stock is listed on the Nasdaq Global Market under the symbol "PHAS."

The following table shows the per share and total public offering price, underwriting discounts and commissions that we are to pay to the underwriters and proceeds to us, before expenses, in connection with this offering. These amounts are shown assuming both no exercise and full exercise of the underwriters' option to purchase additional shares:

		Total	
	Per share	**No exercise**	**Full exercise**
Public offering price	$		
Underwriting discounts and commissions paid by us	$		
Proceeds to us, before expenses	$		

We estimate that expenses payable by us in connection with this offering, exclusive of underwriting discounts and commissions, will be approximately $350,000. We have also agreed to reimburse the underwriters for expenses in an amount up to $30,000 relating to the clearance of this offering with the Financial Industry Regulatory Authority, Inc.

In connection with this offering, the underwriters may purchase and sell shares of our common stock in the open market. Purchases and sales in the open market may include short sales, purchases to cover short positions, which may include purchases pursuant to the underwriters' option to purchase additional shares, and other transactions that would stabilize, maintain or otherwise affect the price of our common stock.

- Short sales involve secondary market sales by the underwriters of a greater number of shares of our common stock than they are required to purchase in this offering:
    - "Covered" short sales involve secondary market sales by the underwriters of a greater number of shares of our common stock than they are represented by the underwriters' option.
    - "Naked" short sales involve secondary market sales by the underwriters of a greater number of shares of our common stock than they are represented by the underwriters' option.
- The underwriters can close out a short position by purchasing additional shares of our common stock, either pursuant to the underwriters' option to purchase additional shares or in the open market.
    - To close a naked short position, the underwriters must purchase shares of our common stock in the open market. A naked short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of the shares of our common stock in the open market after pricing that could adversely affect investors who purchase in this offering.
    - To close a covered short position, the underwriters must purchase shares of our common stock in the open market or exercise their option. In determining the source of shares of our common stock to close the covered short position, the underwriters will consider, among other things, the price of shares of our common stock available for purchase in the open market as compared to the price at which they may purchase shares of our common stock through their option.
- As an additional means of facilitating this offering, the underwriters may bid for, and purchase, shares of our common stock on the Nasdaq Global Market, as long as such bids do not exceed a specified maximum, to stabilize the price of the shares of our common stock.

Purchases to cover short positions and stabilizing purchases, as well as other purchases by the underwriters for their own accounts, may have the effect of preventing or retarding a decline in the market price of the shares. They may also cause the price of the shares of our common stock to be higher than the price that would otherwise prevail in the open market in the absence of these transactions. The underwriters may conduct these transactions on the Nasdaq Global Market, in the over-the-counter market or otherwise. The underwriters are not required to engage in any of these transactions and may discontinue them at any time.

We have agreed to indemnify the underwriters against certain liabilities, including liabilities under the Securities Act, or to contribute to payments the underwriters may be required to make because of any of those liabilities.

A prospectus in electronic format may be made available on websites maintained by one or more of the underwriters or their respective affiliates. The representatives may agree with us to allocate a number of shares of our common stock to underwriters for sale to their online brokerage account holders. Any such allocation for online distributions will be made by the underwriters on the same basis as other allocations. Other than the prospectus in electronic format, the information on the underwriters' or their respective affiliates' websites and any information contained in any other website maintained by any of the underwriters or their respective affiliates is not part of this prospectus, has not been approved and/or endorsed by us or the underwriters and should not be relied upon by investors in this offering.

Other Relationships

The underwriters are full-service financial institutions engaged in various activities, which may include securities trading, commercial and investment banking, financial advisory, investment management, principal investment, hedging, financing and brokerage activities. The underwriters and their respective affiliates may, from time to time, engage in transactions with and perform services for us in the ordinary course of their business for which they may receive customary fees and reimbursement of expenses. In the ordinary course of their various business activities, the underwriters and their respective affiliates may make or hold a broad array of investments and actively trade debt and equity securities (or related derivative securities) and financial instruments (which may include bank loans or credit default swaps) for their own account and for the accounts of their customers and may at any time hold long and short positions in such securities and instruments. Such investments and securities activities may involve securities and/or instruments of ours or our affiliates. The underwriters and their affiliates may also make investment recommendations and/or publish or express independent research views in respect of such securities or financial instruments and may hold, or recommend to clients that they acquire, long or short positions in such securities and instruments.

Notice to Prospective Investors in the European Economic Area

In relation to each member state of the European Economic Area that has implemented the Prospectus Directive (each, a relevant member state), with effect from and including the date on which the Prospectus Directive is implemented in that relevant member state (the relevant implementation date), an offer of shares of our common stock described in this prospectus may not be made to the public in that relevant member state other than:

- to any legal entity which is a qualified investor as defined in the Prospectus Directive;
- to fewer than 100 or, if the relevant member state has implemented the relevant provision of the 2010 PD Amending Directive, 150 natural or legal persons (other than qualified investors as defined in the Prospectus Directive), as permitted under the Prospectus Directive, subject to obtaining the prior consent of the relevant Dealer or Dealers nominated by us for any such offer; or
- in any other circumstances falling within Article 3(2) of the Prospectus Directive,

provided that no such offer of shares of our common stock shall require us or any underwriter to publish a prospectus pursuant to Article 3 of the Prospectus Directive.

For purposes of this provision, the expression an "offer of securities to the public" in any relevant member state means the communication in any form and by any means of sufficient information on the terms of the offer and the shares of our common stock to be offered so as to enable an investor to decide to purchase or subscribe for any shares of our common stock, as the expression may be varied in that member state by any measure implementing the Prospectus Directive in that member state, the expression "Prospectus Directive" means

Directive 2003/71/EC (and amendments thereto, including the 2010 PD Amending Directive, to the extent implemented in the relevant member state) and includes any relevant implementing measure in the relevant member state, and the expression "2010 PD Amending Directive" means Directive 2010/73/EU.

The sellers of the shares of our common stock have not authorized and do not authorize the making of any offer of shares of our common stock through any financial intermediary on their behalf, other than offers made by the underwriters with a view to the final placement of the shares of our common stock as contemplated in this prospectus. Accordingly, no purchaser of the shares of our common stock, other than the underwriters, is authorized to make any further offer of the shares of our common stock on behalf of the sellers or the underwriters.

Notice to Prospective Investors in the United Kingdom

This prospectus is only being distributed to, and is only directed at, persons in the United Kingdom that are qualified investors within the meaning of Article 2(1)(e) of the Prospectus Directive that are also (1) investment professionals falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005, or the Order, or (2) high net worth entities, and other persons to whom it may lawfully be communicated, falling within Article 49(2)(a) to (d) of the Order (each such person being referred to as a relevant person).

This prospectus and its contents are confidential and should not be distributed, published or reproduced (in whole or in part) or disclosed by recipients to any other persons in the United Kingdom. Any person in the United Kingdom that is not a relevant person should not act or rely on this document or any of its contents.

Notice to Prospective Investors in Australia

No prospectus or other disclosure document (as defined in the Corporations Act 2001 (Cth) of Australia, or Corporations Act) in relation to our common stock has been or will be lodged with the Australian Securities & Investments Commission, or ASIC. This document has not been lodged with ASIC and is only directed to certain categories of exempt persons. Accordingly, if you receive this document in Australia:

- you confirm and warrant that you are either:
    - a "sophisticated investor" under Section 708(8)(a) or (b) of the Corporations Act;
    - a "sophisticated investor" under Section 708(8)(c) or (d) of the Corporations Act and that you have provided an accountant's certificate to us which complies with the requirements of Section 708(8)(c)(i) or (ii) of the Corporations Act and related regulations before the offer has been made; a person associated with the company under Section 708(12) of the Corporations Act; or
    - a "professional investor" within the meaning of Section 708(11)(a) or (b) of the Corporations Act, and to the extent that you are unable to confirm or warrant that you are an exempt sophisticated investor, associated person or professional investor under the Corporations Act any offer made to you under this document is void and incapable of acceptance; and
- you warrant and agree that you will not offer any of our common stock for resale in Australia within 12 months of that common stock being issued unless any such resale offer is exempt from the requirement to issue a disclosure document under Section 708 of the Corporations Act.

Notice to Prospective Investors in Canada

The securities may be sold only to purchasers purchasing, or deemed to be purchasing, as principal that are accredited investors, as defined in National Instrument 45-106 Prospectus Exemptions or subsection 73.3(1) of the Securities Act (Ontario), and are permitted clients, as defined in National Instrument 31-103 Registration

Requirements, Exemptions and Ongoing Registrant Obligations. Any resale of the securities must be made in accordance with an exemption from, or in a transaction not subject to, the prospectus requirements of applicable securities laws.

Securities legislation in certain provinces or territories of Canada may provide a purchaser with remedies for rescission or damages if this prospectus (including any amendment thereto) contains a misrepresentation, provided that the remedies for rescission or damages are exercised by the purchaser within the time limit prescribed by the securities legislation of the purchaser's province or territory. The purchaser should refer to any applicable provisions of the securities legislation of the purchaser's province or territory for particulars of these rights or consult with a legal advisor.

Pursuant to Section 3A.3 of National Instrument 33-105 Underwriting Conflicts (NI 33-105), the underwriters are not required to comply with the disclosure requirements of NI 33-105 regarding underwriter conflicts of interest in connection with this offering.

Notice to Prospective Investors in France

Neither this prospectus nor any other offering material relating to the shares of our common stock described in this prospectus has been submitted to the clearance procedures of the *Autorité des Marchés Financiers* or of the competent authority of another member state of the European Economic Area and notified to the *Autorité des Marchés Financiers*. The shares of our common stock have not been offered or sold and will not be offered or sold, directly or indirectly, to the public in France. Neither this prospectus nor any other offering material relating to the shares of our common stock has been or will be:

- released, issued, distributed or caused to be released, issued or distributed to the public in France; or
- used in connection with any offer for subscription or sale of the shares of our common stock to the public in France.

Such offers, sales and distributions will be made in France only:

- to qualified investors (*investisseurs qualifiés*) and/or to a restricted circle of investors (*cercle restreint d'investisseurs*), in each case investing for their own account, all as defined in and in accordance with articles L.411-2, D.411-1, D.411-2, D.734-1, D.744-1, D.754-1and D.764-1 of the French Code monétaire et financier;

- to investment services providers authorized to engage in portfolio management on behalf of third parties; or

- in a transaction that, in accordance with article L.411-2-II-1° -or-2° -or 3° of the French Code *monétaire et financier* and article 211-2 of the General Regulations (*Règlement Général*) of the *Autorité des Marchés Financiers*, does not constitute a public offer (*appel public à l'épargne*).

The shares of our common stock may be resold directly or indirectly, only in compliance with articles L.411-1, L.411-2, L.412-1 and L.621-8 through L.621-8-3 of the French Code *monétaire et financier*.

Notice to Prospective Investors in Hong Kong

The shares of our common stock may not be offered or sold in Hong Kong by means of any document other than (1) in circumstances which do not constitute an offer to the public within the meaning of the Companies Ordinance (Cap. 32, Laws of Hong Kong), or (2) to "professional investors" within the meaning of the Securities and Futures Ordinance (Cap. 571, Laws of Hong Kong) and any rules made thereunder, or (3) in other circumstances which do not result in the document being a "prospectus" within the meaning of the Companies Ordinance (Cap. 32, Laws of Hong Kong) and no advertisement, invitation or document relating to the shares of our common stock may be issued or may be in the possession of any person for the purpose of issue (in each case whether in Hong Kong or elsewhere), which is directed at, or the contents of which are likely to be

accessed or read by, the public in Hong Kong (except if permitted to do so under the laws of Hong Kong) other than with respect to shares of our common stock which are or are intended to be disposed of only to persons outside Hong Kong or only to "professional investors" within the meaning of the Securities and Futures Ordinance (Cap. 571, Laws of Hong Kong) and any rules made thereunder.

Notice to Prospective Investors in the State of Israel

In the State of Israel this prospectus shall not be regarded as an offer to the public to purchase shares of common stock under the Israeli Securities Law, 5728 - 1968, which requires a prospectus to be published and authorized by the Israel Securities Authority, if it complies with certain provisions of Section 15 of the Israeli Securities Law, 5728 - 1968, including, inter alia, if: (1) the offer is made, distributed or directed to not more than 35 investors, subject to certain conditions, or the Addressed Investors; or (2) the offer is made, distributed or directed to certain qualified investors defined in the First Addendum of the Israeli Securities Law, 5728 - 1968, subject to certain conditions, or Qualified Investors. The Qualified Investors shall not be taken into account in the count of the Addressed Investors and may be offered to purchase securities in addition to the 35 Addressed Investors. We have not and will not take any action that would require us to publish a prospectus in accordance with and subject to the Israeli Securities Law, 5728 - 1968. We have not and will not distribute this prospectus or make, distribute or direct an offer to subscribe for our common stock to any person within the State of Israel, other than to Qualified Investors and up to 35 Addressed Investors.

Qualified Investors may have to submit written evidence that they meet the definitions set out in of the First Addendum to the Israeli Securities Law, 5728 - 1968. In particular, we may request that Qualified Investors will each represent, warrant and certify to us and/or to anyone acting on our behalf: (1) that it is an investor falling within one of the categories listed in the First Addendum to the Israeli Securities Law, 5728 - 1968; (2) which of the categories listed in the First Addendum to the Israeli Securities Law, 5728 - 1968 regarding Qualified Investors is applicable to it; (3) that it will abide by all provisions set forth in the Israeli Securities Law, 5728 - 1968 and the regulations promulgated thereunder in connection with this offering; (4) that the shares of common stock that it will be issued are, subject to exemptions available under the Israeli Securities Law, 5728 -1968: (a) for its own account; (b) for investment purposes only; and (c) not issued with a view to resale within the State of Israel, other than in accordance with the provisions of the Israeli Securities Law, 5728 -1968; and (5) that it is willing to provide further evidence of its Qualified Investor status. Addressed Investors may have to submit written evidence in respect of their identity and may have to sign and submit a declaration containing, inter alia, the Addressed Investor's name, address and passport number or Israeli identification number.

Notice to Prospective Investors in Japan

The shares of our common stock offered in this prospectus have not been and will not be registered under the Financial Instruments and Exchange Law of Japan. The shares of our common stock have not been offered or sold and will not be offered or sold, directly or indirectly, in Japan or to or for the account of any resident of Japan (including any corporation or other entity organized under the laws of Japan), except (1) pursuant to an exemption from the registration requirements of the Financial Instruments and Exchange Law and (2) in compliance with any other applicable requirements of Japanese law.

Notice to Prospective Investors in Singapore

This prospectus has not been registered as a prospectus with the Monetary Authority of Singapore. Accordingly, this prospectus and any other document or material in connection with the offer or sale, or invitation for subscription or purchase, of the shares of our common stock may not be circulated or distributed, nor may the shares of our common stock be offered or sold, or be made the subject of an invitation for subscription or purchase, whether directly or indirectly, to persons in Singapore other than (1) to an institutional investor under Section 274 of the Securities and Futures Act, Chapter 289 of Singapore, or the SFA, (2) to a relevant person pursuant to Section 275(1), or any person pursuant to Section 275(1A), and in accordance with the conditions specified in Section 275 of the SFA or (3) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA, in each case subject to compliance with conditions set forth in the SFA.

Where the shares of our common stock are subscribed or purchased under Section 275 of the SFA by a relevant party which is:

- a corporation (which is not an accredited investor (as defined in Section 4A of the SFA)) the sole business of which is to hold investments and the entire share capital of which is owned by one or more individuals, each of whom is an accredited investor; or

- a trust (where the trustee is not an accredited investor) whose sole purpose is to hold investments and each beneficiary of the trust is an individual who is an accredited investor, shares, debentures and units of shares of our common stock and debentures of that corporation or the beneficiaries' rights and interest (howsoever described) in that trust shall not be transferred within six months after that corporation or that trust has acquired the shares of our common stock pursuant to an offer made under Section 275 of the SFA except:

    - to an institutional investor (for corporations, under Section 274 of the SFA) or to a relevant person defined in Section 275(2) of the SFA, or to any person pursuant to an offer that is made on terms that such shares, debentures and units of shares of our common stock and debentures of that corporation or such rights and interest in that trust are acquired at a consideration of not less than $200,000 (or its equivalent in a foreign currency) for each transaction, whether such amount is to be paid for in cash or by exchange of securities or other assets, and further for corporations, in accordance with the conditions specified in Section 275 of the SFA;

    - where no consideration is or will be given for the transfer; or

    - where the transfer is by operation of law.

LEGAL MATTERS

The validity of the shares of common stock being offered by this prospectus will be passed upon for us by Cooley LLP, Reston, Virginia. Goodwin Procter LLP, New York, New York, is representing the underwriters in connection with this offering.

EXPERTS

The financial statements of PhaseBio Pharmaceuticals, Inc. as of December 31, 2018 and 2017 and for the years then ended have been incorporated by reference herein and in the registration statement in reliance upon the report of KPMG LLP, independent registered public accounting firm, incorporated by reference herein, and upon the authority of said firm as experts in accounting and auditing.

WHERE YOU CAN FIND ADDITIONAL INFORMATION

We have filed with the SEC a registration statement on Form S-1 under the Securities Act, with respect to the shares of common stock being offered by this prospectus. This prospectus, which constitutes part of the registration statement, does not contain all of the information in the registration statement and its exhibits. For further information with respect to our company and the common stock offered by this prospectus, we refer you to the registration statement and its exhibits. Statements contained in this prospectus as to the contents of any contract or any other document referred to are not necessarily complete, and in each instance, we refer you to the copy of the contract or other document filed as an exhibit to the registration statement. Each of these statements is qualified in all respects by this reference.

You can read our SEC filings, including the registration statement, over the internet at the SEC's website at *www.sec.gov*.

We are subject to the information reporting requirements of the Exchange Act, and we have filed and will file reports, proxy statements and other information with the SEC. These reports, proxy statements and other information will be available at the website of the SEC referred to above. We also maintain a website at *www.phasebio.com*, at which you may access these materials free of charge as soon as reasonably practicable after they are electronically filed with, or furnished to, the SEC. The information contained in, or that can be accessed through, our website is not part of, and is not incorporated into, this prospectus.

INCORPORATION OF CERTAIN INFORMATION BY REFERENCE

The SEC allows us to "incorporate by reference" information from other documents that we file with it, which means that we can disclose important information to you by referring you to those documents. The information incorporated by reference is considered to be part of this prospectus. Information in this prospectus supersedes information incorporated by reference that we filed with the SEC prior to the date of this prospectus. We incorporate by reference into this prospectus and the registration statement of which this prospectus is a part the information or documents listed below that we have filed with the SEC (File No. 001-38697):

- our Annual Report on Form 10-K for the fiscal year ended December 31, 2018, filed with the SEC on March 26, 2019;
- our definitive Proxy Statement on Schedule 14A, filed with the SEC on April 5, 2019 (excluding those portions that are not incorporated by reference into our Annual Report on Form 10-K for the fiscal year ended December 31, 2018); and
- our Current Reports on Form 8-K filed with the SEC on January 25, 2019, March 4, 2019, March 21, 2019, April 4, 2019 and April 9, 2019, in each case to the extent the information in such reports is filed and not furnished; and
- the description of our common stock contained in our registration statement on Form 8-A filed with the SEC on October 9, 2018, including any amendments or reports filed for the purposes of updating this description.

Notwithstanding the statements in the preceding paragraphs, no document, report or exhibit (or portion of any of the foregoing) or any other information that we have "furnished" to the SEC pursuant to the Exchange Act shall be incorporated by reference into this prospectus.

We will furnish without charge to you, on written or oral request, a copy of any or all of the documents incorporated by reference in this prospectus, including exhibits to these documents. You should direct any requests for documents to PhaseBio Pharmaceuticals, Inc., Attn: Corporate Secretary, 1 Great Valley Parkway, Suite 30, Malvern, Pennsylvania 19355.

You also may access these filings on our website at *www.phasebio.com*. We do not incorporate the information on our website into this prospectus or any supplement to this prospectus and you should not consider any information on, or that can be accessed through, our website as part of this prospectus or any supplement to this prospectus (other than those filings with the SEC that we specifically incorporate by reference into this prospectus or any supplement to this prospectus).

Any statement contained in a document incorporated or deemed to be incorporated by reference in this prospectus will be deemed modified, superseded or replaced for purposes of this prospectus to the extent that a statement contained in this prospectus modifies, supersedes or replaces such statement.

Table of Contents

3,000,000 Shares

Common Stock

PRELIMINARY PROSPECTUS

, 2019

Citigroup **Cowen** **Stifel**

Needham & Company

PART II

INFORMATION NOT REQUIRED IN PROSPECTUS

Item 13. Other Expenses of Issuance and Distribution.

The following table sets forth all costs and expenses, other than underwriting discounts and commissions, payable by us in connection with the sale of the common stock being registered. All amounts shown are estimates except for the Securities and Exchange Commission, or SEC, registration fee and the Financial Industry Regulatory Authority, Inc., or FINRA, filing fee.

	Amount to be Paid
SEC registration fee	$ 4,904
FINRA filing fee	6,750
Printing and engraving expenses	17,500
Legal fees and expenses	200,000
Accounting fees and expenses	65,000
Transfer agent and registrar fees	5,000
Miscellaneous fees and expenses	50,846
Total	$ 350,000

Item 14. Indemnification of Directors and Officers.

We are incorporated under the laws of the State of Delaware. Section 102 of the Delaware General Corporation Law permits a corporation to eliminate the personal liability of directors of a corporation to the corporation or its stockholders for monetary damages for a breach of fiduciary duty as a director, except where the director breached his or her duty of loyalty, failed to act in good faith, engaged in intentional misconduct or knowingly violated a law, authorized the payment of a dividend or approved a stock repurchase in violation of Delaware corporate law or obtained an improper personal benefit.

Section 145 of the Delaware General Corporation Law provides that a corporation has the power to indemnify a director, officer, employee or agent of the corporation and certain other persons serving at the request of the corporation in related capacities against expenses (including attorneys' fees), judgments, fines and amounts paid in settlements actually and reasonably incurred by the person in connection with an action, suit or proceeding to which he or she is or is threatened to be made a party by reason of such position, if such person acted in good faith and in a manner he or she reasonably believed to be in or not opposed to the best interests of the corporation, and, in any criminal action or proceeding, had no reasonable cause to believe his or her conduct was unlawful, except that, in the case of actions brought by or in the right of the corporation, no indemnification shall be made with respect to any claim, issue or matter as to which such person shall have been adjudged to be liable to the corporation unless and only to the extent that the Court of Chancery or other adjudicating court determines that, despite the adjudication of liability but in view of all of the circumstances of the case, such person is fairly and reasonably entitled to indemnity for such expenses which the Court of Chancery or such other court shall deem proper.

As permitted by the Delaware General Corporation Law, our amended and restated bylaws will provide that: (1) we are required to indemnify our directors and executive officers to the fullest extent permitted by the Delaware General Corporation Law; (2) we may, in our discretion, indemnify our other officers, employees and agents as set forth in the Delaware General Corporation Law; (3) we are required, upon satisfaction of certain conditions, to advance all expenses incurred by our directors and executive officers in connection with certain legal proceedings; (4) the rights conferred in the bylaws are not exclusive; (5) we are authorized to enter into

indemnification agreements with our directors, officers, employees and agents and (6) we may secure insurance on behalf of any director, officer, employee or other agent for any liability arising out of his or her actions in that capacity regardless of whether we would otherwise be permitted to indemnify him or her under the provisions of Delaware law.

Our policy is to enter into agreements with our directors and executive officers that require us to indemnify them against expenses, judgments, fines, settlements and other amounts that any such person becomes legally obligated to pay (including with respect to a derivative action) in connection with any proceeding, whether actual or threatened, to which such person may be made a party by reason of the fact that such person is or was a director or officer of us or any of our affiliates, provided such person acted in good faith and in a manner such person reasonably believed to be in, or not opposed to, our best interests. These indemnification agreements also set forth certain procedures that will apply in the event of a claim for indemnification thereunder. At present, no litigation or proceeding is pending that involves any of our directors or officers regarding which indemnification is sought, nor are we aware of any threatened litigation that may result in claims for indemnification.

We maintain a directors' and officers' liability insurance policy. The policy insures directors and officers against unindemnified losses arising from certain wrongful acts in their capacities as directors and officers and reimburses us for those losses for which we have lawfully indemnified the directors and officers. The policy contains various exclusions.

In addition, the underwriting agreement filed as Exhibit 1.1 to this registration statement provides for indemnification by the underwriters of us and our officers and directors for certain liabilities arising under the Securities Act of 1933, as amended, or the Securities Act, or otherwise. Our investor rights agreement with certain stockholders filed as Exhibit 4.3 to this registration statement also provides for cross-indemnification in connection with the registration of our common stock on behalf of such investors.

See the undertakings set forth in response to Item 17 herein.

Item 15. Recent Sales of Unregistered Securities.

The following list sets forth information regarding all unregistered securities issued by us since January 1, 2016 through the date of the prospectus that is a part of this registration statement.

Issuances of Capital Stock

1. In January 2017, we sold convertible promissory notes in the aggregate principal amount of $6,615,000 and issued warrants to 10 investors to purchase an aggregate of 136,979 shares of Series C-1 redeemable convertible preferred stock at $0.12 per share.

2. In October 2017, in connection with a loan and security agreement, we issued warrants to Silicon Valley Bank to purchase 49,713 shares of Series C-1 redeemable convertible preferred stock at $9.659 per share.

3. In October 2017, we sold convertible promissory notes in the aggregate principal amount of up to $8,085,000 and issued warrants to 10 investors to purchase an aggregate of 167,418 shares of Series C-1 redeemable convertible preferred stock at $0.12 per share.

4. In August 2018, we issued 1,842,959 shares of Series D redeemable convertible preferred stock to 19 investors for a purchase price of $9.659 per share, for net proceeds of $17.7 million and issued warrants to purchase 368,582 shares of Series C-1 redeemable convertible preferred stock. We concurrently issued 2,080,209 shares of Series D redeemable convertible preferred stock to 10 investors upon the conversion of outstanding convertible promissory notes, and accrued interest thereon, in the aggregate principal amount of up to $14.7 million. In August and September 2018, we issued 144,951 shares of Series C-1 redeemable convertible preferred stock to seven investors upon the exercise of warrants, for aggregate consideration of $16,036.61.

5. In March 2019, in connection with a loan and security agreement, we issued warrants to purchase an aggregate of 37,606 shares of common stock to Silicon Valley Bank and WestRiver Innovation Lending Fund VIII at $4.73 per share.

The offers, sales and issuances of the securities described in the preceding paragraph were deemed to be exempt from registration under the Securities Act in reliance on Section 4(a)(2) of the Securities Act or Rule 506 of Regulation D promulgated thereunder as a transaction by an issuer not involving a public offering. The recipients of securities in each of these transactions acquired the securities for investment only and not with a view to or for sale in connection with any distribution thereof, and appropriate legends were affixed to the securities issued in these transactions. Each of the recipients of securities in these transactions was either an accredited investor within the meaning of Rule 501 of Regulation D under the Securities Act or had adequate access, through employment, business or other relationships, to information about us.

In addition, in connection with the closing of our initial public offering in October 2018, we issued 58,248 shares of common stock upon the exercise of warrants for cash at a weighted-average exercise price of $0.12 per share. We also issued 560,838 shares of common stock upon the net exercise of warrants at a weighted-average exercise price of $0.12 per share. In conjunction with this transaction, an aggregate of 13,800 shares of common stock otherwise issuable pursuant to such warrants were forfeited as consideration for the exercise. Upon the completion of our initial public offering in October 2018, all of our outstanding shares of redeemable convertible preferred stock, including the shares described above, automatically converted into an aggregate of 13,200,115 shares of common stock. The issuance of the securities described in this paragraph was exempt from registration under Section 3(a)(9) of the Securities Act.

Issuances of Equity Awards

From January 1, 2016 through October 22, 2018, the date of effectiveness of our registration statement on Form S-8, we have granted options under our Amended and Restated 2002 Stock Plan to purchase an aggregate of 1,074,663 shares of our common stock to our officers, employees and consultants, having exercise prices ranging from $1.43 to $5.00 per share. During this time period, options to purchase an aggregate of 99,501 shares have been cancelled without being exercised and 39,114 shares were issued upon the exercise of stock options, at a weighted-average exercise price of $2.09 per share, for aggregate proceeds of approximately $82,000.

The offers, sales and issuances of the securities described in the preceding paragraph were deemed to be exempt from registration either under Rule 701 promulgated under the Securities Act, in that the transactions were under compensatory benefit plans and contracts relating to compensation, or under Section 4(a)(2) of the Securities Act in that the transactions were between an issuer and members of its senior executive management and did not involve any public offering within the meaning of Section 4(a)(2). The recipients of such securities were our employees, directors or consultants and received the securities under our equity incentive plans. Appropriate legends were affixed to the securities issued in these transactions.

The information in this Item 15 gives effect to an 11.0643-for-1 reverse stock split of our common and redeemable convertible preferred stock effected on October 4, 2018.

Item 16. Exhibits and Financial Statement Schedules.

(a) Exhibits

Exhibit Number	Exhibit Title	Incorporated by Reference			
		Form	File No.	Exhibit	Filing Date
1.1	Form of Underwriting Agreement.				
3.1	Amended and Restated Certificate of Incorporation of PhaseBio Pharmaceuticals, Inc.	8-K	001-38697	3.1	October 22, 2018
3.2	Amended and Restated Bylaws of PhaseBio Pharmaceuticals, Inc.	S-1/A	333-227474	3.4	October 5, 2018
4.1	Form of Warrant to Purchase Shares of Series B Redeemable Convertible Preferred Stock, issued by PhaseBio Pharmaceuticals, Inc. on December 22, 2009.	S-1	333-227474	4.2	September 21, 2018

Exhibit Number	Exhibit Title	Incorporated by Reference			
		Form	File No.	Exhibit	Filing Date
4.2	Warrant to Purchase Shares of Series C-1 Redeemable Convertible Preferred Stock, issued by PhaseBio Pharmaceuticals, Inc. to Silicon Valley Bank on October 18, 2017.	S-1	333-227474	4.3	September 21, 2018
4.3	Fourth Amended and Restated Investor Rights Agreement, by and among PhaseBio Pharmaceuticals, Inc. and certain of its stockholders, dated August 27, 2018.	S-1	333-227474	4.4	September 21, 2018
4.4	Warrant to Purchase Shares of Common Stock, issued by PhaseBio Pharmaceuticals, Inc. to Silicon Valley Bank on March 25, 2019.	10-K	001-38697	4.4	March 26, 2019
4.5	Warrant to Purchase Shares of Common Stock, issued by PhaseBio Pharmaceuticals, Inc. to WestRiver Innovation Lending Fund VIII, L.P. on March 25, 2019.	10-K	001-38697	4.5	March 26, 2019
5.1	Opinion of Cooley LLP.				
10.1+	2018 Equity Incentive Plan and Forms of Stock Option Grant Notice and Agreement and Restricted Stock Unit Grant Notice and Agreement thereunder.	S-8	333-227935	10.2	October 22, 2018
10.2+	2018 Employee Stock Purchase Plan.	S-8	333-227935	10.3	October 22, 2018
10.3+	Non-Employee Director Compensation Policy.	S-1/A	333-227474	10.4	October 5, 2018
10.4+	Form of Indemnification Agreement by and between PhaseBio Pharmaceuticals, Inc. and each of its directors and executive officers.	S-1/A	333-227474	10.5	October 5, 2018
10.5+	Severance Benefit Plan and Form of Participation Agreement.	S-1/A	333-227474	10.6.1	October 5, 2018
10.6+	Amended and Restated 2002 Stock Plan and Form of Option Agreement and Exercise Notice thereunder, as amended to date.	S-1	333-227474	10.1	September 21, 2018
10.7+	Offer Letter, dated as of November 19, 2012, by and between PhaseBio Pharmaceuticals, Inc. and Jonathan P. Mow, as amended to date.	S-1	333-227474	10.7	September 21, 2018
10.8+	Offer Letter, dated as of March 13, 2016, by and between PhaseBio Pharmaceuticals, Inc. and John Sharp.	S-1	333-227474	10.8	September 21, 2018
10.9+	Offer Letter, dated as of November 19, 2012, by and between PhaseBio Pharmaceuticals, Inc. and John Lee, M.D., Ph.D.	S-1	333-227474	10.9	September 21, 2018
10.10#	License Agreement, dated as of October 18, 2017 and as amended to date, by and between Phase Bioscience, Inc. (predecessor to PhaseBio Pharmaceuticals, Inc.) and Duke University	S-1	333-227474	10.10	September 21, 2018
10.11#	License Agreement, dated as of November 21, 2017, by and between PhaseBio Pharmaceuticals, Inc. and MedImmune Limited.	S-1	333-227474	10.11	September 21, 2018
10.12	Loan and Security Agreement, dated as of October 18, 2017 and as amended to date, by and between PhaseBio Pharmaceuticals, Inc. and Silicon Valley Bank.	S-1	333-227474	10.12	September 21, 2018

Exhibit Number	Exhibit Title	Incorporated by Reference			
		Form	File No.	Exhibit	Filing Date
10.13	Loan and Security Agreement, dated as of March 25, 2019, by and among PhaseBio Pharmaceuticals, Inc. and Silicon Valley Bank and WestRiver Innovation Lending Fund VIII, L.P.	10-K	001-38697	10.13	March 26, 2019
10.14	Lease Agreement, dated as of January 15, 2010 and as amended to date, by and between PhaseBio Pharmaceuticals, Inc. and Liberty Property Limited Partnership.	S-1	333-227474	10.13	September 21, 2018
10.15##	Master Services Agreement, dated as of November 14, 2018, by and between PhaseBio Pharmaceuticals, Inc. and BioVectra Inc.	10-K	001-38697	10.14	March 26, 2019
10.16##	License Agreement, dated April 1, 2019, by and between PhaseBio Pharmaceuticals, Inc. and Wacker Biotech GmbH.				
10.17##	Eighth Amendment to License Agreement, dated as of March 5, 2019, by and between PhaseBio Pharmaceuticals, Inc. and Duke University.	8-K	001-38697	10.1	April 9, 2019
23.1	Consent of KPMG LLP, independent registered public accounting firm.				
23.2	Consent of Cooley LLP (included in Exhibit 5.1).				
24.1	Power of Attorney (included on signature page hereto).				

+ Indicates management contract or compensatory plan.

Confidential treatment has been granted for certain portions of this exhibit (indicated by asterisks). Such information has been omitted and was filed separately with the Securities and Exchange Commission.

Certain portions of this exhibit (indicated by asterisks) have been omitted because they are not material and would likely cause competitive harm to PhaseBio Pharmaceuticals, Inc., if publicly disclosed.

(b) Financial Statement Schedules

No financial statement schedules are provided because the information called for is not required or is shown either in the financial statements or related notes, which are incorporated herein by reference.

Item 17. Undertakings.

The undersigned Registrant hereby undertakes to provide to the underwriters at the closing specified in the underwriting agreement, certificates in such denominations and registered in such names as required by the underwriters to permit prompt delivery to each purchaser.

Insofar as indemnification by the registrant for liabilities arising under the Securities Act may be permitted to directors, officers and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the SEC such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Securities Act and will be governed by the final adjudication of such issue.

The undersigned registrant hereby undertakes that:

(1) For purposes of determining any liability under the Securities Act, the information omitted from the form of prospectus filed as part of this Registration Statement in reliance upon Rule 430A and contained in a form of prospectus filed by the registrant pursuant to Rule 424(b)(1) or (4) or 497(h) under the Securities Act shall be deemed to be part of this Registration Statement as of the time it was declared effective.

(2) For the purpose of determining any liability under the Securities Act, each post-effective amendment that contains a form of prospectus shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

Table of Contents

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, as amended, the Registrant has duly caused this Registration Statement to be signed on its behalf by the undersigned, thereunto duly authorized, in Malvern, Pennsylvania, on the 9th day of April, 2019.

PHASEBIO PHARMACEUTICALS INC.

By: /s/ Jonathan P. Mow
Jonathan P. Mow
Chief Executive Officer

KNOW ALL BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints Jonathan P. Mow and John Sharp, and each of them, his or her true and lawful agent, proxy and attorney-in-fact, with full power of substitution and resubstitution, for him or her and in his or her name, place and stead, in any and all capacities, to (1) act on, sign and file with the Securities and Exchange Commission any and all amendments (including post-effective amendments) to this registration statement together with all schedules and exhibits thereto and any subsequent registration statement filed pursuant to Rule 462(b) under the Securities Act of 1933, as amended, together with all schedules and exhibits thereto, (2) act on, sign and file such certificates, instruments, agreements and other documents as may be necessary or appropriate in connection therewith, (3) act on and file any supplement to any prospectus included in this registration statement or any such amendment or any subsequent registration statement filed pursuant to Rule 462(b) under the Securities Act of 1933, as amended, and (4) take any and all actions which may be necessary or appropriate to be done, as fully for all intents and purposes as he or she might or could do in person, hereby approving, ratifying and confirming all that such agent, proxy and attorney-in-fact or any of his substitutes may lawfully do or cause to be done by virtue thereof.

Pursuant to the requirements of the Securities Act of 1933, as amended, this Registration Statement has been signed by the following persons in the capacities and on the dates indicated.

Signature	Title	Date
/s/ Jonathan P. Mow Jonathan P. Mow	Chief Executive Officer and Director *(Principal Executive Officer)*	April 9, 2019
/s/ John Sharp John Sharp	Chief Financial Officer *(Principal Financial Officer and Principal Accounting Officer)*	April 9, 2019
/s/ Clay B. Thorp Clay B. Thorp	Chairman of the Board of Directors	April 9, 2019
/s/ Edmund P. Harrigan, M.D. Edmund P. Harrigan, M.D.	Director	April 9, 2019
/s/ Nancy J. Hutson, Ph.D. Nancy J. Hutson, Ph.D.	Director	April 9, 2019
/s/ Peter Justin Klein, M.D., J.D. Peter Justin Klein, M.D., J.D.	Director	April 9, 2019
/s/ Caroline Loewy Caroline Loewy	Director	April 9, 2019
/s/ Bibhash Mukhopadhyay, Ph.D. Bibhash Mukhopadhyay, Ph.D.	Director	April 9, 2019
/s/ Linda Tufts Linda Tufts	Director	April 9, 2019
/s/ Richard A. van den Broek Richard A. van den Broek	Director	April 9, 2019

Exhibit 1.1

PhaseBio Pharmaceuticals, Inc.

[ ] Shares Common
Stock ($0.001 par value)
Underwriting Agreement

New York, New York
[ ], 2019

Citigroup Global Markets Inc.
Cowen and Company, LLC
Stifel, Nicolaus & Company, Incorporated
As Representatives of the several Underwriters,

c/o Citigroup Global Markets
Inc. 388 Greenwich Street
New York, New York 10013

c/o Cowen and Company, LLC
599 Lexington Avenue
New York, New York 10022

c/o Stifel, Nicolaus & Company, Incorporated
One Montgomery Street, Suite 3700
San Francisco, CA 94104

Ladies and Gentlemen:

PhaseBio Pharmaceuticals, Inc., a corporation organized under the laws of Delaware (the "Issuer"), proposes to sell to the several underwriters named in Schedule I hereto (the "Underwriters"), for whom Citigroup Global Markets Inc., Cowen and Company, LLC and Stifel, Nicolaus & Company, Incorporated (the "Representatives") are acting as representatives, [ ] shares of common stock, $0.001 par value per share ("Common Stock") of the Issuer (said shares to be issued and sold by the Issuer being hereinafter called the "Underwritten Securities"). The Issuer also proposes to grant to the Underwriters an option to purchase up to [ ] additional shares of Common Stock to cover over-allotments, if any (the "Option Securities;" the Option Securities, together with the Underwritten Securities, hereinafter called the "Securities"). To the extent there are no additional Underwriters listed on Schedule I other than you, the term Representatives as used herein shall mean you, as Underwriters, and the terms Representatives and Underwriters shall mean either the singular or plural as the context requires.

The offering and sale of the Securities contemplated by this agreement (the "Underwriting Agreement") is referred to herein as the "Offering."

1. Representations and Warranties. The Issuer represents and warrants to, and agrees with, each Underwriter as set forth below:

(a) The Issuer has prepared and filed with the Securities and Exchange Commission (the "SEC") a registration statement (file number 333-[ ]) on Form S-1 including exhibits and financial statements and any prospectus supplement relating to the Securities that is filed with the SEC pursuant to Rule 424(b) under the Securities Act (as defined herein) and deemed part of such registration statement pursuant to Rule 430A under the Securities Act, as amended at the Execution Time (as defined herein) and, in the event any post-effective amendment thereto or any registration statement and any amendments thereto filed pursuant to Rule 462(b) under the Securities Act relating to the Offering (the "Rule 462(b) Registration Statement") becomes effective prior to the Closing Date (as defined herein), shall also mean such registration statement as so amended or such Rule 462(b) Registration Statement, as the case may be (the "Registration Statement"), including a related preliminary prospectus, for registration under the Securities Act of 1933, as amended, and the rules and regulations of the SEC promulgated thereunder (the "Securities Act") of the Offering. Such Registration Statement, including any amendments thereto filed prior to the date and time that this Underwriting Agreement is executed and delivered by the parties hereto (the "Execution Time"), has become effective under the Securities Act. The Issuer may have filed one or more amendments thereto, including a related preliminary prospectus relating to the Securities which is used prior to the filing of the Prospectus (the "Preliminary Prospectus"), each of which has previously been furnished to you. The Issuer will file with the SEC a final prospectus relating to the Securities in accordance with Rule 424(b) after the Execution Time (the "Prospectus"). As filed, such Prospectus shall contain all information required by the Securities Act and the rules thereunder and, except to the extent the Representatives shall agree in writing to a modification, shall be in all substantive respects in the form furnished to you prior to the Execution Time or, to the extent not completed at the Execution Time, shall contain only such specific additional information and other changes (beyond that contained in the latest Preliminary Prospectus) as the Issuer has advised you, prior to the Execution Time, will be included or made therein;

(b) On each date and time that the Registration Statement, any post-effective amendment or amendments thereto and any Rule 462(b) Registration Statement became or becomes effective (the "Effective Date"), the Registration Statement did, and when the Prospectus is first filed in accordance with Rule 424(b) under the Securities Act and on the Closing Date (as defined herein) and on any date on which Option Securities are purchased, if such date is not the Closing Date (a "settlement date"), the Prospectus (and any supplement thereto) will, comply in all material respects with the applicable requirements of the Securities Act and the Securities and Exchange Act of 1934, as amended and the rules and regulations of the SEC promulgated thereunder (the "Exchange Act"); on the Effective Date, at the Execution Time and on the Closing Date, the Registration Statement did not and will not contain any untrue statement of a material fact or omit to state any material fact required to be stated therein or necessary in order to make the statements therein not misleading; and on the date of any filing pursuant to Rule 424(b) and on the Closing Date and any settlement date, the Prospectus (together with any supplement thereto) will not include any untrue statement of a material fact or omit to state a material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading; provided, however, that the Issuer makes no representations or warranties as to the information contained in or omitted from the Registration Statement, or the Prospectus (or any supplement thereto) in reliance upon and in conformity with information furnished in writing to the Issuer by or on behalf of any Underwriter through the Representatives specifically for inclusion in the Registration Statement

or the Prospectus (or any supplement thereto), it being understood and agreed that the only such information furnished by any Underwriter consists of the information described as such in Section 8 hereof;

(c) The "Disclosure Package" shall mean (i) the Preliminary Prospectus that is generally distributed to investors and used to offer the Securities, including any document that is incorporated by reference therein (ii) any issuer free writing prospectus, as defined in Rule 433 under the Securities Act (the "Issuer Free Writing Prospectuses"), if any, identified in Schedule II hereto and (iii) any other free writing prospectus, as defined in Rule 405 under the Securities Act (a "Free Writing Prospectus") that the parties hereto shall hereafter expressly agree in writing to treat as part of the Disclosure Package. (i) The Disclosure Package, (ii) each electronic road show, when taken together as a whole with the Disclosure Package, and (iii) any individual Written Testing-the-Waters Communication (as defined herein), when taken together as a whole with the Disclosure Package and the price to the public, the number of Underwritten Securities and the number of Option Securities to be included on the cover page of the Prospectus, does not contain any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading. The preceding sentence does not apply to statements in or omissions from the Disclosure Package based upon and in conformity with written information furnished to the Issuer by or on behalf of any Underwriter through the Representatives specifically for use therein, it being understood and agreed that the only such information furnished by or on behalf of any Underwriter consists of the information described as such in Section 8 hereof;

(d) (i) At the time of filing the Registration Statement and (ii) as of the Execution Time (with such date being used as the determination date for purposes of this clause (ii)), the Issuer was not and is not an ineligible issuer, as defined in Rule 405 under the Securities Act (an "Ineligible Issuer"), without taking account of any determination by the SEC pursuant to Rule 405 that it is not necessary that the Issuer be considered an Ineligible Issuer;

(e) From the time of initial confidential submission of the Registration Statement to the SEC (or, if earlier, the first date on which the Issuer engaged directly or through any Person authorized to act on its behalf in any Testing-the-Waters Communication) through the Execution Time, the Issuer has been and is an "emerging growth company," as defined in Section 2(a) of the Securities Act (an "Emerging Growth Company"). "Testing-the-Waters Communication" means any oral or written communication with potential investors undertaken in reliance on Section 5(d) of the Securities Act;

(f) The Issuer (i) has not alone engaged in any Testing-the-Waters Communication other than Testing-the-Waters Communications with the consent of the Representatives with entities that are qualified institutional buyers within the meaning of Rule 144A under the Securities Act or institutions that are accredited investors within the meaning of Rule 501 under the Securities Act and (ii) has not authorized anyone other than the Representatives to engage in Testing-the-Waters Communications. The Issuer reconfirms that the Representatives have been authorized to act on its behalf in undertaking Testing-the-Waters Communications. The Issuer has not distributed any Written Testing-the-Waters Communications other than those listed on Schedule III hereto. "Written Testing-the-Waters

Communication" means any Testing-the-Waters Communication that is a written communication within the meaning of Rule 405 under the Securities Act;

(g) Each Issuer Free Writing Prospectus does not include any information that conflicts with the information contained in the Registration Statement, including any document incorporated by reference therein that has not been superseded or modified. The foregoing sentence does not apply to statements in or omissions from any Issuer Free Writing Prospectus based upon and in conformity with written information furnished to the Issuer by or on behalf of any Underwriter through the Representatives specifically for use therein, it being understood and agreed that the only such information furnished by or on behalf of any Underwriter consists of the information described as such in Section 8 hereof;

(h) The interactive data in the eXtensible Business Reporting Language ("XBRL") included as an exhibit to the Registration Statement fairly presents the information called for in all material respects and has been prepared in accordance with the SEC's rules and guidelines applicable thereto;

(i) The Issuer has been duly incorporated and is validly existing as a corporation in good standing under the laws of the jurisdiction in which it is chartered or organized with full corporate power and authority to own or lease, as the case may be, and to operate its properties and conduct its business as described in the Disclosure Package and the Prospectus, and is duly qualified to do business as a foreign corporation and is in good standing under the laws of each jurisdiction which requires such qualification, except where such failure would not reasonably be expected to have a material adverse effect on the condition (financial or otherwise), prospects, earnings, business or properties of the Issuer, whether or not arising from transactions in the ordinary course of business (a "Material Adverse Effect");

(j) There is no franchise, contract or other document of a character required to be described in the Registration Statement or Prospectus, or to be filed as an exhibit thereto, which is not described or filed as required (and the Preliminary Prospectus contains in all material respects the same description of the foregoing matters contained in the Prospectus); and the statements in the Preliminary Prospectus and the Prospectus under the headings ["Material U.S. Federal Income Tax Considerations for Non-U.S. Holders," "Risk Factors – "Risks Related to Our Intellectual Property," "Risk Factors – Risks Related to Legal and Regulatory Compliance Matters," and "Business – Government Regulation and Product Approval"] insofar as such statements summarize legal matters, agreements, documents or proceedings discussed therein, are accurate and fair summaries of such legal matters, agreements, documents or proceedings;

(k) This Underwriting Agreement has been duly authorized, executed and delivered by the Issuer;

(l) The Issuer is not and, immediately after giving effect to the Offering and the application of the proceeds thereof as described in the Disclosure Package and the Prospectus, will not be an "investment company" as defined in the Investment Company Act of 1940, as amended;

(m) No consent, approval, authorization, filing with or order of any court or governmental agency or body is required in connection with the transactions contemplated herein, except such as have been obtained under the Securities Act, the listing rules of the Nasdaq Global Market and the applicable rules of the Financial Industry Regulatory Authority, Inc. and such as may be required under the blue sky laws of any jurisdiction in connection with the purchase and distribution of the Securities by the Underwriters in the manner contemplated herein and in the Disclosure Package and the Prospectus;

(n) Neither the issue and sale of the Securities nor the consummation of any other of the transactions herein contemplated nor the fulfillment of the terms hereof will conflict with, result in a breach or violation of, or imposition of any lien, charge or encumbrance upon any property or assets of the Issuer pursuant to, (i) the charter or by- laws of the Issuer, (ii) the terms of any indenture, contract, lease, mortgage, deed of trust, note agreement, loan agreement or other agreement, obligation, condition, covenant or instrument to which the Issuer is a party or bound or to which its or their property is subject, or (iii) any statute, law, rule, regulation, judgment, order or decree applicable to the Issuer of any court, regulatory body, administrative agency, governmental body, arbitrator or other authority having jurisdiction over the Issuer or any of its properties, except in the cases of clauses (ii) and (iii) for such conflict, breach, violation or imposition as would not reasonably be expected to have a Material Adverse Effect;

(o) No holders of securities of the Issuer have rights to the registration of such securities under the Registration Statement except for such as have been effectively waived in connection with this Offering;

(p) The historical financial statements and schedules of the Issuer included in the Preliminary Prospectus, the Prospectus and the Registration Statement present fairly in all material respects the financial condition, results of operations and cash flows of the Issuer as of the dates and for the periods indicated, comply as to form in all material respects with the applicable accounting requirements of the Securities Act and have been prepared in conformity with generally accepted accounting principles applied on a consistent basis throughout the periods involved (except as otherwise noted therein); The selected financial data set forth under the caption “Selected Financial Data” in the Preliminary Prospectus, the Prospectus and Registration Statement fairly present in all material respects, on the basis stated in the Preliminary Prospectus, the Prospectus and the Registration Statement, the information included therein;

(q) No action, suit or proceeding by or before any court or governmental agency, authority or body or any arbitrator involving the Issuer or its or their property is pending or, to the best knowledge of the Issuer, threatened that (i) would reasonably be expected to have a material adverse effect on the performance of this Underwriting Agreement or the consummation of any of the transactions contemplated hereby or (ii) would reasonably be expected to have a Material Adverse Effect, except as set forth in or contemplated in the Disclosure Package and the Prospectus (exclusive of any amendment or supplement thereto);

(r) Each of the Issuer owns or leases all such properties as are necessary to the conduct of its operations as presently conducted, except for intellectual property, which is

separately addressed in subsection (mm) below, and except as would not reasonably be expected to have a Material Adverse Effect;

(s) The Issuer is not in violation or default of (i) any provision of its charter or bylaws, (ii) the terms of any indenture, contract, lease, mortgage, deed of trust, note agreement, loan agreement or other agreement, obligation, condition, covenant or instrument to which it is a party or bound or to which its property is subject, or (iii) any statute, law, rule, regulation, judgment, order or decree of any court, regulatory body, administrative agency, governmental body, arbitrator or other authority having jurisdiction over the Issuer or any of its properties, as applicable, except in the case of clauses (ii) and (iii), for such violation or default as would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect;

(t) KPMG LLP, who have certified certain financial statements of the Issuer and delivered their report with respect to the audited financial statements and schedules included in the Disclosure Package and the Prospectus, are independent public accountants with respect to the Issuer within the meaning of the Securities Act and the applicable published rules and regulations thereunder;

(u) There are no transfer taxes or other similar fees or charges under Federal law or the laws of any state, or any political subdivision thereof, required to be paid in connection with the execution and delivery of this Underwriting Agreement or the issuance by the Issuer or sale by the Issuer of the Securities;

(v) The Issuer has filed all tax returns that are required to be filed or has requested extensions thereof (except in any case in which the failure so to file would not reasonably be expected to have a Material Adverse Effect) and has paid all taxes required to be paid by it and any other assessment, fine or penalty levied against it, to the extent that any of the foregoing is due and payable, except for any such assessment, fine or penalty that is currently being contested in good faith or as would not reasonably be expected to have a Material Adverse Effect.

(w) No labor problem or dispute with the employees of the Issuer exists or, to the knowledge of the Issuer, is threatened or imminent, and the Issuer is not aware of any existing or imminent labor disturbance by the employees of any of its principal suppliers, contractors or customers, that would reasonably be expected to have a Material Adverse Effect;

(x) The Issuer is insured by insurers of recognized financial responsibility against such losses and risks and in such amounts as the Issuer reasonably believes are prudent and customary in the businesses in which they are engaged; all policies of insurance insuring the Issuer or its business, assets, employees, officers and directors are in full force and effect; the Issuer is in compliance with the terms of such policies and instruments in all material respects; and there are no claims by the Issuer under any such policy or instrument as to which any insurance company is denying liability or defending under a reservation of rights clause; the Issuer has not been refused any insurance coverage sought or applied for; and the Issuer has no reason to believe that it will not be able to renew its existing insurance coverage as and when such coverage expires or to obtain similar coverage from similar insurers as may be necessary to

continue its business at a cost that would not reasonably be expected to have a Material Adverse Effect;

(y) The Issuer possesses all licenses, certificates, permits and other authorizations required to be issued by all applicable authorities necessary to conduct its business, except where the failure to possess such licenses, certificates, permits and other authorizations would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect, and the Issuer has not received any notice of proceedings relating to the revocation or modification of any such certificate, authorization or permit which, singly or in the aggregate, if the subject of an unfavorable decision, ruling or finding, would reasonably be expected to have a Material Adverse Effect;

(z) The Issuer maintains a system of internal accounting controls designed to provide reasonable assurance that (i) transactions are executed in accordance with management's general or specific authorizations; (ii) transactions are recorded as necessary to permit preparation of financial statements in conformity with generally accepted accounting principles and to maintain asset accountability; (iii) access to assets is permitted only in accordance with management's general or specific authorization, (iv) the recorded accountability for assets is compared with the existing assets at reasonable intervals and appropriate action is taken with respect to any differences and (v) the interactive data in eXtensible Business Reporting Language included or incorporated by reference in the Registration Statement, the Preliminary Prospectus and the Prospectus is in compliance with the SEC's published rules, regulations and guidelines applicable thereto. The Issuer's internal controls over financial reporting are effective at the reasonable assurance level and the Issuer is not aware of any material weakness in its internal controls over financial reporting (it being understood that as of the date hereof, the Issuer is not required to comply with Section 404 of the Sarbanes Oxley Act (as defined herein));

(aa) The Issuer maintains "disclosure controls and procedures" (as such term is defined in Rule 13a-15(e) under the Exchange Act; such disclosure controls and procedures are effective at the reasonable assurance level;

(bb) The Issuer has not taken, directly or indirectly, without giving effect to activities by the Underwriters, any action designed to or that would constitute or that would reasonably be expected to cause or result in, under the Exchange Act or otherwise, stabilization or manipulation of the price of any security of the Issuer to facilitate the sale or resale of the Securities;

(cc) The Issuer is (i) in compliance with any and all applicable foreign, federal, state and local laws and regulations relating to the protection of human health and safety, the environment or hazardous or toxic substances or wastes, pollutants or contaminants ("Environmental Laws"), (ii) has received and is in compliance with all permits, licenses or other approvals required of them under applicable Environmental Laws to conduct its business and (iii) has not received notice of any actual or potential liability under any environmental law, except where such non-compliance with Environmental Laws, failure to receive required permits, licenses or other approvals, or liability would not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect. Except as set forth in the Disclosure Package and the Prospectus, the Issuer has not been named as a "potentially responsible party"

under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended;

(dd) None of the following events has occurred or exists: (i) a failure to fulfill the obligations, if any, under the minimum funding standards of Section 302 of the United States Employee Retirement Income Security Act of 1974, as amended ("ERISA"), and the regulations and published interpretations thereunder with respect to a Plan (as defined herein), determined without regard to any waiver of such obligations or extension of any amortization period; (ii) an audit or investigation by the Internal Revenue Service, the U.S. Department of Labor, the Pension Benefit Guaranty Corporation or any other federal or state governmental agency or any foreign regulatory agency with respect to the employment or compensation of employees by any of the Issuer that would reasonably be expected to have a Material Adverse Effect; and (iii) any breach of any contractual obligation, or any violation of law or applicable qualification standards, with respect to the employment or compensation of employees by the Issuer that would reasonably be expected to have a Material Adverse Effect. None of the following events has occurred or, to the Issuer's knowledge, is reasonably likely to occur: (i) a material increase in the aggregate amount of contributions required to be made to all Plans in the current fiscal year of the Issuer compared to the amount of such contributions made in the most recently completed fiscal year of the Issuer; (ii) a material increase in the "accumulated post-retirement benefit obligations" (within the meaning of Statement of Financial Accounting Standards 106) of the Issuer compared to the amount of such obligations in the most recently completed fiscal year of the Issuer; (iii) any event or condition giving rise to a liability under Title IV of ERISA that would reasonably be expected to have a Material Adverse Effect; or (iv) the filing of a claim by one or more employees or former employees of the Issuer related to their employment that would reasonably be expected to have a Material Adverse Effect. For purposes of this paragraph, the term "Plan" means a plan (within the meaning of Section 3(3) of ERISA) subject to Title IV of ERISA with respect to which the Issuer may have any liability;

(ee) There is and has been no failure on the part of the Issuer and any of the Issuer's directors or officers, in their capacities as such, to comply with any provision of the Sarbanes-Oxley Act of 2002, as amended, and the rules and regulations promulgated in connection thereunder (the "Sarbanes-Oxley Act"), including Section 402 relating to loans and Sections 302 and 906 relating to certifications;

(ff) Neither the Issuer nor, to the knowledge of the Issuer, any director, officer, agent, employee, affiliate or other person acting on behalf of the Issuer is aware of or has taken any action, directly or indirectly, that would result in a violation or a sanction for violation by such persons of the Foreign Corrupt Practices Act of 1977 or the U.K. Bribery Act 2010, each as may be amended, or similar law of any other relevant jurisdiction, or the rules or regulations thereunder; and the Issuer has instituted and maintains policies and procedures designed to ensure compliance therewith. No part of the proceeds of the offering will be used, directly or indirectly, in violation of the Foreign Corrupt Practices Act of 1977 or the U.K. Bribery Act 2010, each as may be amended, or similar law of any other relevant jurisdiction, or the rules or regulations thereunder;

(gg) The operations of the Issuer are and have been conducted at all times in compliance with applicable financial recordkeeping and reporting requirements and the money

laundering statutes and the rules and regulations thereunder and any related or similar rules, regulations or guidelines, issued, administered or enforced by any governmental agency (collectively, the "Money Laundering Laws") and no action, suit or proceeding by or before any court or governmental agency, authority or body or any arbitrator involving the Issuer with respect to the Money Laundering Laws is pending or, to the best knowledge of the Issuer, threatened;

(hh) Neither the Issuer nor, to the knowledge of the Issuer, any director, officer, agent, employee or affiliate of the Issuer (i) is, or is controlled or 50% or more owned in the aggregate by or is acting on behalf of, one or more individuals or entities that are currently the subject of any sanctions administered or enforced by the United States (including any administered or enforced by the Office of Foreign Assets Control of the U.S. Department of the Treasury, the U.S. Department of State or the Bureau of Industry and Security of the U.S. Department of Commerce), the United Nations Security Council, the European Union, a member state of the European Union (including sanctions administered or enforced by Her Majesty's Treasury of the United Kingdom) or other relevant sanctions authority (collectively, "Sanctions" and such persons, "Sanctioned Persons" and each such person, a "Sanctioned Person"), (ii) is located, organized or resident in a country or territory that is, or whose government is, the subject of Sanctions that broadly prohibit dealings with that country or territory (collectively, "Sanctioned Countries" and each, a "Sanctioned Country") or (iii) will, directly or indirectly, use the proceeds of this Offering, or lend, contribute or otherwise make available such proceeds to any joint venture partner or other individual or entity in any manner that would result in a violation of any Sanctions by, or would result in the imposition of Sanctions against, any individual or entity (including any individual or entity participating in the Offering, whether as underwriter, advisor, investor or otherwise);

(ii) The Issuer has not engaged in any dealings or transactions with or for the benefit of a Sanctioned Person, or with or in a Sanctioned Country, in the preceding three years, nor does the Issuer have any plans to engage in dealings or transactions with or for the benefit of a Sanctioned Person, or with or in a Sanctioned Country;

(jj) The Issuer has no subsidiaries;

(kk) The Issuer (i) is and at all times has been in compliance in all material respects with all statutes, rules and regulations applicable to the ownership, testing, development, manufacture, packaging, processing, use, distribution, marketing, advertising, labeling, promotion, sale, offer for sale, storage, import, export or disposal of any product manufactured or distributed by the Issuer including, without limitation the Federal Food, Drug and Cosmetic Act (21 U.S.C. §301 et seq.), the federal Anti- Kickback Statute (42 U.S.C. §1320a-7b(b)), the Health Insurance Portability and Accountability Act of 1996, as amended by the Health Information Technology for Economic and Clinical Health Act of 2009, and the Patient Protection and Affordable Care Act of 2010, as amended by the Health Care and Education Affordability Reconciliation Act of 2010, the regulations promulgated pursuant to such laws, and any successor government programs and comparable state laws, regulations relating to Good Clinical Practices and Good Laboratory Practices and all other local, state, federal, national, supranational and foreign laws, manual provisions, policies and administrative guidance relating to the regulation of the Issuer (collectively, the "Applicable Laws"); (ii) has not received any

written notice from any court or arbitrator or governmental or regulatory authority or third party alleging or asserting noncompliance with any Applicable Laws or any licenses, exemptions, certificates, approvals, clearances, authorizations, permits, registrations and supplements or amendments thereto required by any such Applicable Laws ("Authorizations"), except for such non-compliance as would not reasonably be expected to have a Material Adverse Effect; (iii) possesses all Authorizations and such Authorizations are valid and in full force and effect and are not in violation of any term of any such Authorizations, except where the absence of any such Authorization would not reasonably be expected, individually or in the aggregate, to have a Material Adverse Effect; (iv) has not received written notice of any claim, action, suit, proceeding, hearing, enforcement, investigation arbitration or other action from any court or arbitrator or governmental or regulatory authority or third party alleging that any product operation or activity is in violation of any Applicable Laws or Authorizations nor, to the Issuer's knowledge, is any such claim, action, suit, proceeding, hearing, enforcement, investigation, arbitration or other action threatened; (v) has not received any written notice that any court or arbitrator or governmental or regulatory authority has taken, is taking or intends to take, action to limit, suspend, materially modify or revoke any Authorizations nor, to the Issuer's knowledge, is any such limitation, suspension, modification or revocation threatened; (vi) has filed, obtained, maintained or submitted all reports, documents, forms, notices, applications, records, claims, submissions and supplements or amendments as required by any Applicable Laws or Authorizations and that all such reports, documents, forms, notices, applications, records, claims, submissions and supplements or amendments were complete and accurate in all material respects on the date filed (or were corrected or supplemented by a subsequent submission), except where the failure to so file, obtain, maintain or submit or the failure of such reports, documents, forms, notices, applications, records, claims, submissions and supplements or amendment would not reasonably be expected, individually or in the aggregate, to have a Material Adverse Effect; and (vii) is not a party to any corporate integrity agreements, monitoring agreements, consent decrees, settlement orders, or similar agreements with or imposed by any governmental or regulatory authority.

(ll) The clinical and pre-clinical trials conducted by or on behalf of or sponsored by the Issuer, or in which the Issuer has participated, that are described in the Registration Statement, the Disclosure Package and the Prospectus or the results of which are referred to in the Registration Statement, the Disclosure Package and the Prospectus, as applicable, and are intended to be submitted to Regulatory Authorities as a basis for product approval, were and, if still pending, are being conducted in all material respects in accordance with standard medical and scientific research procedures and all applicable statutes, rules and regulations of the U.S. Food and Drug Administration and comparable drug regulatory agencies outside of the United States to which it is subject (collectively, the "Regulatory Authorities"), including, without limitation, 21 C.F.R. Parts 50, 54, 56, 58, and 312, and current Good Clinical Practices and Good Laboratory Practices; the descriptions in the Registration Statement, the Disclosure Package or the Prospectus of the results of such studies and trials are accurate and complete in all material respects and fairly present the data derived from such trials; the Issuer has no knowledge of any other trials the results of which are inconsistent with or otherwise call into question the results described or referred to in the Registration Statement, Disclosure Package and the Prospectus; the Issuer has operated and is currently in compliance in all material respects with all applicable statutes, rules and regulations of the Regulatory Authorities; the Issuer has not received any written notices, correspondence or other communication from the

Regulatory Authorities or any governmental authority which could lead to the termination or suspension of any clinical or pre-clinical trials that are described in the Registration Statement, the Disclosure Package and the Prospectus or the results of which are referred to in the Registration Statement, Disclosure Package or the Prospectus, and, to the Issuer's knowledge, there are no reasonable grounds for same.

(mm) The Issuer owns, possesses, licenses or has other rights to use, on reasonable terms, all patents, patent applications, trade and service marks, trade and service mark registrations, trade names, copyrights, licenses, inventions, trade secrets, technology, know-how and other intellectual property (collectively, the "Intellectual Property") necessary for the conduct of the Issuer's business as now conducted or as proposed in the Disclosure Package and Prospectus to be conducted, except, in each case, where the failure to own, possess, license or have such other rights that would not, individually or in the aggregate, have a Material Adverse Effect. Except as set forth in the Disclosure Package and the Prospectus (a) to the Issuer's knowledge, there are no rights of third parties to any such Intellectual Property; (b) to the Issuer's knowledge, there is no material infringement by third parties of any such Intellectual Property; (c) there is no pending or, to the Issuer's knowledge, threatened action, suit, proceeding or claim by others challenging the Issuer's rights in or to any such Intellectual Property, and the Issuer is unaware of any facts which would form a reasonable basis for any such claim; (d) there is no pending or, to the Issuer's knowledge, threatened action, suit, proceeding or claim by others challenging the validity or scope of any such Intellectual Property, and the Issuer is unaware of any facts which would form a reasonable basis for any such claim; (e) there is no pending or, to the Issuer's knowledge, threatened action, suit, proceeding or claim by others that the Issuer infringes or otherwise violates any patent, trademark, copyright, trade secret or other proprietary rights of others, and the Issuer is unaware of any other fact which would form a reasonable basis for any such claim; (f) to the Issuer's knowledge, there is no U.S. patent or published U.S. patent application which contains claims that dominate or may dominate any Intellectual Property described in the Disclosure Package and the Prospectus as being owned by or licensed to the Issuer or that interferes with the issued or pending claims of any such Intellectual Property; and (g) there is no prior art of which the Issuer is aware that may render any U.S. patent held by the Issuer invalid or any U.S. patent application held by the Issuer un-patentable which has not been disclosed to the U.S. Patent and Trademark Office;

(nn) Except as disclosed in the Registration Statement, the Disclosure Package and the Prospectus, the Issuer (i) does not have any material lending or other relationship with any bank or lending affiliate of the Underwriters and (ii) does not intend to use any of the proceeds from the sale of the Securities hereunder to repay any outstanding debt owed to any affiliate of the Underwriters;

(oo) Neither the Company nor any of its subsidiaries is a party to any contract, agreement or understanding with any person (other than this Underwriting Agreement) that would give rise to a valid claim against the Company or any of its subsidiaries or the Underwriters for a brokerage commission, finder's fee or like payment in connection with the offering and sale of the Securities or any transaction contemplated by this Underwriting Agreement, the Registration Statement, the Disclosure Package or the Prospectus;

(pp) Nothing has come to the attention of the Issuer that has caused the Issuer to believe that the statistical and market-related data included or incorporated by reference in the Registration Statement, the Disclosure Package and the Prospectus is not based on or derived from sources that are reliable and accurate in all material respects;

(qq) No forward-looking statement (within the meaning of Section 27A of the Securities Act and Section 21E of the Exchange Act) contained in the Registration Statement, the Disclosure Package or the Prospectus has been made or reaffirmed without a reasonable basis or has been disclosed other than in good faith; and

(rr) (i) Except as may be included or incorporated by reference in the Registration Statement, the Disclosure Package and the Prospectus, (x) to the Issuer's knowledge, there has been no material security breach or other material compromise of or relating to any of the Issuer's information technology and computer systems, networks, hardware, software, data (including the data of their respective customers, employees, suppliers, vendors and any third party data maintained by or on behalf of it), equipment or technology (collectively, "IT Systems and Data") and (y) the Issuer has not been notified of, and has no knowledge of any event or condition that would reasonably be expected to result in, any material security breach or other material compromise to their IT Systems and Data; (ii) the Issuer is presently in compliance with all applicable laws or statutes and all judgments, orders, rules and regulations of any court or arbitrator or governmental or regulatory authority, internal policies and contractual obligations relating to the privacy and security of IT Systems and Data and to the protection of such IT Systems and Data from unauthorized use, access, misappropriation or modification, except as would not, in the case of this clause (ii), individually or in the aggregate, have a Material Adverse Effect; and (iii) the Issuer has implemented backup and disaster recovery technology consistent with industry standards and practices.

Any certificate signed by any officer of the Issuer and delivered to the Representatives or counsel for the Underwriters in connection with the Offering shall be deemed a representation and warranty by the Issuer, as to matters covered thereby, to each Underwriter.

2. Purchase and Sale.

(a) Subject to the terms and conditions and in reliance upon the representations and warranties herein set forth, the Issuer agrees to sell to each Underwriter, and each Underwriter agrees, severally and not jointly, to purchase from the Issuer, at a purchase price of $[ ] per share, the amount of the Underwritten Securities set forth opposite such Underwriter's name in Schedule I hereto; and

(b) Subject to the terms and conditions and in reliance upon the representations and warranties herein set forth, the Issuer hereby grants an option to the several Underwriters to purchase, severally and not jointly, up to [ ] Option Securities at the same purchase price per share as the Underwriters shall pay for the Underwritten Securities, less an amount per share equal to any dividends or distributions declared by the Issuer and payable on the Underwritten Securities but not payable on the Option Securities. Said option may be exercised only to cover over-allotments in the sale of the Underwritten Securities by the Underwriters. Said option may be exercised in whole or in part at any time on or before the 30th

day after the date of the Prospectus upon written notice by the Representatives to the Issuer setting forth the number of shares of the Option Securities as to which the several Underwriters are exercising the option and the settlement date. The number of Option Securities to be purchased by each Underwriter shall be the same percentage of the total number of shares of the Option Securities to be purchased by the several Underwriters as such Underwriter is purchasing of the Underwritten Securities, subject to such adjustments as you in your absolute discretion shall make to eliminate any fractional shares.

3. Delivery and Payment. Delivery of and payment for the Underwritten Securities and the Option Securities (if the option provided for in Section 2(b) hereof shall have been exercised on or before the third Business Day immediately preceding the Closing Date) shall be made at [10]:00 [a.m./p.m.], Eastern Standard Time, on [ ], 2019, or at such time on such later date not more than three Business Days after the foregoing date as the Representatives shall designate, which date and time may be postponed by agreement between the Representatives and the Issuer or as provided in Section 9 hereof (such date and time of delivery and payment for the Securities being herein called the "Closing Date"). For purposes herein, "Business Day" shall mean any day other than a Saturday, a Sunday or a legal holiday or a day on which banking institutions or trust companies are authorized or obligated by law to close in New York, New York. Delivery of the Securities shall be made to the Representatives for the respective accounts of the several Underwriters against payment by the several Underwriters through the Representatives of the purchase price thereof to or upon the order of the Issuer by wire transfer payable in same-day funds to an account specified by the Issuer. Delivery of the Underwritten Securities and the Option Securities shall be made through the facilities of The Depository Trust Company unless the Representatives shall otherwise instruct.

If the option provided for in Section 2(b) hereof is exercised after the third Business Day immediately preceding the Closing Date, the Issuer will deliver the Option Securities (at the expense of the Issuer) to the Representatives, at 388 Greenwich Street, New York, New York, 10013 on the date specified by the Representatives (which shall be within three Business Days after exercise of said option) for the respective accounts of the several Underwriters, against payment by the several Underwriters through the Representatives of the purchase price thereof to or upon the order of the Issuer by wire transfer payable in same-day funds to an account specified by the Issuer. If settlement for the Option Securities occurs after the Closing Date, the Issuer will deliver to the Representatives on the settlement date for the Option Securities, and the obligation of the Underwriters to purchase the Option Securities shall be conditioned upon receipt of, supplemental opinions, certificates and letters confirming as of such date the opinions, certificates and letters delivered on the Closing Date pursuant to Section 6 hereof.

4. Offering by Underwriters. It is understood that the several Underwriters propose to offer the Securities for sale to the public as set forth in the Prospectus.

5. Agreements. The Issuer agrees with the several Underwriters that:

(a) Prior to the termination of the Offering, the Issuer will not file any amendment of the Registration Statement or supplement to the Prospectus or any Rule 462(b) Registration Statement unless the Issuer has furnished you a copy for your review prior to filing and will not file any such proposed amendment or supplement to which you reasonably object.

The Issuer will cause the Prospectus, properly completed, and any supplement thereto to be filed in a form approved by the Representatives with the SEC pursuant to the applicable paragraph of Rule 424(b) under the Securities Act within the time period prescribed and will provide evidence satisfactory to the Representatives of such timely filing. The Issuer will promptly advise the Representatives (i) when the Prospectus, and any supplement thereto, shall have been filed (if required) with the SEC pursuant to Rule 424(b) or when any Rule 462(b) Registration Statement shall have been filed with the SEC, (ii) when, prior to termination of the Offering, any amendment to the Registration Statement shall have been filed or become effective, (iii) of any request by the SEC or its staff for any amendment of the Registration Statement, or any Rule 462(b) Registration Statement, or for any supplement to the Prospectus or for any additional information, (iv) of the issuance by the SEC of any stop order suspending the effectiveness of the Registration Statement or of any notice objecting to its use or the institution or threatening of any proceeding for that purpose and (v) of the receipt by the Issuer of any notification with respect to the suspension of the qualification of the Securities for sale in any jurisdiction or the institution or threatening of any proceeding for such purpose. The Issuer will use its reasonable best efforts to prevent the issuance of any such stop order or the occurrence of any such suspension or objection to the use of the Registration Statement and, upon such issuance, occurrence or notice of objection, to obtain as soon as possible the withdrawal of such stop order or relief from such occurrence or objection, including, if necessary, by filing an amendment to the Registration Statement or a new registration statement and using its reasonable best efforts to have such amendment or new registration statement declared effective as soon as practicable;

(b) If, at any time prior to the filing of the Prospectus pursuant to Rule 424(b) under the Securities Act, any event occurs as a result of which the Disclosure Package would include any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein in the light of the circumstances under which they were made at such time not misleading, the Issuer will (i) notify promptly the Representatives so that any use of the Disclosure Package may cease until it is amended or supplemented; (ii) amend or supplement the Disclosure Package to correct such statement or omission; and (iii) supply any amendment or supplement to you in such quantities as you may reasonably request;

(c) If, at any time when a prospectus relating to the Securities is required to be delivered under the Securities Act (including in circumstances where such requirement may be satisfied pursuant to Rule 172 under the Securities Act ("Rule 172")), any event occurs as a result of which the Prospectus as then supplemented would include any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein in the light of the circumstances under which they were made or the circumstances then prevailing not misleading, or if it shall be necessary to amend the Registration Statement or supplement the Prospectus to comply with the Securities Act or the rules thereunder, the Issuer promptly will (i) notify the Representatives of any such event; (ii) prepare and file with the SEC, subject to the second sentence of paragraph (a) of this Section 5, an amendment or supplement which will correct such statement or omission or effect such compliance; and (iii) supply any supplemented Prospectus to you in such quantities as you may reasonably request;

(d) As soon as practicable, the Issuer will make generally available to its security holders and to the Representatives an earnings statement or statements of the Issuer which will satisfy the provisions of Section 11(a) of Rule 158 under the Securities Act;

(e) Upon request, the Issuer will furnish to the Representatives and counsel for the Underwriters, without charge, signed copies of the Registration Statement (including exhibits thereto) and to each other Underwriter a copy of the Registration Statement (without exhibits thereto) and, so long as delivery of a prospectus by an Underwriter or dealer may be required by the Securities Act (including in circumstances where such requirement may be satisfied pursuant to Rule 172), as many copies of each Preliminary Prospectus, the Prospectus and each Issuer Free Writing Prospectus and any supplement thereto as the Representatives may reasonably request. The Issuer will pay the expenses of printing or other production of all documents relating to the Offering;

(f) The Issuer will arrange, if necessary, for the qualification of the Securities for sale under the laws of such jurisdictions as the Representatives may reasonably designate and will use its reasonable best efforts to maintain such qualifications in effect so long as required for the distribution of the Securities; provided that in no event shall the Issuer be obligated to qualify to do business in any jurisdiction where it is not now so qualified or to take any action that would subject it to service of process in suits, other than those arising out of the offering or sale of the Securities, in any jurisdiction where it is not now so subject.

(g) The Issuer will not, without the prior written consent of Citigroup Global Markets Inc. and Cowen and Company, LLC, offer, sell, contract to sell, pledge, or otherwise dispose of, (or enter into any transaction which is designed to, or might reasonably be expected to, result in the disposition (whether by actual disposition or effective economic disposition due to cash settlement or otherwise) by the Issuer or any affiliate of the Issuer or any person in privity with the Issuer or any affiliate of the Issuer) directly or indirectly, including the filing (or participation in the filing) of a registration statement with the SEC in respect of, or establish or increase a put equivalent position or liquidate or decrease a call equivalent position within the meaning of Section 16 of the Exchange Act, any other shares of Common Stock or any securities convertible into, or exercisable, or exchangeable for, shares of Common Stock; or publicly announce an intention to effect any such transaction, for a period of 60 days after the date of the Underwriting Agreement, provided, however, that the Issuer may (i) issue and sell shares of Common Stock (or any securities convertible into, or exercisable or exchangeable for shares of Common Stock) pursuant to any employee stock option plan, incentive plan, employee stock purchase plan, stock ownership plan or dividend reinvestment plan of the Issuer in effect at the Execution Time or described in the Disclosure Package and the Prospectus, (ii) issue Common Stock issuable upon the conversion or exercise of securities or the exercise of warrants outstanding at the Execution Time, (iii) file one or more registration statements on Form S-8, (iv) offer, issue or sell shares of Common Stock, or any securities convertible into, or exercisable or exchangeable for, Common Stock in connection with any merger, acquisition or strategic investment (including any joint venture, strategic alliance, partnership, collaboration, licensing agreement, manufacturing or distribution arrangement or similar transaction) as long as (x) the aggregate number of shares of Common Stock issued or issuable does not exceed 10% of the number of shares of Common Stock outstanding immediately after the Offering and (y) each recipient of any such Common Stock issued or issuable agrees to the restrictions on the resale of securities that are consistent with the lock-up letters described in Section 6(g) hereof for the remainder of the 60-day restricted period.

(h) The Issuer will not take, directly or indirectly, without giving effect to the activities by the Underwriters, any action designed to or that would constitute or that would reasonably be expected to cause or result in, under the Exchange Act or otherwise, stabilization or manipulation of the price of any security of the Issuer to facilitate the sale or resale of the Securities;

(i) The Issuer agrees to pay the costs and expenses relating to the following matters: (i) the preparation, printing or reproduction and filing with the SEC of the Registration Statement (including financial statements and exhibits thereto), each Preliminary Prospectus, the Prospectus and each Issuer Free Writing Prospectus, and each amendment or supplement to any of them; (ii) the printing (or reproduction) and delivery (including postage, air freight charges and charges for counting and packaging) of such copies of the Registration Statement, each Preliminary Prospectus, the Prospectus and each Issuer Free Writing Prospectus, and all amendments or supplements to any of them, as may, in each case, be reasonably requested for use in connection with the offering and sale of the Securities; (iii) the preparation, printing, authentication, issuance and delivery of certificates for the Securities, including any stamp or transfer taxes in connection with the original issuance and sale of the Securities; (iv) the printing (or reproduction) and delivery of this Underwriting Agreement, any blue sky memorandum and all other agreements or documents printed (or reproduced) and delivered in connection with the Offering; (v) the registration of the Securities under the Exchange Act and the continued listing of the Securities on the Nasdaq Global Market; (vi) any registration or qualification of the Securities for offer and sale under the securities or blue sky laws of the several states (including filing fees and the reasonable fees and expenses of counsel for the Underwriters relating to such registration and qualification); (vii) any filings required to be made with the Financial Industry Regulatory Authority, Inc. ("FINRA") (including filing fees and the reasonable fees and expenses of counsel for the Underwriters relating to such filings), with such fees and expenses of counsel contained in clauses (vi) and (vii) not to exceed $30,000 in the aggregate; (viii) the transportation and other expenses incurred by or on behalf of Issuer representatives in connection with presentations to prospective purchasers of the Securities; provided, however, that if the Representatives and the Issuer mutually agree that an aircraft shall be chartered in connection with the "road show" for the Securities, the Issuer shall only be responsible for one-half of the cost and expenses of such aircraft and the Underwriters shall be responsible for the balance; (ix) the fees and expenses of the Issuer's accountants and the fees and expenses of counsel (including local and special counsel) for the Issuer; and (x) all other costs and expenses incident to the performance by the Issuer of its obligations hereunder;

(j) The Issuer agrees that, unless it has or shall have obtained the prior written consent of the Representatives, and each Underwriter, severally and not jointly, agrees with the Issuer that, unless it has or shall have obtained, as the case may be, the prior written consent of the Issuer, it has not made and will not make any offer relating to the Securities that would constitute an Issuer Free Writing Prospectus or that would otherwise constitute a Free Writing Prospectus required to be filed by the Issuer with the SEC or retained by the Issuer under Rule 433 under the Securities Act ("Rule 433"), provided that the prior written consent of the parties hereto shall be deemed to have been given in respect of the Free Writing Prospectuses included in Schedule II hereto and any electronic road show. Any such free writing prospectus consented to by the Representatives or the Issuer is hereinafter referred to as a "Permitted Free Writing Prospectus." The Issuer agrees that (x) it has treated and will treat, as the case may be, each

Permitted Free Writing Prospectus as an Issuer Free Writing Prospectus and (y) it has complied and will comply, as the case may be, with the requirements of Rules 164 and 433 under the Securities Act applicable to any Permitted Free Writing Prospectus, including in respect of timely filing with the SEC, legending and record keeping;

(k) The Issuer will notify promptly the Representatives if the Issuer ceases to be an Emerging Growth Company at any time prior to the later of (a) completion of the distribution of the Securities within the meaning of the Securities Act and (b) completion of the 60-day restricted period referred to in Section 5(g) hereof; and

(l) If at any time following the distribution of any Written Testing-the-Waters Communication, any event occurs as a result of which such Written Testing-the-Waters Communication would include any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements therein in the light of the circumstances under which they were made at such time not misleading, the Issuer will (i) notify promptly the Representatives so that use of the Written Testing-the-Waters Communication may cease until it is amended or supplemented; (ii) amend or supplement the Written Testing-the-Waters Communication to correct such statement or omission; and (iii) supply any amendment or supplement to the Representatives in such quantities as may be reasonably requested.

6. Conditions to the Obligations of the Underwriters. The obligations of the Underwriters to purchase the Underwritten Securities and the Option Securities, as the case may be, shall be subject to the accuracy of the representations and warranties on the part of the Issuer contained herein as of the Execution Time, the Closing Date and any settlement date pursuant to Section 3 hereof, to the accuracy of the statements of the Issuer made in any certificates pursuant to the provisions hereof, to the performance by the Issuer of its obligations hereunder and to the following additional conditions:

(a) The Prospectus, and any supplement thereto, have been filed in the manner and within the time period required by Rule 424(b) under the Securities Act; any material required to be filed by the Issuer pursuant to Rule 433(d) under the Securities Act shall have been filed with the SEC within the applicable time periods prescribed for such filings by Rule 433; and no stop order suspending the effectiveness of the Registration Statement or any notice objecting to its use shall have been issued and no proceedings for that purpose shall have been instituted or threatened;

(b) The Issuer shall have requested and caused Cooley LLP, counsel for the Issuer, to have furnished to the Representatives their opinion, dated the Closing Date and addressed to the Representatives, in form and substance reasonably satisfactory to the Representatives.

(c) The Issuer shall have requested and caused Cooley LLP, intellectual property counsel for the Issuer, to have furnished to the Representatives their opinion, dated the Closing Date and addressed to the Representatives, in form and substance reasonably satisfactory to the Representatives.

(d) The Representatives shall have received from Goodwin Procter LLP, counsel for the Underwriters, such opinion or opinions, dated the Closing Date and addressed to the Representatives, with respect to the issuance and sale of the Securities, the Registration Statement, the Disclosure Package, the Prospectus (together with any supplement thereto) and other related matters as the Representatives may reasonably require, and the Issuer shall have furnished to such counsel such documents as they may reasonably request for the purpose of enabling them to pass upon such matters;

(e) The Issuer shall have furnished to the Representatives a certificate of the Issuer, signed by the Chairman of the Board or the President and the principal financial or accounting officer of the Issuer, dated the Closing Date, to the effect that the signers of such certificate have carefully examined the Registration Statement, the Disclosure Package, the Prospectus and any amendment or supplement thereto, as well as each electronic road show used in connection with the Offering, and this Underwriting Agreement and that:

(i) the representations and warranties of the Issuer in this Underwriting Agreement are true and correct on and as of the Closing Date with the same effect as if made on the Closing Date and the Issuer has complied with all the agreements and satisfied all the conditions on its part to be performed or satisfied at or prior to the Closing Date;

(ii) no stop order suspending the effectiveness of the Registration Statement or any notice objecting to its use has been issued and no proceedings for that purpose have been instituted or, to the Issuer's knowledge, threatened; and

(iii) since the date of the most recent financial statements included or incorporated by reference in the Disclosure Package and the Prospectus (exclusive of any amendment or supplement thereto), there has been no Material Adverse Effect, except as set forth in or contemplated in the Disclosure Package and the Prospectus (exclusive of any amendment or supplement thereto).

(f) The Issuer shall have requested and caused KPMG LLP to have furnished to the Representatives, at the Execution Time and at the Closing Date, letters, dated respectively as of the Execution Time and as of the Closing Date, in form and substance reasonably satisfactory to the Representatives, containing statements and information of the type ordinarily included in accountant's "comfort letters" to underwriters, delivered according to Statement of Auditing Standards No. 72 (or any successor bulletin), with respect to the audited and unaudited financial statements and certain financial information contained in the Registration Statement, the Disclosure Package, and each free writing prospectus, if any.

(g) Subsequent to the Execution Time or, if earlier, the dates as of which information is given in the Registration Statement (exclusive of any amendment thereof) and the Prospectus (exclusive of any amendment or supplement thereto), there shall not have been (i) any change or decrease specified in the letter or letters referred to in paragraph (e) of this Section 6 or (ii) any change, or any development involving a prospective change, in or affecting the condition (financial or otherwise), earnings, business or properties of the Issuer, whether or not arising from transactions in the ordinary course of business, except as set forth in or

contemplated in the Disclosure Package and the Prospectus (exclusive of any amendment or supplement thereto) the effect of which, in any case referred to in clause (i) or (ii) above, is, in the sole judgment of the Representatives, so material and adverse as to make it impractical or inadvisable to proceed with the offering or delivery of the Securities as contemplated by the Registration Statement (exclusive of any amendment thereof), the Disclosure Package and the Prospectus (exclusive of any amendment or supplement thereto).

(h) Prior to the Closing Date, the Issuer shall have furnished to the Representatives such further information, certificates and documents as the Representatives may reasonably request.

(i) Subsequent to the Execution Time, there shall not have been any decrease in the rating of any of the Issuer's debt securities by any "nationally recognized statistical rating organization" (as defined for purposes of Rule 3(a)(62) under the Exchange Act) or any notice given of any intended or potential decrease in any such rating or of a possible change in any such rating that does not indicate the direction of the possible change.

(j) The Securities shall have been listed and admitted and authorized for trading on the Nasdaq Global Market, and satisfactory evidence of such actions shall have been provided to the Representatives.

(k) At the Execution Time, the Issuer shall have furnished to the Representatives a letter substantially in the form of Exhibit A hereto from each officer and director of the Issuer and certain stockholders of the Issuer, addressed to the Representatives.

If any of the conditions specified in this Section 6 shall not have been fulfilled when and as provided in this Underwriting Agreement, or if any of the opinions and certificates mentioned above or elsewhere in this Underwriting Agreement shall not be reasonably satisfactory in form and substance to the Representatives and counsel for the Underwriters, this Underwriting Agreement and all obligations of the Underwriters hereunder may be canceled at, or at any time prior to, the Closing Date by the Representatives. Notice of such cancellation shall be given to the Issuer in writing or by telephone or facsimile confirmed in writing.

The documents required to be delivered by this Section 6 shall be delivered at the office of Goodwin Procter LLP, counsel for the Underwriters, at 620 Eighth Avenue, New York, New York 10018, on the Closing Date.

7. Reimbursement of Underwriters' Expenses. If the sale of the Securities provided for herein is not consummated because any condition to the obligations of the Underwriters set forth in Section 6 hereof is not satisfied, because of any termination pursuant to Section 10 hereof or because of any refusal, inability or failure on the part of the Issuer to perform any agreement herein or comply with any provision hereof other than by reason of a default by any of the Underwriters, the Issuer will reimburse the Underwriters severally through Citigroup Global Markets Inc. on demand for all documented out-of-pocket expenses (including reasonable fees and disbursements of counsel) that shall have been reasonably incurred by them in connection with the proposed purchase and sale of the Securities.

8. Indemnification and Contribution.

(a) The Issuer agrees to indemnify and hold harmless each Underwriter, the directors, officers, employees, affiliates within the meaning of Rule 405 under the Act and agents of each Underwriter and each person who controls any Underwriter within the meaning of either the Securities Act or the Exchange Act against any and all losses, claims, damages or liabilities, joint or several, to which they or any of them may become subject under the Securities Act, the Exchange Act or other Federal or state statutory law or regulation, at common law or otherwise, insofar as such losses, claims, damages or liabilities (or actions in respect thereof) arise out of or are based upon any untrue statement or alleged untrue statement of a material fact contained in the registration statement for the registration of the Securities as originally filed or in any amendment thereof, or in any Preliminary Prospectus, or the Prospectus, any Issuer Free Writing Prospectus, or any Written Testing-the-Waters Communication or in any amendment thereof or supplement thereto or arise out of or are based upon the omission or alleged omission to state therein a material fact required to be stated therein or necessary to make the statements therein not misleading, and agrees to reimburse each such indemnified party, as incurred, for any legal or other out-of-pocket expenses reasonably incurred by them in connection with investigating or defending any such loss, claim, damage, liability or action; provided, however, that the Issuer will not be liable in any such case to the extent that any such loss, claim, damage or liability arises out of or is based upon any such untrue statement or alleged untrue statement or omission or alleged omission made therein in reliance upon and in conformity with information furnished in writing to the Issuer by or on behalf of any Underwriter through the Representatives specifically for inclusion therein. This indemnity agreement will be in addition to any liability which the Issuer may otherwise have.

(b) Each Underwriter severally and not jointly agrees to indemnify and hold harmless the Issuer, each of its directors, each of its officers who signs the Registration Statement, and each person who controls the Issuer within the meaning of either the Securities Act or the Exchange Act, to the same extent as the foregoing indemnity from the Issuer to each Underwriter, but only with reference to written information relating to such Underwriter furnished to the Issuer by or on behalf of such Underwriter through the Representatives specifically for inclusion in the documents referred to in the foregoing indemnity. This indemnity agreement will be in addition to any liability which any Underwriter may otherwise have. The Issuer acknowledges that the statements set forth (i) in the last paragraph of the cover page regarding delivery of the Securities and under the heading “Underwriting”, (ii) the list of Underwriters and their respective participation in the sale of the Securities, (iii) the sentences related to concessions and reallowances and (iv) the paragraph related to stabilization, syndicate covering transactions and penalty bids in the Preliminary Prospectus and the Prospectus constitute the only information furnished in writing by or on behalf of the several Underwriters for inclusion in the Preliminary Prospectus, the Prospectus or any Issuer Free Writing Prospectus.

(c) Promptly after receipt by an indemnified party under this Section 8 of notice of the commencement of any action, such indemnified party will, if a claim in respect thereof is to be made against the indemnifying party under this Section 8, notify the indemnifying party in writing of the commencement thereof; but the failure so to notify the indemnifying party (i) will not relieve it from liability under paragraph (a) or (b) above unless and to the extent it did not otherwise learn of such action and such failure results in the forfeiture by the indemnifying party of substantial rights and defenses and (ii) will not, in any event,

relieve the indemnifying party from any obligations to any indemnified party other than the indemnification obligation provided in paragraph (a) or (b) above. The indemnifying party shall be entitled to appoint counsel of the indemnifying party's choice at the indemnifying party's expense to represent the indemnified party in any action for which indemnification is sought (in which case the indemnifying party shall not thereafter be responsible for the fees and expenses of any separate counsel retained by the indemnified party or parties except as set forth below); provided, however, that such counsel shall be reasonably satisfactory to the indemnified party. Notwithstanding the indemnifying party's election to appoint counsel to represent the indemnified party in an action, the indemnified party shall have the right to employ separate counsel (including local counsel), and the indemnifying party shall bear the reasonable and documented fees, costs and expenses of such separate counsel (which, if the Issuer is the indemnifying party, shall be limited to one such separate counsel for any Underwriter together with all persons who control such Underwriter within the meaning of the Exchange Act or the Securities Act, and no more than three such separate counsel for all of the Underwriters) if (i) the use of counsel chosen by the indemnifying party to represent the indemnified party would present such counsel with a conflict of interest, (ii) the actual or potential defendants in, or targets of, any such action include both the indemnified party and the indemnifying party and the indemnified party shall have reasonably concluded that there may be legal defenses available to it and/or other indemnified parties which are different from or additional to those available to the indemnifying party, (iii) the indemnifying party shall not have employed counsel reasonably satisfactory to the indemnified party to represent the indemnified party within a reasonable time after notice of the institution of such action or (iv) the indemnifying party shall authorize the indemnified party to employ separate counsel at the expense of the indemnifying party. An indemnifying party will not, without the prior written consent (which shall not be unreasonably withheld) of the indemnified parties, settle or compromise or consent to the entry of any judgment with respect to any pending or threatened claim, action, suit or proceeding in respect of which indemnification or contribution may be sought hereunder (whether or not the indemnified parties are actual or potential parties to such claim or action) unless such settlement, compromise or consent (i) includes an unconditional release of each indemnified party from all liability arising out of such claim, action, suit or proceeding and (ii) does not include a statement as to or an admission of fault, culpability or a failure to act, by or on behalf of any indemnified party.

(d) In the event that the indemnity provided in paragraph (a), (b) or (c) of this Section 8 is unavailable to or insufficient to hold harmless an indemnified party for any reason, the Issuer and the Underwriters severally agree to contribute to the aggregate losses, claims, damages and liabilities (including legal or other expenses reasonably incurred in connection with investigating or defending the same) (collectively "Losses") to which the Issuer and one or more of the Underwriters may be subject in such proportion as is appropriate to reflect the relative benefits received by the Issuer on the one hand and by the Underwriters on the other from the Offering. If the allocation provided by the immediately preceding sentence is unavailable for any reason, the Issuer and the Underwriters severally shall contribute in such proportion as is appropriate to reflect not only such relative benefits but also the relative fault of the Issuer on the one hand and of the Underwriters on the other in connection with the statements or omissions which resulted in such Losses as well as any other relevant equitable considerations. Benefits received by the Issuer shall be deemed to be equal to the total net proceeds from the Offering (before deducting expenses) received by it, and benefits received by the Underwriters shall be deemed to be equal to the total underwriting discounts and commissions, in each case as set forth

on the cover page of the Prospectus. Relative fault shall be determined by reference to, among other things, whether any untrue or any alleged untrue statement of a material fact or the omission or alleged omission to state a material fact relates to information provided by the Issuer on the one hand or the Underwriters on the other, the intent of the parties and their relative knowledge, access to information and opportunity to correct or prevent such untrue statement or omission. The Issuer and the Underwriters agree that it would not be just and equitable if contribution were determined by pro rata allocation or any other method of allocation which does not take account of the equitable considerations referred to above. Notwithstanding the provisions of this paragraph (d), in no event shall an Underwriter be required to contribute any amount in excess of the amount by which the total underwriting discounts and commissions received by such Underwriter with respect to the Offering exceeds the amount of any damages that such Underwriter has otherwise been required to pay by reason of such untrue or alleged untrue statement or omission or alleged omission. Notwithstanding the provisions of this paragraph (d), no person guilty of fraudulent misrepresentation (within the meaning of Section 11(f) of the Securities Act) shall be entitled to contribution from any person who was not guilty of such fraudulent misrepresentation. For purposes of this Section 8, each person who controls an Underwriter within the meaning of either the Securities Act or the Exchange Act and each director, officer, employee, affiliate within the meaning of Rule 405 under the Securities Act and agent of an Underwriter shall have the same rights to contribution as such Underwriter, and each person who controls the Issuer within the meaning of either the Securities Act or the Exchange Act, each officer of the Issuer who shall have signed the Registration Statement and each director of the Issuer shall have the same rights to contribution as the Issuer, subject in each case to the applicable terms and conditions of this paragraph (d).

9. Default by an Underwriter. If any one or more Underwriters shall fail to purchase and pay for any of the Securities agreed to be purchased by such Underwriter or Underwriters hereunder and such failure to purchase shall constitute a default in the performance of its or their obligations under this Underwriting Agreement, the remaining Underwriters shall be obligated severally to take up and pay for (in the respective proportions which the amount of Securities set forth opposite their names in Schedule I hereto bears to the aggregate amount of Securities set forth opposite the names of all the remaining Underwriters) the Securities which the defaulting Underwriter or Underwriters agreed but failed to purchase; provided, however, that in the event that the aggregate amount of Securities which the defaulting Underwriter or Underwriters agreed but failed to purchase shall exceed 10% of the aggregate amount of Securities set forth in Schedule I hereto, the remaining Underwriters shall have the right to purchase all, but shall not be under any obligation to purchase any, of the Securities, and if such non-defaulting Underwriters do not purchase all the Securities, this Underwriting Agreement will terminate without liability to any non-defaulting Underwriter or the Issuer. In the event of a default by any Underwriter as set forth in this Section 9, the Closing Date shall be postponed for such period, not exceeding five Business Days, as the Representatives shall determine in order that the required changes in the Registration Statement and the Prospectus or in any other documents or arrangements may be effected. Nothing contained in this Underwriting Agreement shall relieve any defaulting Underwriter of its liability, if any, to the Issuer and any non-defaulting Underwriter for damages occasioned by its default hereunder.

10. Termination. This Underwriting Agreement shall be subject to termination in the absolute discretion of the Representatives, by notice given to the Issuer prior to delivery of and

payment for the Securities, if at any time prior to such delivery and payment (i) trading in the Issuer's Common Stock shall have been suspended by the SEC, the Nasdaq Global Market or trading in securities generally on the New York Stock Exchange or the Nasdaq Global Market shall have been suspended or limited or minimum prices shall have been established on either of such exchanges, (ii) a banking moratorium shall have been declared either by Federal or New York State authorities, (iii) there shall have occurred a material disruption in commercial banking or securities settlement or clearance services or (iv) there shall have occurred any outbreak or escalation of hostilities, declaration by the United States of a national emergency or war, or other calamity or crisis the effect of which on financial markets is such as to make it, in the sole judgment of the Representatives, impractical or inadvisable to proceed with the offering or delivery of the Securities as contemplated by the Preliminary Prospectus or the Prospectus (exclusive of any amendment or supplement thereto).

11. Representations and Indemnities to Survive. The respective agreements, representations, warranties, indemnities and other statements of the Issuer or its officers and of the Underwriters set forth in or made pursuant to this Underwriting Agreement will remain in full force and effect, regardless of any investigation made by or on behalf of any Underwriter or the Issuer or any of the officers, directors, employees, agents, affiliates within the meaning of Rule 405 under the Act or controlling persons referred to in Section 8 hereof, and will survive delivery of and payment for the Securities. The provisions of Sections 7 and 8 hereof shall survive the termination or cancellation of this Underwriting Agreement.

12. Notices. All communications hereunder will be in writing and effective only on receipt, and, if sent to the Representatives, will be mailed, delivered or telefaxed to Citigroup Global Markets Inc. General Counsel, fax no.: 1(646) 291-1469), and confirmed to the General Counsel, Citigroup Global Markets Inc., at 388 Greenwich Street, New York, New York, 10013, Attention: General Counsel; to Cowen and Company, LLC, fax no. 1(646) 562-1124 (with such fax to be confirmed by telephone to (1(415) 646-7200) and to be confirmed to the Head of Equity Capital Markets, Cowen and Company, LLC at 599 Lexington Avenue, New York, New York, 10022 and to, Attention: Head of Equity Capital Markets; and to Stifel, Nicolaus & Company, Incorporated at One Montgomery Street, Suite 3700, San Francisco, California 94104, Attention: General Counsel; or, if sent to PhaseBio Pharmaceuticals, Inc., will be mailed, delivered or telefaxed to Regus Del Mar, 12707 High Bluff Drive, Suite 200, San Diego, California 92130, Attention: Jonathan Mow.

13. Successors. This Underwriting Agreement will inure to the benefit of and be binding upon the parties hereto and their respective successors and the officers, directors, employees, agents and controlling persons referred to in Section 8 hereof, and no other person will have any right or obligation hereunder.

14. Jurisdiction. The Issuer agrees that any suit, action or proceeding against the Issuer brought by any Underwriter, the directors, officers, employees, affiliates and agents of any Underwriter, or by any person who controls any Underwriter, arising out of or based upon this Underwriting Agreement or the transactions contemplated hereby may be instituted in any State or U.S. federal court in The City of New York and County of New York, and waives any objection which it may now or hereafter have to the laying of venue of any such proceeding, and irrevocably submits to the non-exclusive jurisdiction of such courts in any suit, action or

proceeding. The Issuer hereby appoints Jonathan Mow, PhaseBio Pharmaceuticals, Inc., Regus Del Mar, 12707 High Bluff Drive, Suite 200, San Diego, California 92130, as its authorized agent (the "Authorized Agent") upon whom process may be served in any suit, action or proceeding arising out of or based upon this Underwriting Agreement or the transactions contemplated herein that may be instituted in any State or U.S. federal court in The City of New York and County of New York, by any Underwriter, the directors, officers, employees, affiliates and agents of any Underwriter, or by any person who controls any Underwriter, and expressly accepts the non-exclusive jurisdiction of any such court in respect of any such suit, action or proceeding. The Issuer hereby represents and warrants that the Authorized Agent has accepted such appointment and has agreed to act as said agent for service of process, and the Issuer agrees to take any and all action, including the filing of any and all documents that may be necessary to continue such appointment in full force and effect as aforesaid. Service of process upon the Authorized Agent shall be deemed, in every respect, effective service of process upon the Issuer. Notwithstanding the foregoing, any action arising out of or based upon this Underwriting Agreement may be instituted by any Underwriter, the directors, officers, employees, affiliates and agents of any Underwriter, or by any person who controls any Underwriter, in any court of competent jurisdiction in Delaware.

15. Recognition of the U.S. Special Resolution Regimes.

(a) In the event that any Underwriter that is a Covered Entity becomes subject to a proceeding under a U.S. Special Resolution Regime, the transfer from such Underwriter of this Underwriting Agreement, and any interest and obligation in or under this Underwriting Agreement, will be effective to the same extent as the transfer would be effective under the U.S. Special Resolution Regime if this Underwriting Agreement, and any such interest and obligation, were governed by the laws of the United States or a state of the United States.

(b) In the event that any Underwriter that is a Covered Entity or a BHC Act Affiliate of such Underwriter becomes subject to a proceeding under a U.S. Special Resolution Regime, Default Rights under this Underwriting Agreement that may be exercised against such Underwriter are permitted to be exercised to no greater extent than such Default Rights could be exercised under the U.S. Special Resolution Regime if this Underwriting Agreement were governed by the laws of the United States or a state of the United States.

(c) As used in this Section 15, "BHC Act Affiliate" has the meaning assigned to the term "affiliate" in, and shall be interpreted in accordance with, 12 U.S.C. § 1841(k); "Covered Entity" means any of the following: (i) a "covered entity" as that term is defined in, and interpreted in accordance with, 12 C.F.R. § 252.82(b), (ii) a "covered bank" as that term is defined in, and interpreted in accordance with, 12 C.F.R. § 47.3(b) or (iii) a "covered FSI" as that term is defined in, and interpreted in accordance with, 12 C.F.R. § 382.2(b); "Default Right" has the meaning assigned to that term in, and shall be interpreted in accordance with, 12 C.F.R. §§ 252.81, 47.2 or 382.1, as applicable; and "U.S. Special Resolution Regime" means each of (i) the Federal Deposit Insurance Act and the regulations promulgated thereunder and (ii) Title II of the Dodd-Frank Wall Street Reform and Consumer Protection Act and the regulations promulgated thereunder.

16. No Fiduciary Duty. The Issuer hereby acknowledges that (a) the purchase and sale of the Securities pursuant to this Underwriting Agreement is an arm's-length commercial transaction between the Issuer, on the one hand, and the Underwriters and any affiliate through which it may be acting, on the other, (b) the Underwriters are acting as principal and not as an agent or fiduciary of the Issuer and (c) the Issuer's engagement of the Underwriters in connection with the Offering and the process leading up to the offering is as independent contractors and not in any other capacity. Furthermore, the Issuer agrees that it is solely responsible for making its own judgments in connection with the Offering (irrespective of whether any of the Underwriters has advised or is currently advising the Issuer on related or other matters). The Issuer agrees that it will not claim that the Underwriters have rendered advisory services of any nature or respect, or owe an agency, fiduciary or similar duty to the Issuer, in connection with such transaction or the process leading thereto.

17. Integration. This Underwriting Agreement supersedes all prior agreements and understandings (whether written or oral) between the Issuer and the Underwriters, or any of them, with respect to the subject matter hereof.

18. Applicable Law. This Underwriting Agreement will be governed by and construed in accordance with the laws of the State of New York applicable to contracts made and to be performed within the State of New York.

19. Waiver of Jury Trial. The Issuer and the Underwriters hereby irrevocably waive, to the fullest extent permitted by applicable law, any and all right to trial by jury in any legal proceeding arising out of or relating to this Underwriting Agreement or the transactions contemplated hereby.

20. Counterparts. This Underwriting Agreement may be signed in one or more counterparts, each of which shall constitute an original and all of which together shall constitute one and the same agreement.

21. Headings. The section headings used herein are for convenience only and shall not affect the construction hereof.

[Signature page follows]

If the foregoing is in accordance with your understanding of our agreement, please sign and return to us the enclosed duplicate hereof, whereupon this letter and your acceptance shall represent a binding agreement among the Issuer and the several Underwriters.

Very truly yours,

PhaseBio Pharmaceuticals, Inc.

By: _____
Name: Jonathan P. Mow
Title: Chief Executive Officer

The foregoing Underwriting Agreement is hereby confirmed and accepted as of the date first above written.

Citigroup Global Markets Inc.

By: _____
Name:
Title:

Cowen and Company, LLC

By: _____
Name:
Title:

Stifel, Nicolaus & Company, Incorporated

By: _____
Name:
Title:

For themselves and the other several Underwriters named in Schedule I to the foregoing Underwriting Agreement.

SCHEDULE I

Underwriters	Number of Underwritten Securities to be Purchased
Citigroup Global Markets Inc.	[ ]
Cowen and Company, LLC	[ ]
Stifel, Nicolaus & Company	[ ]
Needham & Company, LLC	[ ]
Total	[ ]

SCHEDULE II

Schedule of Free Writing Prospectuses included in the Disclosure Package

SCHEDULE III

Schedule of Written Testing-the-Waters Communication

30

EXHIBIT A

FORM OF LOCK UP AGREEMENT

PhaseBio Pharmaceuticals, Inc.
Public Offering of Common Stock

[ ] , 2019

Citigroup Global Markets Inc.
Cowen and Company, LLC
Stifel, Nicolaus & Company, Incorporated

As Representatives of the several Underwriters,

c/o Citigroup Global Markets Inc.
388 Greenwich Street
New York, New York 10013

c/o Cowen and Company, LLC
One Maritime Plaza, 9th Floor
San Francisco, California 94111

c/o Stifel, Nicolaus & Company,
Incorporated One Montgomery Street,
Suite 3700
San Francisco, California 94104

Ladies and Gentlemen:

This letter is being delivered to you in connection with the proposed underwriting agreement (the "Underwriting Agreement"), between PhaseBio Pharmaceuticals, Inc., a Delaware corporation (the "Issuer"), and each of you as representatives of a group of Underwriters named therein (the "Underwriters"), relating to an underwritten public offering of Common Stock, $0.001 par value (the "Common Stock"), of the Issuer (the "Offering").

In order to induce you and the other Underwriters to enter into the Underwriting Agreement, the undersigned will not, without the prior written consent of Citigroup Global Markets Inc. and Cowen and Company, LLC (collectively, the "Representatives"), offer, sell, contract to sell, pledge or otherwise dispose of, (or enter into any transaction which is designed to, or might reasonably be expected to, result in the disposition (whether by actual disposition or effective economic disposition due to cash settlement or otherwise) by the undersigned or any affiliate of the undersigned or any person in privity with the undersigned or any affiliate of the undersigned), directly or indirectly, including the filing (or participation in the filing) of a registration statement with the Securities and Exchange Commission in respect of, or establish or increase a put equivalent position or liquidate or decrease a call equivalent position within the meaning of Section 16 of the Securities Exchange Act of 1934,

as amended (the "Exchange Act"), and the rules and regulations of the Securities and Exchange Commission promulgated thereunder with respect to, any shares of capital stock of the Issuer or any securities convertible into, or exercisable or exchangeable for such capital stock, or publicly announce an intention to effect any such transaction, for a period from the date hereof through 60 days after the date of the Underwriting Agreement (the "Lock-Up Period"), other than:

(i) transactions relating to shares of Common Stock or other securities acquired in the Offering or in open market transactions after the completion of the Offering;

(ii) transfers of shares of Common Stock or any security convertible into Common Stock as a bona fide gift or charitable contribution;

(iii) exercise of stock options or warrants to purchase shares of Common Stock or the vesting of stock awards of Common Stock and any related transfer of shares of Common Stock to the Issuer in connection therewith (x) deemed to occur upon the "cashless" or "net" exercise of such options or warrants or (y) for the purpose of paying the exercise price of such options or warrants or for paying taxes due as a result of the exercise of such options or warrants, the vesting of such options, warrants or stock awards, or as a result of the vesting of such shares of Common Stock, it being understood that all shares of Common Stock received upon such exercise, vesting or transfer will remain subject to the restrictions of this agreement during the Lock-Up Period;

(iv) transfers to the spouse, domestic partner, parent, child or grandchild or first cousin of the undersigned (each, an "Immediate Family Member") or to a trust formed for the direct or indirect benefit of the undersigned or an Immediate Family Member;

(v) transfers by will, other testamentary document or intestate succession to the legal representative, heir, beneficiary, trustee or Immediate Family Member of the undersigned;

(vi) transfers pursuant to a divorce settlement agreement or decree or a qualified domestic relations order as defined in the United States Employee Retirement Income Security Act of 1974, as amended;

(vii) transfers of Common Stock or securities convertible into or exchangeable for Common Stock to any affiliate (as such term is defined in Rule 405 of the Securities Act of 1933, as amended), limited partners, general partners, limited liability company members or stockholders of the undersigned, or if the undersigned is a corporation to any wholly owned subsidiary of such corporation; and

(viii) the establishment of a trading plan pursuant to Rule 10b-5-1 under the Exchange Act for the transfer of shares of Common Stock or securities

convertible into or exchangeable for Common Stock, provided that such plan does not provide for the transfer of shares of Common Stock during the Lock- Up Period and no filing or other public announcement shall be made during the Lock-Up Period;

provided, that, in the case of clause (i), (a) no filing under Section 13 or Section 16(a) of the Exchange Act reporting a reduction in beneficial ownership of shares of Common Stock shall be required, other than Forms 5 and Schedule 13F and (b) no filing under Section 13 or Section 16(a) of the Exchange Act or other public announcement shall be voluntarily made by the undersigned, in the case of both clauses (a) and (b), during the Lock-Up Period, other than Forms 5 and Schedule 13F; provided further that in the case of any transfer or distribution pursuant to clauses (ii), (iv), (v), (vi), and (vii) (a) the recipient agrees to be bound in writing by the same restrictions set forth herein for the duration of the Lock-Up Period, (b) no filing under Section 13 or Section 16(a) of the Exchange Act reporting a reduction in beneficial ownership of shares of Common Stock shall be required during the Lock-Up Period, other than Forms 5 and Schedule 13F and (c) no filing under Section 13 of Section 16(a) of the Exchange Act or other public announcement shall be voluntarily made by the undersigned or the transferee during the Lock-Up Period, other than Forms 5 and Schedule 13F and (d) any such transfer shall not involve a disposition for value.

This agreement shall automatically terminate upon the earliest to occur, if any, of (i) the date that the Issuer advises the Representatives, or the Representatives advise the Issuer, in each case in writing, prior to the execution of the Underwriting Agreement, that it has determined not to proceed with the Offering, (ii) the date of termination of the Underwriting Agreement if prior to the closing of the Offering, or (iii) May 15, 2019, if the Offering has not been completed by such date.

Yours very truly,

By: _____
Name:
Title:

Cooley

Darren K. DeStefano
T: 703 456 8034
ddestefano@cooley.com

April 9, 2019

PhaseBio Pharmaceuticals, Inc.
1 Great Valley Parkway
Suite 30
Malvern, Pennsylvania 19355

Ladies and Gentlemen:

We have acted as counsel to PhaseBio Pharmaceuticals, Inc., a Delaware corporation (the "***Company***"), in connection with the filing by the Company of a Registration Statement on Form S-1 (the "***Registration Statement***") with the Securities and Exchange Commission, including a related prospectus filed with the Registration Statement (the "***Prospectus***"), covering an underwritten public offering of up to 3,450,000 shares of the Company's common stock (the "***Shares***"), par value $0.001 per share, including up to 450,000 Shares that may be sold pursuant to the exercise of an over-allotment option to be granted to the underwriters.

In connection with this opinion, we have (i) examined and relied upon (a) the Registration Statement and the Prospectus, (b) the Company's Amended and Restated Certificate of Incorporation and Amended and Restated Bylaws, each as amended and in effect as of the date hereof and (c) originals or copies certified to our satisfaction of such records, documents, certificates, memoranda and other instruments as in our judgment are necessary or appropriate to enable us to render the opinion expressed below, and (ii) assumed the Board of Directors of the Company or a duly authorized committee thereof has taken action to set the sale price of the Shares.

We have assumed the genuineness and authenticity of all documents submitted to us as originals and the conformity to originals of all documents submitted to us as copies and the due execution and delivery, other than by the Company, of all documents where due execution and delivery are a prerequisite to the effectiveness thereof. As to certain factual matters, we have relied upon a certificate of an officer of the Company and have not sought independently to verify such matters.

Our opinion is expressed only with respect to the General Corporation Law of the State of Delaware. We express no opinion to the extent that any other laws are applicable to the subject matter hereof and no opinion and provide no assurance as to compliance with any federal or state securities law, rule or regulation.

On the basis of the foregoing, and in reliance thereon, we are of the opinion that the Shares, when sold and issued against payment therefor as described in the Registration Statement and the Prospectus, will be validly issued, fully paid and non-assessable.

We consent to the reference to our firm under the caption "Legal Matters" in the Prospectus included in the Registration Statement and to the filing of this opinion as an exhibit to the Registration Statement.

Sincerely,

Cooley LLP

By: /s/ Darren K. DeStefano
Darren K. DeStefano

CERTAIN CONFIDENTIAL INFORMATION CONTAINED IN THIS DOCUMENT, MARKED BY [***], HAS BEEN OMITTED BECAUSE IT IS NOT MATERIAL AND WOULD LIKELY CAUSE COMPETITIVE HARM TO THE COMPANY IF PUBLICLY DISCLOSED.

LICENSE AGREEMENT

between

Wacker Biotech GmbH
Hans-Knöll-Straße 3
D-07745 Jena
Germany
(value added tax identification number DE199093878)

- hereinafter referred to as „**Wacker Biotech”** -

and

PhaseBio Pharmaceuticals, Inc.
1 Great Valley Parkway, Suite 30
Malvern, PA 19355
USA

- hereinafter referred to as **„PhaseBio”** –

PhaseBio and Wacker Biotech hereinafter collectively referred to as “Parties” and individually referred to as “Party”, as the case might be.

WHEREAS PhaseBio is a biopharmaceutical company with experience in research and development of protein therapeutics.

WHEREAS Wacker Biotech is a biotechnology company with experience in feasibility evaluation, process development, GMP-compliant production of clinical test materials and GMP-compliant bulk production of biopharmaceuticals.

WHEREAS Wacker Biotech has access to a modified microbial production system (“ESETEC®” as hereinafter defined), based on a modified *E. coli* [***] strain (the “Wacker Secretion Strain” as hereinafter defined) owned by its Affiliate Wacker AG (as hereinafter defined).

WHEREAS ESETEC®, the Wacker Secretion Strain and any information related thereto constitute valuable assets of Wacker Biotech and Wacker AG.

WHEREAS PhaseBio has recently acquired rights to develop the product PB2452 (the “Product”, as hereinafter defined) from MedImmune Limited, a member of the AstraZeneca group (hereinafter “**MedImmune**”) (the “**Transaction**”). A manufacturing process for production of Product using ESETEC® has been developed by Wacker Biotech for MedImmune under the MedImmune FSAs and the MedImmune DCSA (as hereinafter defined).

WHEREAS PhaseBio desires to develop the Product for therapeutic use in reversing ticagrelor-mediated platelet inhibition.

WHEREAS Wacker Biotech and PhaseBio have entered into a separate Development and Clinical Supply Agreement (the “PhaseBio DCSA”, as hereinafter defined) in order to further develop and improve the production process and to supply GMP-compliant material of Product by Wacker Biotech to PhaseBio.

WHEREAS PhaseBio desires to obtain a license, with the right to sublicense, as hereinafter set forth under the WACKER Licensed Technology (as hereinafter defined) for the production of Product using the Developed Process (as hereinafter defined) and the Developed Strain (as hereinafter defined) both as developed under the Preceding Service Agreement(s) and the PhaseBio DCSA.

WHEREAS Wacker Biotech is willing to grant said license accordingly on the terms and conditions hereinafter set forth.

WHEREAS PhaseBio is willing to accept such license on the terms and conditions hereinafter set forth.

NOW, THEREFORE, in consideration of the promises and the mutual covenants hereinafter recited, the Parties agree as follows:

1. Definitions

In this Agreement, the following terms shall have the meanings set forth in this Article.

1.1 "**Affiliate(s)**" shall mean a) an organization, which directly or indirectly controls a Party; or b) an organization, which is directly or indirectly controlled by a Party; c) an organization, which is controlled, directly or indirectly, by the ultimate parent company of a Party. Control as per (a) to (c) is defined as owning fifty percent (50%) or more of the voting stock of a company or having otherwise the power to govern the financial and the operating policies or to appoint the management of an organization.

1.2 "**Agreement**" shall mean this agreement including any attached Annexes.

1.3 "**Annex**" shall mean an annex attached to this Agreement.

1.4 "**Annual Minimum Royalty**" shall have the meaning as set forth in Section 3.1(b).

1.5 "**API**" shall mean an active pharmaceutical ingredient derived from a production run which is compliant with GMP in accordance with Part II of Eudralex Vol. 4 "The rules governing medicinal products in the European Union", titled " Basic Requirements for Active Substances used as Starting Materials", intended to be used alone or in mixtures with other substances in the manufacture of a final drug (medicinal) product and that, when used in the production of a final drug (medicinal) product, becomes an active ingredient of the final drug (medicinal) product, whereas such substances are intended to furnish pharmacological activity or other direct effect in the diagnosis, cure, mitigation, treatment, or prevention of disease or to affect the structure and function of the body.

1.6 "**Background IP**" shall mean (i) with respect to Wacker Biotech, any and all IP owned by, licensed to, or controlled by Wacker Biotech/Wacker AG prior to the earlier of the FSA Effective Dates (April 24, 2014) or arising outside of and not related to the performance of the MedImmune FSAs, MedImmune DCSA and PhaseBio DCSA; and/or (ii) with respect to PhaseBio, any and all IP owned by, licensed to, or controlled by PhaseBio prior to the effective date of the PhaseBio DCSA or arising outside of and not related to the performance of the PhaseBio DCSA.

1.7 "**Calendar Year**" shall mean the period from the Effective Date until December 31 of the same year (the "**First Calendar Year**"), thereafter the period from January 01 to December 31 of each year of the Gregorian calendar (the "**Full Calendar Year**") and - in the last year of the term of this Agreement - the period from January 01 until the expiration of the Royalty Period (the "**Last Calendar Year**").

1.8 "**cGMP**" shall mean the current Good Manufacturing Practices for manufacture, processing or packaging of drug substances and drug products as set forth in the EU Guidelines to Good Manufacturing Practice Medicinal Products for Human and Veterinary Use as outlined in the European Commission Directive 2003/94/EC, of 8 October 2003, ICH Guidance for Industry "Q7 Good Manufacturing Practice for Active Pharmaceutical Ingredients", Requirements of the Code of Federal Regulations of the FDA, relevant and applicable local laws, each as amended from time to time during the term of this Agreement.

1.9 "**Combination Product**" shall mean the Final Drug Product sold, distributed, transferred, provided or otherwise made available in combination (in the same package, at the same time, as an associated supply, as part of the same action (including where pricing or consideration paid is linked to, dependent on or associated with any other supply or series of supplies) and including as a co-formulation) with one or more other active ingredients that are not the subject of this Agreement (each, an "**Other Active**").

1.10 "**Confidential Information**" shall mean, except as otherwise expressly set forth below, any information (whether in written, oral, visual, graphic, electronic or other form) disclosed or provided by or on behalf of one Party (the "**Disclosing Party**") to the other Party (the "**Receiving Party**") under this Agreement. The Disclosing Party shall use commercially reasonable efforts to mark as "Confidential" any such information disclosed or provided in written or recorded form and, in the case of orally disclosed information, shall use commercially reasonable efforts to identify such information as confidential at the time of oral disclosure and to confirm the confidential nature of such information in writing within thirty (30) days after oral disclosure. Notwithstanding the foregoing, information which is not marked "Confidential" at the time it is delivered to the Receiving Party, or which is not identified as confidential when disclosed orally and confirmed in writing within thirty (30) days will be deemed to be Confidential Information if the confidential nature of such information would be apparent to, or generally understood by, a reasonable person in the biotechnological industry based on the subject matter thereof, the circumstances under which it was disclosed, or otherwise.

Wacker Biotech's Confidential Information shall include the WACKER Licensed Process Technology, any information related to ESETEC® and/or the WACKER Secretion Technology, the Developed Strain and the WACKER Secretion Strain (and all material and immaterial aspects of it including their genetic nature and elements).

With respect to PhaseBio's Confidential Information the following shall apply: The Parties do not anticipate that PhaseBio will directly disclose any additional technical information to Wacker Biotech under this Agreement; the PhaseBio Background IP, PhaseBio Material, and the sequences encoding for Product (including the protein sequence and/or related genetic information as described in **Annex 3**) are subject to the confidentiality and non-use obligations of the PhaseBio DCSA. Therefore the Parties anticipate that PhaseBio's Confidential Information (i.e. information where PhaseBio is the Disclosing Party) made available to Wacker Biotech under this Agreement will be limited to any commercial information provided in form of the reporting in accordance with the stipulations of Section 3.7 herein, any list of Permitted Persons or Permitted Entities provided by PhaseBio to Wacker Biotech, any disclosure by the auditor to Wacker Biotech pursuant to Section 3.12, any Expert's Statement, any manufacturing records made available pursuant to Section 4.6, or any Claim Notice delivered by PhaseBio to Wacker Biotech.

1.11 "**Day of First Commercial Sale**" shall mean the day of the first sale by PhaseBio, its Affiliates or its Sublicensee(s) to a Third Party of a Final Drug Product for commercial use after obtaining all of the applicable regulatory approvals.

1.12 "**Deliverables**" shall mean the written documentation of the WACKER Licensed Technology and the Developed Strain as described finally in **Annex 2.**

1.13 "**Developed Process**" shall mean the documented process for the cGMP manufacture of Product using a Developed Strain developed under the Preceding Service Agreements or a future agreement between the Parties; the Developed Process is consisting of the Upstream Process and the Downstream Process.

1.14 "**Developed Strain(s)**" are the modified Wacker Secretion Strains developed under the Preceding Service Agreements or any future agreement between the Parties, for the cGMP manufacture of Product. As of the Effective Date, Developed Strains include the modified Wacker Secretion Strains with the names [***] and [***] (the latter also known as [***] under the MedImmune DCSA) (collectively, the "**Existing Developed Strains**"). In case a new statement of work under the PhaseBio DCSA to be mutually agreed by the Parties, or a future agreement between the Parties, is directed to the development of a modification of or improvement to an Existing Developed Strain or the development of a new modified Wacker Secretion Strain containing genetic information coding for Product, such modified or improved strain resulting from such development shall constitute a "Developed Strain" for purposes of this Agreement.

1.15 "**Distributed Dose**" shall mean a Dose sold, distributed, transferred, provided or otherwise made available for the first time by PhaseBio, its Affiliates or Sublicensee(s) to an independent Third Party expressly including distributers, wholesalers managed care organizations, hospitals, other buying groups, any governmental or regulatory authority. A Dose shall be deemed to be made available to an independent Third Party when a Dose is no longer in direct possession of

PhaseBio, its Affiliates or Sublicensee(s) irrespective whether or not any compensation (in cash or otherwise) has been received in return.

For the sake of clarity, a Dose shall be deemed to be a Distributed Dose for the calculation of Running Royalties even if such Dose is made available to an independent Third Party (i) in form of a Combination Product; or (ii) as a replacement for any expired (shelf-life) Dose. However a Dose shall *not* be deemed to be a Distributed Dose for the calculation of Running Royalties if such Dose is made available to an independent Third Party as a replacement for any rejected, returned (but not due to expiration of shelf-life), recalled, damaged or defective Dose.

1.16 "**Dose**" shall mean a single-dose of medication containing Final Drug Product intended for parenteral administration (injection or infusion) that is meant for use in a single patient for a single treatment in the dosage and packaging configuration approved by the applicable regulatory authority in a jurisdiction of the Territory for the approved indication, whether such approved dosage is contained in a single vial (or other container) in final packaging or in two or more vials (or other containers) packaged together in final packaging.

1.17 "**Downstream Process**" shall mean that part of the Developed Process that follows the Upstream Process starting with (and expressly including) the following process step: loading of the first chromatographic column and expressly including all chromatographic purification and final conditioning of the Product.

1.18 "**Drug Product**" shall mean any pharmaceutical product that contains the Product either alone or in combination with other active pharmaceutical ingredients or pharmaceutical product, provided that the Product contained in such Drug Product has been manufactured using WACKER Licensed Technology.

1.19 "**Effective Date**" shall be the date of the signature of the Party last-to-sign this Agreement.

1.20 "**ESETEC®**" shall mean Wacker AG's modified microbial production system, including ESETEC® 1.0 and ESETEC® 2.0, which is suitable for the massive secretion of functional, recombinant proteins into the culture broth based on a selection of modified *E. coli* [***] strains (the "**Wacker Secretion Strain(s)**" as hereinafter defined) and a set of modified plasmids carrying specific signal sequences or helper genes which confer correct folding and/or secretion of a protein into the culture medium of a microbial production host (including any future modifications, derivatives, mutations and/or clones thereof made, derived, developed or arisen).

1.21 "**Final Drug Product**" shall mean Drug Product in the ready-to-sell form provided that a marketing authorization has been obtained for such pharmaceutical product from the U.S. Food and Drug Administration (FDA) or any other competent regulatory authority in the world.

1.22 "**Indemnified Wacker Technology**" shall mean

(a) [***]; and

(b) [***]

both (a) and (b) in unmodified form and in the status of development as of the earlier of the MedImmune FSAs Effective Dates (April 24, 2014). For the sake of clarity, the term "Indemnified Wacker Technology" as used in this Agreement does expressly *not* comprise (i) any contributions (either material or immaterial) of either MedImmune or PhaseBio to the performance of the Preceding Service Agreements for the development of the Developed Process and/or the Developed Strain, including Product, genetic material or information coding for Product, the Downstream Process and/or PhaseBio Background IP; or (ii) any combinations of such contributions of either MedImmune or PhaseBio with (a) and/or (b) - the term "Indemnified Wacker Technology" as used in this Agreement is strictly limited to (a) and (b) as such.

1.23 "**Indirect Taxes**" means value added taxes, sales taxes, consumption taxes and other similar taxes required by law to be disclosed on the invoice.

1.24 "**IP**" shall mean any and all technical, scientific and/or analytical information, inventions, discoveries (whether patentable or not), know-how, methods (including without limitation testing methodologies) and Patent Rights.

1.25 "**Material**" shall mean any tangible biological, chemical, physical material or samples including any DNA, RNA, proteins, plasmids, restriction maps and sequences, reagents, culture supernatant, samples of Product, cells, progeny derived from cells whether modified or not, antibodies, apparatus, manuals, protocols, reports, data sheets, standard operation procedures ("SOP(s)") or any other material or article of manufacture.

1.26 "**MedImmune Background IP**" shall have the meaning as set forth in the MedImmune DCSA.

1.27 "**MedImmune DCSA**" shall mean the service agreement entered into by and between MedImmune and Wacker Biotech with an effective date of July 24, 2015 as amended or updated from time to time.

1.28 "**MedImmune FSAs**" shall mean the service agreements entered into by and between MedImmune and Wacker Biotech with effective dates of April 24, 2014 and of June 27, 2014 (the "**FSA Effective Date(s)**") both as amended or updated from time to time.

1.29 "**MedImmune IP**" shall have the meaning as set forth in the MedImmune DCSA.

1.30 "**Notification Purposes**" shall have the meaning as set forth in Section 4.5.

1.31 "**Notification Information**" shall have the meaning as set forth in Section 4.5.

1.32 "**Patent Rights**" shall mean any and all patents or patent applications, rights in inventions and any rights of the same or similar nature or effect anywhere in the world, including divisionals, continuations, continuations-in-part, and substitutions thereof and all foreign patent applications corresponding to the preceding applications; and all patents issuing on any of the preceding applications, including extensions, reissues, and re-examinations.

1.33 "**Permitted Persons**" shall have the meaning as set forth in Section 4.2.

1.34 "**Permitted Entities**" shall have the meaning set forth in Section 4.6.

1.35 "**PhaseBio Background IP**" shall mean the Background IP of PhaseBio. PhaseBio Background IP includes, without limitation, the Downstream Process and all MedImmune Background IP and MedImmune IP as far as (i) the rights thereto have been exclusively licensed to PhaseBio by MedImmune pursuant to the Transaction; and (ii) WACKER has become aware thereof in course of the Preceding Service Agreements.

1.36 "**PhaseBio DCSA**" shall mean the Development and Clinical Supply Services Agreement entered into by and between PhaseBio and Wacker Biotech with an effective date of June 07, 2018 as amended or updated from time to time.

1.37 "**PhaseBio Material**" shall mean

(i) the Material of PhaseBio provided to Wacker Biotech under the PhaseBio DCSA;

(ii) to the extent still existing and in the possession or control of Wacker Biotech, the Material of MedImmune provided to Wacker Biotech under the MedImmune FSAs and/or MedImmune DCSA.

1.38 "**Preceding Service Agreements**" shall mean (i) the MedImmune FSAs; (ii) the MedImmune DCSA; and (iii) the PhaseBio DCSA.

1.39 "**Product**" shall mean anti-ticagrelor antibody fragment known as PB2452 (or in the Preceding Service Agreements as MEDI2452) and defined by the protein sequence and/or related genetic information as described in **Annex 3**; Product is intended to be used as an API.

1.40 "**Promotional Samples**" shall have the meaning as set forth in Section 3.5.

1.41 "**Royalty Period**" shall mean a period commencing on the Effective Date and ending at the later of

(a) the day on which the manufacture, use, sale or offer for sale of Product no longer infringes a Valid Claim; or

(b) the [***] anniversary of the Day of First Commercial Sale.

1.42 "**Running Royalty**" shall have the meaning as set forth in Section 3.1(a).

1.43 "**Sublicensee(s)**" shall mean the permitted Third Parties as set forth in Section 2.2.

1.44 "**Tax**" or "**Taxation**" means any form of tax or taxation, levy, duty, charge, social security charge, contribution, or withholding of whatever nature (including any related fine, penalty, surcharge or interest) imposed by, or payable to, a Tax Authority.

1.45 "**Tax Authority**" means any government, state or municipality, or any local, state, federal or other fiscal, revenue, customs or excise authority, body or official anywhere in the world, authorized to levy Tax.

1.46 "**Technical Assistance Agreement**" shall have the meaning as set forth in Section 2.4.

1.47 "**Territory**" shall mean any country in the world expressly excluding [***]. The Territory might be subject to changes according to the stipulations of Section 2.1 last paragraph.

1.48 "**Third Party**" means any person or entity other than Wacker Biotech, Wacker AG, WBA or PhaseBio or any of the Affiliates of the aforementioned parties.

1.49 "**Transaction**" shall have the meaning as set forth in the recitals.

1.50 "**Upstream Process**" shall mean that part of the Developed Process starting with (and expressly including) the following process step: first inoculation of a culture with the Developed Strain up to (but expressly excluding) the following process step: the loading of the first chromatographic column; for the sake of clarity the Upstream Process shall expressly include any fermentation, harvest and clarification of the culture broth.

1.51 "**Valid Claim**" shall mean a claim of

(a) an issued, unexpired patent included within the WACKER Licensed Technology, that has not been: (i) held invalid, unpatentable or unenforceable by a final decision, that was not appealed or is unappealable, of a court of competent jurisdiction or of an administrative agency having authority over patents, or (ii) admitted to be invalid, unpatentable or unenforceable by the holder by reissue, disclaimer or otherwise; or

(b) a pending claim in a pending good faith patent application within WACKER Licensed Technology. Notwithstanding the foregoing clause (a), in the event that a pending claim in a pending application will not issue as a valid and enforceable claim in an issued patent within [***] years after the earliest date from which such patent application claims priority, such a pending claim will not be a Valid Claim, unless and until such pending claim subsequently issues as a valid and enforceable claim in an issued patent, in which case such claim will be reinstated and be deemed to be a Valid Claim as of the date of issuance of such patent.

1.52 "**Wacker AG**" shall mean Wacker Chemie AG (with offices located at Hanns-Seidel-Platz 4, 81737 Munich, Germany), which is the parent company of Wacker Biotech.

1.53 "**WACKER Background IP**" shall mean the Background IP of Wacker Biotech and/or Wacker AG, in particular such Background IP of Wacker Biotech and/or Wacker AG related to WACKER Secretion Technology.

1.54 "**WACKER Licensed Process Technology**" shall mean any and all Confidential Information relating to the Upstream Process and the Developed Strain which either (i) has been contributed by Wacker Biotech to the performance of the Preceding Service Agreements; or (ii) has been assigned to Wacker Biotech under the Preceding Service Agreements and which is reasonably necessary for the implementation of the Upstream Process in accordance with the terms and conditions of the license granted under this Agreement.

1.55 **"WACKER Licensed Technology**" shall mean the WACKER Licensed Process Technology and the WACKER Patent Rights.

1.56 "**WACKER Patent Rights**" shall mean the Patent Rights listed in more detail in **Annex 1** hereto (and as amended from time to time) and all other Patent Rights owned or controlled by Wacker Biotech that would be infringed by implementing the Developed Process as permitted in accordance with the terms and conditions of the license granted under this Agreement.

1.57 "**WACKER Secretion Strain**" shall mean (a) the specific proprietary *E. coli* [***] strain of Wacker Biotech in an unmodified form and which has been selected by Wacker Biotech from ESETEC® in course of the Preceding Service Agreements as the basis for the construction of the Developed Strain(s), or (b) any specific modified or improved strain that may be developed by Wacker Biotech pursuant to a new statement of work under the PhaseBio DCSA to be mutually agreed by the Parties, or a future agreement between the Parties, as the basis for the construction of Developed Strain(s). For the sake of clarity, the term "WACKER Secretion Strain" as used in this Agreement shall expressly not comprise (i) any contributions (either material or immaterial) of MedImmune or PhaseBio under the Preceding Service Agreements, including, in each case, genetic material or information coding for Product, PhaseBio Background IP and/or PhaseBio Material; or (ii) any combinations of such contributions of MedImmune and/or PhaseBio under the Preceding Service Agreements with such specific proprietary *E. coli* [***] strain. The term "WACKER Secretion Strain" as used in this Agreement is strictly limited to the specific proprietary *E. coli* [***] strain described in clause (a) of the first sentence of this Section 1.57 as such, or a specific modified or improved strain described in clause (b) of the first sentence of this Section 1.57 as such; which strain, in each case ((a) and (b)), does not contain genetic information coding for Product. For clarity, the WACKER Secretion Strain as such is not able to produce or secrete Product since it does not contain genetic information coding for Product.

1.58 "**WACKER Secretion Technology**" shall mean Wacker AG's and/or Wacker Biotech's Confidential Information related to ESETEC®, to the proprietary *E. coli* [***] strains (including the WACKER Secretion Strain) and to the molecular design of production hosts, the fermentation of production hosts, the secretion of proteins and their primary isolation from the culture broth.

1.59 "**WBA**" shall mean Wacker Biotech B.V. (formerly known as SynCo Bio Partners B.V.), whose registered office is at Paasheuvelweg 30, 1105 BJ Amsterdam, the Netherlands, which is a subsidiary of Wacker AG.

1.60 **Interpretation**

(a) Whenever any provision of this Agreement uses the term "including" (or "includes"), such term shall be deemed to mean "including without limitation" and "including but not limited to" (or "includes without limitations" and "includes but is not limited to") regardless of whether the words "without limitation" or "but not limited to" actually follow the term "including" (or "includes"), except if expressly excluded by using the words "solely", "only" or similar wording;

(b) The recitals set forth at the start of this Agreement, along with the Annexes to this Agreement, and the terms and conditions incorporated in such recitals and Annexes shall be deemed integral parts of this Agreement and all references in this Agreement to this Agreement shall encompass such recitals and Annexes and the terms and conditions incorporated in such recitals and Annexes;

(c) This Agreement shall be construed as if both Parties drafted it jointly, and shall not be construed against either Party as principal drafter;

(d) Unless otherwise provided, all references to Sections, Articles and Annexes in this Agreement are to Sections, Articles and Annexes of and to this Agreement;

(e) Unless otherwise provided, all references to days, months, quarters or years are references to calendar days, calendar months, calendar quarters or calendar years;

(f) The above definitions are intended to encompass the defined terms in both the singular and plural forms;

(g) The Article and Section headings of this Agreement are for convenience of the Parties only and in no way alter, modify, amend, limit, or restrict the contractual obligations of the Parties; and

(h) The words "in writing" or "written" used in this Agreement shall be deemed to include any communications sent by letter, facsimile or e-mail received by the Receiving Party; and

(i) The term "shall" used in this Agreement is to be interpreted exclusively as "must", therefore implying mandatory rights and obligations of the Parties.

2. License Grant and Technology Transfer

2.1 Subject to the terms and conditions of this Agreement and in consideration of the fees payable by PhaseBio to Wacker Biotech according to Article 3, Wacker Biotech hereby grants to PhaseBio an exclusive right and license under the WACKER Licensed Technology, the Developed Strain and the Deliverables

(a) to make and have made the Product in the Territory; and

(b) to use worldwide the Product manufactured in accordance with Section 2.1(a) for the manufacture of the Drug Product; and

(c) to sell, have sold, offer for sale and import worldwide the Final Drug Product manufactured in accordance with Section 2.1(a) or 2.1(b) respectively.

With respect to the Territory, PhaseBio acknowledges and agrees that Wacker Biotech and Wacker AG are willing to take all necessary measures to protect their valuable WACKER Secretion Technology, in particular the Wacker Secretion Strain. [***]

For the sake of clarity, the rights granted hereunder do ***not*** comprise and expressly ***exclude*** any activity of PhaseBio or its Sublicensees directed to a modification of the Developed Strain. For the sake of clarity, the rights granted hereunder do ***not*** comprise and expressly ***exclude*** the right of PhaseBio or its Sublicensees to reproduce and make master cell banks (MCB) and/or working cell banks (WCB), *unless* Wacker Biotech is not able or willing to provide cell banking services to PhaseBio, in which event the Parties will mutually agree in writing on a specific exemption from such exclusion; Wacker Biotech agrees that all cell banking services provided to PhaseBio for the Developed Strain will be performed as a fee-for-service based on customary and commercially reasonable terms.

2.2 PhaseBio is entitled to grant sublicenses to any Third Party (the "**Sublicensee(s)**") under the rights granted hereunder according to Section 2.1. [***]

However, PhaseBio shall impose on the Sublicensee(s) [***] the same obligations as imposed on PhaseBio under this Agreement (including all reporting, accounting and confidentiality obligations and acceptance of all rights of Wacker Biotech (expressly including the rights of auditing and investigation) set forth herein). PhaseBio shall promptly inform Wacker Biotech upon conclusion of such a sublicense agreement. PhaseBio shall be responsible for the compliance of the Sublicensee(s) with the terms and provisions set forth herein.

2.3 Within [***] days after receipt by Wacker Biotech of the complete payment of the first Annual Minimum Royalty in accordance with Sections 3.1(b), 3.6 and 3.10, Wacker Biotech shall disclose and supply the Deliverables to PhaseBio or a Third Party contract manufacturer designated by PhaseBio. In the event that PhaseBio reasonably believes that the Deliverables supplied by Wacker Biotech are incomplete, PhaseBio shall immediately provide written notice thereof to Wacker Biotech detailing the missing parts, and Wacker Biotech shall undertake reasonable efforts to furnish amended Deliverables within thirty (30) days after receipt of such PhaseBio's written notice.

2.4 During a period of [***] calculated from the Effective Date and if requested by PhaseBio, Wacker Biotech shall provide reasonable technical assistance to PhaseBio in relation to the implementation of Developed Process at facilities designated by PhaseBio. Such technical assistance shall be limited to a maximum of [***] per month during the [***] period ([***]) and to a maximum of [***] per month during the [***] period ([***]). Such technical assistance shall be compensated by PhaseBio to Wacker Biotech at a rate of [***]. The details of such technical assistance shall be subject to a separate technical assistance service agreement ("**Technical Assistance Agreement**").

2.5 Except as expressly provided herein, PhaseBio acknowledges and agrees that nothing in this Agreement shall be construed as granting to PhaseBio by implication, estoppel or otherwise, any licenses, options or any additional or other rights in ESETEC®, Wacker Background IP, WACKER Patent Rights, WACKER Licensed Process Technology, Developed Strain and/or WACKER Secretion Technology; no obligation of Wacker Biotech, Wacker AG or WBA nor any of their affiliated companies, neither expressed nor implied, to grant any additional licenses or any additional rights shall exist. Furthermore, for the sake of clarity, except as provided expressly to the contrary in this Agreement, PhaseBio acknowledges and agrees that no other or additional biologic material including bacterial strains, vectors, plasmids, sequences and/or constructs shall be released or provided to PhaseBio neither by Wacker Biotech, WBA or Wacker AG nor any of their affiliated companies as a deliverable of this Agreement except as expressly stipulated in the Deliverables or the Technical Assistance Agreement.

3. Consideration and Payment Terms

3.1 For and in consideration of the rights granted under Sections 2.1 and 2.2 PhaseBio shall pay to Wacker Biotech during the term of the Royalty Period:

(a) subject to Section 3.5, a per-unit (*i.e.*, Distributed Dose) royalty (quota license) in an amount of [***] per Distributed Dose (the "**Running Royalty**"); and

(b) subject to Section 3.6, an annual fixed license fee of [***] per Calendar Year (the "**Annual Minimum Royalty**").

The Running Royalty and the Annual Minimum Royalty shall be reduced by [***].

Debtor of any royalties payable to Wacker Biotech according to this Section 3.1 shall be PhaseBio, irrespective of whether or not the royalties payable to Wacker Biotech result from actions subject to licenses of PhaseBio, its Affiliates or its Sublicensee(s); royalties payable to Wacker Biotech under this Section 3.1 shall be made by PhaseBio as if any action subject to licenses has been made by PhaseBio directly.

3.2 The amount of [***] per Distributed Dose pursuant to Section 3.1(a) shall be valid until and including the calendar year [***]. For the period following the calendar year [***] the per-unit royalty pursuant to Section 3.1(a) shall [***], without further declarations or agreements between the Parties being required. For the avoidance of doubt, for the year [***] the amount of [***] per Distributed Dose pursuant to Section 3.1(a) shall [***]. Notwithstanding the foregoing, but always subject to Section 3.3, beginning with [***], in no event shall the per-unit royalty under Section 3.1(a) [***] the per-unit royalty under Section 3.1(a) for [***] by reason of any and all [***] for the [***], regardless of the [***], without the prior written consent of PhaseBio; *provided, however,* that in the event of [***] that Wacker Biotech believes in good faith [***], Wacker Biotech and PhaseBio shall negotiate in good faith [***].

3.3 As of the Effective Date the Parties assume that the amount of Product in a Dose will be [***]. The Parties hereby agree that in case the the amount of Product in a Dose will exceed [***] the Parties will enter into good faith negotiations on [***] to adequately reflect the [***].

3.4 If PhaseBio reasonably determines that it is necessary for the execution of the rights granted under Sections 2.1 and 2.2 [***], the royalties payable to Wacker Biotech under Section 3.1 shall be [***]; provided, however, that in no event shall any royalties payable to Wacker Biotech [***] pursuant to this Section 3.4 [***] of the royalties payable to Wacker Biotech in Section 3.1 above.

3.5 For the avoidance of doubt, there are no Running Royalties due or payable for that share of the Distributed Doses containing solely Product manufactured by Wacker Biotech under a separate supply agreement to be conducted by the Parties.

Furthermore PhaseBio, its Affiliate or its Sublicensee(s) collectively will be allowed to distribute Doses as free promotional samples up to a cumulative total of [***] of all Distributed Doses per Calendar Year ("**Promotional Samples**"). Any Promotional Samples that have been made available to an independent Third Party up to such percentage in a Calendar Year shall be deemed not to be Distributed Doses and shall not be subject to the obligation to pay Running Royalties. Any Doses which have been made available as free promotional samples to an independent Third Party exceeding such percentage in a Calendar Year shall be deemed to be Distributed Doses and shall be subject to the obligation to pay Running Royalties.

3.6 The Running Royalty of a Calendar Year – if any – shall be fully creditable against the Annual Minimum Royalty of the same Calendar Year.

The Annual Minimum Royalty shall be due beginning with such Calendar Year in which the Developed Strain was transferred to PhaseBio by Wacker Biotech and shall be payable within [***] days of the beginning of a Calendar Year. In the event the First Calendar Year is not a Full Calendar Year the Annual Minimum Royalty for such First Calendar Year shall be paid on a pro rata basis calculated on the basis of 365 calendar days per Calendar Year and shall be due and payable within [***] days after the Effective Date. For each Calendar Year following the First Calendar Year the Annual Minimum Royalty shall be due within [***] days of the beginning of such Calendar Year. In the event the Last Calendar Year is not a Full Calendar Year the Annual Minimum Royalty for such Calendar Year shall be paid on a pro rata basis calculated on the basis of 365 calendar days per Calendar Year; in case of any excess payment Wacker Biotech shall reimburse PhaseBio any amount paid in excess within [***] after the later of (i) the termination date of this Agreement or (ii) the date on which an excess payment has been determined.

3.7 Within [***] days after June 30 and December 31 of each Calendar Year (semi-annually), PhaseBio shall furnish to Wacker Biotech a written report showing in reasonably specific detail

(a) the amount of Distributed Doses for the preceding six (6) months period; and

(b) the calculation of the payments due and payable, if any, which shall have accrued hereunder; and

(c) withholding taxes, if any, required by law to be deducted in respect of any royalties due.

In the report of December 31 of each Calendar Year PhaseBio shall include additionally the amount and percentage (in relation to the amount of Distributed Doses) of Promotional Samples for the preceding twelve (12) months period.

In case no Running Royalties have become due in a reporting period PhaseBio shall inform Wacker Biotech accordingly at the due dates according to the foregoing stipulations.

3.8 The Running Royalty shall be payable on the day the written report according to Section 3.7 is due.

3.9 Any payments due to Wacker Biotech hereunder shall be a net payment, i.e. free of any bank and transfer charges and without deduction of any Taxes (including Indirect Taxes) or other fees payable outside the Federal Republic of Germany, except any withholding tax, if any, imposed on the amount payable under this Agreement which PhaseBio may deduct from payment hereunder and pay to the relevant Tax Authority. In the event withholding taxes shall be due the Parties will reasonably cooperate in completing and filing a request for exemption or reduction of withholding tax required under the provisions of any applicable double taxation or similar treaty or agreement in order to enable PhaseBio to make such payments to Wacker Biotech under this Agreement without any deduction or with reduced withholding. PhaseBio will furnish Wacker Biotech with the certificate of tax receipt issued by the relevant tax office, necessary to have such taxes credited in the Federal Republic of Germany.

3.10 All payments hereunder shall be payable in Euro (EUR) and shall be submitted by PhaseBio to Wacker Biotech to the following account of Wacker Biotech GmbH with Deutsche Bank, München (unless Wacker Biotech informs PhaseBio in writing about a change in the receiving bank):

[***]

adding the remark [***].

The obligation to pay shall only be considered fulfilled on the day on which the complete amount of money is credited to said account.

3.11 Whenever conversion of United States Dollars (USD) to Euro (EUR) shall be required, such conversion shall be calculated using the exchange rates of the European Central Bank ("ECB") (e.g., https://www.ecb.europa.eu; also available at Reuters page "ECB37"). For the purposes of crediting the Running Royalty of a Calendar Year against the Annual Minimum Royalty of the same Calendar Year the following procedure shall apply: For calculation purposes the Annual Minimum Royalty shall be converted to United States Dollars (USD) on the day on which the respective Annual Minimum Royalty is due using the exchange rate of the ECB of that day; any balance to be paid by PhaseBio between the respective converted Annual Minimum Royalty in United States Dollars (USD) and the credited Running Royalties of the same Calendar Year shall be converted from United States Dollars (USD) to Euro (EUR) using the average exchange rate of the ECB published for the respective six (6) month royalty period during the Calendar Year.

3.12 In the event that PhaseBio is delinquent in the payment due under this Agreement, Wacker Biotech is entitled to charge default interest amounting to [***] above the interest rate of the European Central Bank (ECB). Such interest shall be calculated on a pro rata basis from the day payment was due until the day the payment is credited to the account according to Section 3.10.

3.13 PhaseBio will keep complete and accurate records of account for [***] years preceding the current year for the verification of the royalties to be paid under this Agreement. During the term of this Agreement and within [***] years after termination, such records of account shall be open at all reasonable times – but not more than once each calendar year - to the inspection of an independent certified auditor chosen by Wacker Biotech and acceptable to PhaseBio. The auditor shall keep confidential any information obtained during such inspection and shall report to Wacker Biotech only the payments due and payable.

The costs of such inspection and audit shall be borne by Wacker Biotech, unless it shall be established by Wacker Biotech that as a result of an error in such a report PhaseBio has failed to pay Wacker Biotech at least [***] of the full amount of royalties due and owing under this Agreement, in which event the costs of such inspection shall be borne by PhaseBio. The results of such inspection are binding to the Parties.

3.14 Subject to Section 3.6, last sentence any payments already made by PhaseBio are not refundable in any event, including termination of this Agreement.

4. Confidentiality and Use Restrictions

4.1 Unless otherwise agreed in this Agreement, the Receiving Party shall keep strictly confidential any Confidential Information of the Disclosing Party and shall not make Confidential Information of the Disclosing Party, in whole or in part, available to any Third Party (including any patent offices or similar authorities). The Receiving Party shall use Confidential Information of the Disclosing Party only for the purpose of exercising its rights (including, in the case of PhaseBio as the Receiving Party, the rights granted hereunder under Section 2.1 and 2.2) and performing its obligations under this Agreement. The Receiving Party shall not use or exploit Confidential Information of the Disclosing Party in any form directly or indirectly, in whole or in part, for any other purposes or for the obtainment of intellectual property rights. All Confidential Information of the Disclosing Party and all rights therein shall remain the Disclosing Party's exclusive property.

In particular PhaseBio shall ***not*** deposit, in whole or in part, the Developed Strain with a depositary institution [***]; furthermore PhaseBio shall use the Developed Strain ***only*** for the purpose of exercising its rights under this Agreement.

4.2 The Receiving Party shall take all necessary steps to meet the obligations set forth in this Article 4. The Receiving Party shall disclose Confidential Information of the Disclosing Party only to those of its directors, officers, employees, legal representatives, Sublicensee(s) or contract manufacturers (the "**Permitted Persons**") who have a need to know of such Confidential Information for the exercise of the Receiving Party's rights (including, in the case of PhaseBio as the Receiving Party, the rights granted hereunder under Section 2.1 and 2.2) and the performance of the Receiving Party's obligations hereunder and who have agreed before to be bound by the terms of confidentiality and restricted use consistent with this Agreement, in particular this Article 4, in writing, unless such Permitted Persons are already bound accordingly by the terms of employment, other contracts or by applicable law. The Receiving Party shall be liable for any breach of the provisions of this Agreement by its Permitted Persons.

However, notwithstanding the foregoing PhaseBio shall ***not*** disclose or make otherwise available to any Third Party, expressly ***not*** to Sublicensee(s) or contract manufacturers, the genotype and/or related genetic information of the Wacker Secretion Strain and/or the Developed Strain, [***].

4.3 PhaseBio shall ***not*** analyze, have analyzed, perform or have performed any reverse engineering or decompilation of the Developed Strain or any other Deliverable provided hereunder in order to receive any information on the genotype and/or related genetic information of the Wacker Secretion Strain (which builds also the basis of the Developed Strain) or any aspect thereof; such information shall be deemed to be Confidential Information of Wacker Biotech in each case.

PhaseBio shall expressly instruct in writing any individual within its organization who has access to the Developed Strain to comply with this non-analysis obligation pursuant to this Section 4.3 and oblige the Permitted Entities in writing to impose a similar obligation to those individuals within the Permitted Entities' organizations; for clarity, every individual within PhaseBio's organization or within the organization of the Permitted Entities who has access to the Developed Strain shall have been expressly instructed in writing to comply with this non-analysis obligation pursuant to this Section 4.3.

Furthermore PhaseBio shall ***not*** have the right to reconstruct the Developed Strain.

4.4 Subject to (i) the use of Confidential Information reasonably necessary solely for the duration and the performance of PhaseBio's rights according to Section 9.9; and/or (ii) the requirement to retain any Confidential Information for regulatory reasons, in the event of termination of this Agreement PhaseBio shall immediately return or destroy all embodiments of the received Confidential Information, including but not limited to records, data media, product samples, materials or other documents in any form, including any electronic (with respect to electronic files, deleted to the extent reasonably practicable), paper or otherwise embodied copies at Wacker Biotech's request which may be made at any time upon or after termination of this Agreement.

After termination of this Agreement, PhaseBio shall immediately stop using the WACKER Licensed Technology, in particular the Developed Process and the Developed Strain and, subject to Section 9.9, any material, including Product, produced by such use; in particular PhaseBio shall immediately destroy the Developed Strain and any modification, derivative, mutations, clones or progeny thereof.

Complete return or destruction shall be confirmed in writing by PhaseBio. The above shall not apply to back-up copies of electronic data routinely prepared but only for the time for which such back-up copies of similar-type information are customarily retained.

For the sake of clarity, in the event of termination of this Agreement (but not expiration of the Royalty Period), upon expiration of the period of use permitted under Section 9.9, the obligations of this Section 4.4 on complete return and destruction shall apply without limitation or restriction.

4.5 Notwithstanding the obligations of this Article 4, PhaseBio may disclose Confidential Information if it is required to do so in response to a valid order of a competent court or other government authority; provided however, Confidential Information shall not be disclosed without (a) first timely notifying Wacker Biotech in writing to allow Wacker Biotech to safeguard its rights by protective order or equivalent; and (b) cooperating with Wacker Biotech to limit the scope of Confidential

Information disclosed to the greatest extent possible and to ensure that disclosed Confidential Information is (i) treated as confidential by the recipient to the greatest extent possible by law; and (ii) used solely for the purposes for which the order was issued.

Notwithstanding the foregoing, Wacker Biotech acknowledges that PhaseBio intends to establish a contract manufacturing relationship for Product with a contract manufacturer located in [***]. PhaseBio will reimburse Wacker Biotech for (i) all reasonable and documented costs and expenses of said third party consultant as well as (ii) all reasonable internal efforts and documented out-of-pocket expenses incurred by Wacker Biotech directly in course of its supporting efforts at the then effective hourly rate of Wacker Biotech. PhaseBio will be invoiced by Wacker Biotech and the payments are due and payable within thirty (30) days net from the date of an invoice. Wacker Biotech is entitled to charge default interest in accordance with Section 3.12 in the event of delinquency of payment of such invoiced amounts by PhaseBio.

[***]

4.6 PhaseBio agrees and acknowledges that Wacker Biotech or Wacker AG shall have the right once in any calendar year to seek a legally binding written declaration by PhaseBio and each of its Affiliates, Sublicensees, and contract manufacturers of Product that have access to the Developed Strain (collectively, "**Permitted Entities**") that the WACKER Licensed Technology or any part of it, in particular the Developed Strain, has only been used for the performance of the rights granted hereunder and/or that products, other than Product, Drug Product and/or Final Drug Product, manufactured or sold by PhaseBio, its Affiliates, its permitted Sublicensee(s) and subcontractors are not made, based upon or using the WACKER Licensed Technology, in particular not ESETEC® and/or the Wacker Secretion Strain.

From time to time upon Wacker Biotech's request, PhaseBio will provide Wacker Biotech with a list of the Permitted Entities who have access to the Developed Strain, the WACKER Licensed Technology or any part of it.

Furthermore Wacker Biotech and/or Wacker AG shall have the right at any time, at its own cost, to have an independent expert, acceptable to PhaseBio, investigate to verify that neither PhaseBio, nor the Permitted Entities have in any manner become involved, directly or indirectly, in the manufacture or sale of a product, other than the Product, Drug Product or Final Drug Product, based upon or using the WACKER Licensed Technology, in particular ESETEC® and/or the Wacker Secretion Strain (collectively hereinafter a "Misuse of WACKER Licensed Technology"), and such investigation shall [***]. PhaseBio shall cooperate in a reasonable manner with such independent expert in its investigation. The right of investigation under this sub-paragraph shall be strictly limited to the respective product in question.

In connection with this investigation, the independent expert shall only provide to Wacker Biotech and/or Wacker AG a report that [***] (the "**Expert's Statement**"). [***] Wacker Biotech and/or Wacker AG shall have the right to use the redacted Expert's Statement as it deems fit.

Wacker Biotech and/or Wacker AG's rights of investigation under this Section 4.6 shall not obligate PhaseBio or any Permitted Entity to provide [***].

PhaseBio shall require any of its Permitted Entities who will have access to the Developed Strain in writing to expressly agree to Wacker Biotech and/or Wacker AG's rights of investigation according to this Section 4.6 prior to any transfer of WACKER Licensed Technology, in particular the Developed Strain, to such Permitted Entities.

In each event the provisions of this Section 4.6 shall survive [***] after any termination or expiration of this Agreement. Upon expiration of said [***] term Wacker Biotech and/or Wacker AG shall [***].

4.7 The obligations of confidentiality and restricted use set forth in this Article 4 shall not apply to any portion of Confidential Information of the Disclosing Party that the Receiving Party can prove by competent evidence:

(a) is in the public domain at the time of disclosure; or

(a) after disclosure, becomes part of the public domain by publication or otherwise, except through breach of this Agreement or the PhaseBio DCSA by the Receiving Party; or

(b) was already in its possession at the time of disclosure, without confidentiality restrictions; or

(c) is disclosed to the Receiving Party by a Third Party who is entitled to disclose the information without an obligation to maintain the confidentiality thereof; or

(d) is expressly approved for disclosure by written authorization of the Disclosing Party in each case; or

(e) is independently developed by personnel of the Receiving Party without recourse or reference to the Confidential Information of the Disclosing Party.

Any combination of features shall not be deemed to be within the foregoing exceptions merely because individual features are within an exception unless the actual combination itself is within an exception. Any specific Confidential Information shall not be deemed to be in the foregoing exceptions merely because it is encompassed by more general information which is within an exception unless the specific Confidential Information itself is within an exception.

4.8 Without limiting the Parties' rights according to Sections 2.2, 6.2 and 10.8, each Party shall keep confidential the terms and conditions of this Agreement.

5. Prosecution and Maintenance of WACKER Patent Rights and Third Party Infringement

5.1 Wacker Biotech and/or Wacker AG shall not be obliged to prosecute and maintain WACKER Patent Rights or to take any measures which are necessary for the perfection on the WACKER Patent Rights. Wacker Biotech and/or Wacker AG shall not be obliged to offer to PhaseBio the transfer of any of the WACKER Patent Rights in the event that Wacker Biotech and/or Wacker AG elects not to continue prosecuting or maintaining any of the WACKER Patent Rights.

5.2 All costs related to the prosecution and maintenance of WACKER Patent Rights shall be borne by Wacker AG or Wacker Biotech respectively.

5.3 The Parties shall furnish the other with timely written notice of any and all infringements and other unauthorized uses of WACKER Patent Rights that come to their attention during the term of this Agreement.

6. Press Release, Publicity and Use of Names

6.1 Neither Party shall make use of the name or trademarks of the other Party, nor of any agent of the other Party in connection with any publicity, advertising, promotional material, or otherwise without the prior written approval of the other Party.

6.2 Always subject to Section 4.8, the Parties agree that an initial public announcement of the execution of this Agreement shall be made in the form of a mutual press release. The content of the mutual press release is outlined in **Annex 4**. Final wording (but not content) and time of the publication is to be agreed upon by the Parties in good faith. After such press release is published, each Party shall be entitled to make or publish any public statement consistent with the contents thereof.

7. Warranties and Representations

7.1 **Warranties and Representations of PhaseBio**

PhaseBio represents and warrants that

(a) the execution, delivery and performance of this Agreement shall not result in a breach or violation of any agreements, contracts or other arrangements to which it is a party;

(b) it is duly organized and validly existing under the laws of jurisdiction of its organization and it has the legal right to enter into this Agreement;

(c) it has an exclusive license from MedImmune to the Medimmune Background IP, the MedImmune IP, the Product and in any and all confidential information and Material of MedImmune provided to Wacker Biotech under the Preceding Service Agreement(s);

(d) it is duly authorized to execute and deliver this Agreement and to perform its obligations hereunder, and the person executing this Agreement on its behalf has been duly authorized to do so by all requisite corporate action;

(e) this Agreement is a legal and valid obligation binding upon PhaseBio and enforceable in accordance with its terms;

(f) it shall comply with any applicable supranational, national or local laws, regulations or codes in the performance of its material obligations under this Agreement; and

(g) as of the Effective Date, [***], the provision of [***] hereunder [***] for reason attributable to: (i) [***]; and/or (iii) [***].

7.2 **Warranties and Representations of Wacker Biotech**

Wacker Biotech represents and warrants that

(a) the execution, delivery and performance of this Agreement shall not result in a breach or violation of any agreements, contracts or other arrangements to which it is a party;

(b) it is duly organized and validly existing under the laws of jurisdiction of its organization, and it has the legal right to enter into this Agreement;

(c) it is duly authorized to execute and deliver this Agreement and to perform its obligations hereunder, and the person executing this Agreement on its behalf has been duly authorized to do so by all requisite corporate action;

(d) this Agreement is a legal and valid obligation binding upon Wacker Biotech and enforceable in accordance with its terms;

(e) as of the Effective Date, [***] the WACKER Secretion Strain as such, [***];

(f) to the best of Wacker Biotech's knowledge, no person other than those persons named as inventors on any of WACKER Patent Rights is an inventor of the inventions claimed in the WACKER Patent Rights;

(g) Wacker Biotech has not received written notice (and is not otherwise aware) of any pending lawsuits, judgments, settlements, or legal actions against Wacker Biotech with respect to the WACKER Licensed Technology that, [***]. Except for [***] Wacker Biotech has not received written notice (and is not otherwise aware) of [***]; and

(h) as of the Effective Date, Wacker Biotech is not pursuing any lawsuits, judgments, settlements, or legal actions with respect to the WACKER Secretion Technology, ESETEC® or the WACKER Licensed Technology that, [***] would have [***].

7.3 **Disclaimers**

7.3.1 Nothing in this Agreement is or shall be construed neither express nor implied as an obligation of Wacker Biotech, WBA and/or Wacker AG to bring or prosecute actions or suits against any Third Party for infringement of the WACKER Licensed Technology, including the WACKER Patent Rights.

7.3.2 Except for the warranties and representations given under Section 7.2 above, nothing in this Agreement is or shall be construed neither express nor implied as:

(b) a warranty or representation by Wacker Biotech, WBA and/or Wacker AG as to the validity, enforceability or scope of the WACKER Patent Rights or any claim within the WACKER Patent Rights; or

(c) a warranty or representation by Wacker Biotech, WBA and/or Wacker AG that the manufacture, use, offer-for-sale or sale of Product, Drug Product or Final Drug Product or the use of the WACKER Licensed Technology (expressly including the Developed Process) or the Deliverables (expressly including the Developed Strain) in accordance with the rights granted under this Agreement is or will be free from infringement of and does and will not intervene in any Patent Rights of any Third Party; or

(d) granting by implication, estoppel, or otherwise any licenses, sub-licenses or other rights or making covenants not-to-sue under any Patent Rights of Wacker Biotech, WBA, Wacker AG and/or any Third Party, other than the licenses expressly granted as set forth in Article 2; or

(e) a warranty or representation by Wacker Biotech, WBA and/or Wacker AG as to the accuracy, sufficiency, completeness or fitness for a particular purpose [***].

7.3.3 Except for the express warranties set forth in Section 7.2 Wacker Biotech, WBA AND/OR Wacker AG make NO REPRESENTATIONS OR WARRANTIES OF ANY KIND WITH RESPECT TO the WACKER LICENSED TECHNOLOGY, Deliverables, Confidential Information and/or any other information or materials disclosed, provided or delivered AND/OR RIGHTS OR LICENSES GRANTED by Wacker Biotech AND/OR Wacker AG hereunder or the use thereof, WHETHER EXPRESS OR IMPLIED, EITHER IN FACT OR BY OPERATION OF LAW, BY STATUTE OR OTHERWISE. Wacker Biotech HEREBY SPECIFICALLY DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY OR GUARANTEE OF ACCURACY, COMPLETENESS, SUFFICIENCY, MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, VALIDITY, ENFORCEABILITY OR NON-INFRINGEMENT OF INTELLECTUAL PROPERTY RIGHTS OR ANY OTHER RIGHTS OF THIRD PARTIES.

7.3.4 PhaseBio shall in any case be solely responsible for the use to which it puts WACKER Licensed Technology including any Deliverables and/or any other information or material which it receives from Wacker Biotech and/or Wacker AG hereunder; except to the extent of [***]. PhaseBio shall be solely responsible for the manufacture, use or distribution, offer for sale and sale of Product, Drug Product and Final Drug Product or any other product resulting therefrom. PhaseBio agrees to comply with all laws and regulations applicable to the handling, use, storage and disposal of any materials provided hereunder and to otherwise handle, use and store such materials in a safe, secure and responsible manner.

8. Indemnification, Liability and Limitation of Liability

8.1 PhaseBio shall indemnify, defend and hold harmless Wacker Biotech, its employees, officers, directors, governors, managers, subsidiaries, Affiliates, agents and principals (partners, shareholders or holders of an ownership interest, as the case may be) (hereinafter collectively "**Wacker Biotech Released Parties**") from and against any and all losses, damages, costs and expenses, including reasonable attorneys' fees and court costs (hereinafter collectively "**Damages**"), to which any Wacker Biotech Released Party may become subject as a result of any claim, demand, action or other proceeding by any Third Party (each, an "**Action**"), to the extent such Damages result from or arise out of (i) any breach by PhaseBio of any of its warranties or representations set forth in Section 7.1; (ii) any product liability claims with respect to Product, Drug Product and/or Final Drug Product made by or on behalf of PhaseBio or any of its Affiliates or Sublicensees by exercising the license granted hereunder; (iii) an alleged or actual failure of Product, Drug Product and/or Final Drug Product made by or on behalf of PhaseBio or any of its Affiliates or Sublicensees by exercising the license granted hereunder to conform to requirements of any applicable laws and/or any applicable regulatory approvals, including the failure of PhaseBio to obtain the necessary regulatory approvals; (iv) the use of any Deliverables, the WACKER Licensed Technology or any other information or material disclosed, delivered or provided hereunder [***]; and/or (v) [***].

Such indemnification (as described herein under (i) - (v)), shall not apply if such Action or Damage arises from matters which are subject to Wacker Biotech's indemnification obligations set forth in Section 8.2. Subject to Section 8.4, PhaseBio will defend any Actions covered by this Section 8.1 at its expense and will pay any Damages that may be finally awarded against Wacker Biotech and Wacker Biotech Released Parties; to this extent, PhaseBio waives the defense of time limitation.

8.2 Wacker Biotech shall indemnify, defend and hold harmless PhaseBio, its employees, officers, directors, governors, managers, subsidiaries, Affiliates, agents and principals (partners, shareholders or holders of an ownership interest, as the case may be) (hereinafter collectively "**PhaseBio Released Parties**") from and against any and all Damages to which any PhaseBio Released Party may become subject as a result of any Action, to the extent such Damages result from or arise out of any breach by Wacker Biotech of any of its warranties or representations set forth in Section 7.2.

Such indemnification shall not apply if and to the extent any Action or Damage arises from matters which are subject to PhaseBio's indemnification obligations set forth in Section 8.1.

Subject to Section 8.4, Wacker Biotech will defend such Actions at its expense and will pay any Damages, that may be finally awarded against PhaseBio and PhaseBio Released Parties.

8.3 If any of the Indemnified Wacker Technology becomes, [***], the subject of a Third Party claim of infringement or litigation Wacker Biotech shall, [***]. For the sake of clarity, this claim of PhaseBio pursuant to this Section 8.3 is [***].

8.4 A Party wishing to seek indemnification hereunder (the "**Indemnified Party**") shall notify the other Party (the "**Indemnifying Party**") in writing of any Action as soon as reasonably practicable ("**Claim Notice**") after the Indemnified Party receives notice of the Action, shall permit the Indemnifying Party to assume direction and control of the defense of the Action (including the right to settle the Action solely for monetary consideration) using counsel reasonably satisfactory to the Indemnified Party, and shall cooperate as requested by the Indemnifying Party's request (at the Indemnifying Party's expense), in the defense of such Action. The Indemnifying Party shall keep the Indemnified Party informed on a current basis of its defense of any such Action. Each Party hereto shall cooperate with the other Party in every reasonable way to facilitate the defence of any such Action. The Indemnified Party shall not agree to any settlement of such Action without the prior written consent of the Indemnifying Party, which shall not be unreasonably withheld, delayed or conditioned. The Indemnifying Party shall be free to take any reasonable action as it deems fit, provided however the Indemnifying Party will not settle any Action in any manner or agree to any settlement of such Action or consent to any judgment in respect thereof that (i) does not include a complete and unconditional release of the Indemnified Party from all liability with respect thereto; (ii) adversely affects the rights of the Indemnified Party; (iii) admits or imposes any liability or obligation on the Indemnified Party; or (iv) acknowledges fault by the Indemnified Party without the prior written consent of the Indemnified Party.

The Indemnified Party's failure to provide a Claim Notice to the Indemnifying Party under this Section 8.4 does not relieve the Indemnifying Party of any liability that the Indemnifying Party may have to an Indemnified Party, but in no event shall the Indemnifying Party be liable for any Damages that result from a delay in providing a Claim Notice. Each Claim Notice must contain a description of the Action and the nature and amount of the related Damages (to the extent that the nature and amount of the Damages are known at that time). In the event that a final judgment or order is entered by any court or other tribunal against the Indemnified Party, the Indemnifying Party shall satisfy such judgment or order (and/or reimburse the Indemnified Party for any amounts it pays against such judgment or order) incurred by the Indemnified Party with regard to its defence against the Action or Damage within [***] days of the Indemnified Party providing notice to the Indemnifying Party of the judgment or order.

8.5 Except for [***], as far as legally permitted neither Party shall be liable to the other Party, whether in tort, contract or otherwise, for any consequential, special, incidental, punitive or indirect damages, loss or expenses (including but not limited to business interruption, lost business, lost profits, or lost savings) in connection with this Agreement; provided, however, that this Section 8.5 [***], as applicable.

8.6 Except for [***], as far as legally permitted the entire liability of Wacker Biotech to PhaseBio under this Agreement, whether in tort, contract, under the indemnity contained in Section 8.2 or otherwise shall be limited to [***].

8.7 Nothing in this Agreement shall purport or attempt or serve to exclude or restrict any liability (i) for any fraud or fraudulent misrepresentation, (ii) for wilful misconduct or (iii) under mandatory applicable law, including without limitation mandatory product liability law.

8.8 PhaseBio and Wacker Biotech shall obtain and/or maintain during the term of this Agreement and for a period of [***] years thereafter, liability insurance in amounts which are reasonable and customary in the biopharmaceutical industry for the respective activities (i.e. Wacker Biotech as contract manufacturing organisation and PhaseBio as sponsor/pharmaceutical company) at the respective place of business, but no less than [***], and such liability insurance shall insure against all mandatory liability, including liability for personal injury, physical injury and property damage. Wacker Biotech shall have the right to self-insure at any time.

9. Term and Termination

9.1 This Agreement shall come into effect on the Effective Date and shall - unless terminated earlier in accordance with the provisions of the Sections 9.2 to 9.7 – be in force for an indefinite period of time.

9.2 Upon regular expiration of the Royalty Period (i.e. without occurrence of an earlier termination in accordance with the stipulations herein) the license granted hereunder to PhaseBio shall be fully-paid up and automatically converts to a non-exclusive license. Irrespective of such expiration the obligations of the Parties according to Articles 4, 6, 7 and 8 shall remain in effect.

9.3 This Agreement (including the rights granted herein) may be terminated by either Party upon any material breach by the other Party of any material obligation or condition, effective [***] days after giving written notice to the breaching Party of such termination, which notice shall describe such breach in reasonable detail. The foregoing notwithstanding, if such default or breach is cured or shown to be non-existent within the aforesaid [***] day period, the notice shall be deemed automatically withdrawn and of no effect; provided, however, that prior to giving any notice for breach, the Parties shall first attempt to amicably resolve any disputes as to the existence of any breach through good faith negotiations between a senior management member from each Party for a period of not less than [***] days.

A material breach of PhaseBio which entitles Wacker Biotech to terminate this Agreement for cause shall include, but not be limited to the default of PhaseBio to pay the consideration according to Article 3 within the remedy periods set out in Section 9.3 or any non-compliance by PhaseBio with the provisions of Article 4.1, 4.2, 4.3, 4.6 and 4.8.

9.4 PhaseBio shall have the right to terminate this Agreement and the rights granted to PhaseBio hereunder earlier with effect to the end of a Calendar Year by giving [***] months prior written notice of termination to Wacker Biotech, provided that any payments due for the period before the effective date of the termination will be paid by PhaseBio even if the due date of such payment would be after the effective date of the termination.

9.5 Wacker Biotech shall have the right to terminate this Agreement and the rights granted to PhaseBio hereunder with immediate effect by giving written notice of termination in the event PhaseBio declares bankruptcy or commences bankruptcy or reorganization proceedings, or if PhaseBio has such proceedings commenced against it which are not dismissed within [***] days after service, or if PhaseBio makes a general assignment for the benefit of creditors or is generally unable to pay its debts as they become due.

9.6 Wacker Biotech shall have the right to terminate this Agreement and the rights granted to PhaseBio hereunder with immediate effect by giving written notice of termination in the event PhaseBio challenges or supports challenge of WACKER Patent Rights.

9.7 Upon any termination of this Agreement, Section 4.4 shall apply. Upon any termination of this Agreement (but, for clarity, not upon expiration of the Royalty Period in accordance with Section 9.2) any and all rights granted to PhaseBio hereunder shall cease and shall automatically revert to Wacker Biotech.

9.8 Furthermore termination of this Agreement or expiration of the Royalty Period for any reason shall not affect and shall be without prejudice to any rights or obligations of either Party which shall have arisen on or before the date of such termination of this Agreement or expiration of the Royalty Period, nor shall it affect the survival of any provisions of this Agreement which are expressly, or by implication, intended to survive the termination of this Agreement or expiration of the Royalty Period, in particular without limitation the rights and obligations of Articles 3, 4, 6, 7, 10 and 11 shall survive any termination of this Agreement or expiration of the Royalty Period (provided that PhaseBio shall have no obligation to pay Running Royalties or any Annual Minimum Royalty for any period after expiration of the Royalty Period. Termination of the Agreement or expiration of the Royalty Period in accordance with the provisions hereof shall not limit any remedies which may be otherwise available.

9.9 In case of termination by PhaseBio under Section 9.3 or 9.4, PhaseBio shall have the right to utilize the stock in its inventory of any Product as permitted by the license granted by Wacker Biotech under this Agreement for a limited period of [***] following the date of termination hereof subject to PhaseBio's continuing obligation to pay royalties for such [***] period in accordance with the stipulations of Article 3 hereof.

10. Miscellaneous

10.1 Any change or modification of this Agreement, including this Section 10.1, requires written amendment signed by both parties.

10.2 If any provision in this Agreement is invalid or unenforceable the rest of this Agreement shall remain unaffected. The Parties shall in good faith substitute such provision with a valid and enforceable provision which comes closest to the economic intention of the invalid or unenforceable provision.

10.3 All notices, requests and other communications hereunder shall be in writing and shall be delivered or sent in each case to the respective address specified below, or such other address as may be specified in writing to the other Party hereto via hand delivery or internationally recognized overnight delivery services that maintains records of delivery, and shall be effective either upon receipt, if hand delivered, or on the third delivery day after deposit with an internationally recognized overnight delivery service (unless the receiving Party can prove by reasonable evidence later receipt):

(a) Wacker Biotech:
Wacker Biotech GmbH
Hans-Knöll-Straße 3
D-07745 Jena
Germany
Attn.: Managing Director

with a copy to:
Wacker Chemie AG
Corporate Department IP - Intellectual Property
Hanns-Seidel-Platz 4
D-81737 Munich
Germany

(b) PhaseBio:
PhaseBio Pharmaceuticals, Inc.
1 Great Valley Parkway, Suite 30,
Malvern, PA 19355
USA
Attn: Chief Executive Officer

10.4 Both Parties are independent contractors under this Agreement. Nothing contained in this Agreement is intended nor is to be construed so as to constitute Wacker Biotech or PhaseBio as partners or joint venturers with respect to this Agreement. Except as expressly stipulated herein, neither Party shall have any express or implied right or authority to assume or create any obligations on behalf of or in the name of the other Party or to bind the other Party to any other contract, agreement, or undertaking with any Third Party. Furthermore nothing herein is intended nor is to be construed so as to assume or create any obligations of a Party to enter into any other contract, agreement, or undertaking with the other Party.

10.5 No waiver of any rights shall be effective unless consented to in writing by the Party to be charged and the waiver of any breach or default shall not constitute a waiver of any other right hereunder or any subsequent breach or default.

10.6 This Agreement is not a release. This Agreement is not a joint development agreement.

10.7 This Agreement constitutes the entire and exclusive Agreement between the Parties with respect to the subject matter hereof and supersedes and cancels all previous discussions, agreements, commitments and writings in respect thereof; *provided, however,* that the PhaseBio DCSA shall remain in effect in accordance with its terms. No amendment or addition to this Agreement shall

be effective unless reduced to writing and executed by the authorized representatives of the Parties. In case of any discrepancy between the main body of this Agreement and its Annexes, the main body shall prevail without restriction. In the event of any conflict between this Agreement and the Preceding Service Agreements, this Agreement shall control.

10.8 Neither Party may transfer or assign this Agreement, directly or indirectly, or any of its rights hereunder without the prior written consent of the other Party, other than to an Affiliate, a successor of a Party under a change in control of such Party or to a Third Party in connection with the transfer or sale of all or substantially all of its business relating to the subject matter of this Agreement, always provided that the assignee expressly obligates itself in a written instrument to fully perform all of the obligations of the assignor under this Agreement. However, should PhaseBio [***], PhaseBio shall [***]. Any consent required by either Party under this Section 10.8 shall not be unreasonably withheld. Any other attempted transfer or assignment in violation of this Section 10.8, in particular an assignment of this Agreement without a transfer of the rights and obligations hereunder shall be void. In the event of a permitted change of control, the original Party's (or its successor's) obligations hereunder shall continue. This Agreement shall be binding upon and inure to the benefit of the Parties and their permitted successors and assignees.

10.9 Neither Party will be liable nor deemed to be in default for any delay or failure in performance under this Agreement or other interruption of service deemed resulting directly or indirectly from a cause beyond the reasonable control of either Party, including but not limited to, Acts of God, civil or military authority, acts of public enemy, war, accident, fire, explosion, earthquake, flood, failure of transportation, strike, or other work interruption by either Party's employees or any similar or dissimilar cause (each such event being a "Force Majeure").

10.10 This Agreement may be executed in counterparts, each of which will be deemed to be an original but all of which together will constitute one and the same agreement binding to the Parties; electronic or facsimile signature or signature by electronic image transmission (such as portable document format, PDF) will be as binding and enforceable as an original.

11. Law and jurisdiction

11.1 Subject to Section 11.3 this Agreement and any dispute, including without limitation any arbitration, arising from the performance or breach hereof shall be governed by and construed and enforced in accordance with the laws of the Federal Republic of Germany.

11.2 The Parties will endeavor to settle all disputes amicably in good faith discussions. If an amicable agreement is not achieved, the exclusive place of jurisdiction shall be Munich, subject to Section 11.3.

11.3 All determinations and requirements of inventorship will be determined in accordance with [***].

[Remainder of the page left blank intentionally; signatures follow on the next page]

IN WITNESS WHEREOF, PhaseBio and Wacker Biotech have executed this Agreement in duplicate originals by duly authorized representatives.

Wacker Biotech GmbH		**PhaseBio Pharmaceuticals, Inc.**	
Signed By:	/s/ Susanne Leonharlsberger	Signed By:	/s/ Jonathan P. Mow
Printed Name:	Dr. Susanne Leonharlsberger	Printed Name:	Jonathan P. Mow

Title: Managing Director	Title: Chief Executive Officer
Date: March 25, 2019	Date: April 1, 2019

List of Annexes

Annex 1: List of WACKER Patent Rights

Annex 2: List of Deliverables

Annex 3: Sequence of Product

Annex 4: Content of the Mutual Press Release

Annex 1 – List of WACKER Patent Rights

[***]

Annex 2 - List of Deliverables

Developed Strain in the status of development as of the Effective Date:

1. Developed Strain: [***]

   The Developed Strain will be delivered to PhaseBio as [***].

2. Confidential Information relating to the Developed Process as of the Effective Date

   (*to be updated after finalization of the Performance under the PhaseBio DCSA, if necessary*)

   A. Process Flow Chart:

   [***]

   B. Documents:

   [***]

Annex 3 - Sequence of Product

[***]

Annex 4 – Content of the Mutual Press Release

- PhaseBio selected Wacker Biotech to develop an improved manufacturing process for PB2452 using ESETEC®.
- PB2452 is a first-in-class antibody fragment to reverse the effects of ticagrelor, which addresses important unmet need for patients requiring antiplatelet therapy
- ESETEC® was selected based on superior space-time yields for this difficult-to-express antibody fragment, outperforming conventional expression systems including mammalian cells
- PhaseBio has now acquired a product-specific license for ESETEC®.
- PhaseBio obtained a license in order to have direct access to the cell line and developed process.

Annex 5 – Information Required for [***]

[***]

Exhibit 23.1

Consent of Independent Registered Public Accounting Firm

The Board of Directors
PhaseBio Pharmaceuticals, Inc.:

We consent to the use of our report incorporated by reference herein and the reference to our Firm under the heading “Experts” in the prospectus.

/s/ KPMG LLP

Philadelphia, Pennsylvania
April 9, 2019