

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

**FORM S-1
REGISTRATION STATEMENT UNDER THE SECURITIES ACT OF 1933**

Theriva Biologics, Inc.

(Exact Name of Registrant as Specified in its Charter)

Nevada (State or other jurisdiction of incorporation or organization)	2834 (Primary Standard Industrial Classification Code Number)	26-279813 (I.R.S. Employer Identification No.)
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**9605 Medical Center, Suite 270
Rockville, MD 20850
(301) 417-4364**

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

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Approximate date of commencement of proposed sale to the public: From time to time after the date this registration statement becomes effective.

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, 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, please 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 statement 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 <input type="checkbox"/>	Accelerated filer <input type="checkbox"/>
Non-accelerated filer <input checked="" type="checkbox"/>	Smaller reporting company <input checked="" type="checkbox"/>
Emerging growth company <input type="checkbox"/>	

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.

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 which 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 Commission, acting pursuant to said Section 8(a), may determine.

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



Up to 7,692,307 Shares of Common Stock
Up to 7,692,307 Common Warrants to Purchase Up to 7,692,307 Shares of Common Stock
Up to 7,692,307 Pre-Funded Warrants to Purchase Up to 7,692,307 Shares of Common Stock
Up to 15,384,614 Shares of Common Stock Underlying the Common Warrants and Pre-Funded Warrants

We are offering on a best efforts basis up to 7,692,307 shares of our common stock, par value \$0.001 (the "Common Stock"), together with warrants to purchase up to 7,692,307 shares of our Common Stock. Each share of Common Stock, or a pre-funded warrant in lieu thereof, is being sold together with a common warrant to purchase one share of Common Stock (the "Common Warrant"). The shares of Common Stock and Common Warrants are immediately separable and will be issued separately in this offering, but must be purchased together in this offering. The assumed public offering price for each share of Common Stock and accompanying Common Warrant is \$1.30, which was the closing price of our Common Stock on the NYSE American LLC ("NYSE American") on December 9, 2024. Each Common Warrant will have an exercise price per share of \$[.] and will be immediately exercisable. The Common Warrants will expire on the 5-year anniversary of the original issuance date.

We are also offering to certain purchasers whose purchase of shares of Common Stock in this offering would otherwise result in the purchaser, together with its affiliates and certain related parties, beneficially owning more than 4.99% (or, at the election of the purchaser, 9.99%) of our outstanding Common Stock immediately following the consummation of this offering, the opportunity to purchase, if any such purchaser so chooses, pre-funded warrants (the "Pre-Funded Warrants"), in lieu of shares of Common Stock that would otherwise result in such purchaser's beneficial ownership exceeding 4.99% (or, at the election of the purchaser, 9.99%) of our outstanding Common Stock. The public offering price of each Pre-Funded Warrant and accompanying Common Warrant will be equal to the price at which one share of Common Stock and accompanying Common Warrant is sold to the public in this offering, minus \$0.001, and the exercise price of each Pre-Funded Warrant will be \$0.001 per share. The Pre-Funded Warrants will be immediately exercisable and may be exercised at any time until all of the Pre-Funded Warrants are exercised in full. The Pre-Funded Warrants and Common Warrants are immediately separable and will be issued separately in this offering, but must be purchased together in this offering. For each Pre-Funded Warrant we sell, the number of shares of Common Stock we are offering will be decreased on a one-for-one basis.

We have engaged A.G.P./Alliance Global Partners ("A.G.P." or the "Placement Agent"), to act as our sole placement agent, to use its reasonable best efforts to arrange for the sale of the securities offered by this prospectus. The Placement Agent is not purchasing or selling any of the securities we are offering, and the Placement Agent is not required to arrange the purchase or sale of any specific number or dollar amount of securities.

The securities will be offered at a fixed price and are expected to be issued in a single closing. The offering will terminate on [December 27], 2024, unless (i) the closing occurs prior thereto or (ii) we decide to terminate the offering prior thereto (which we may do at any time in our discretion). Investors purchasing securities offered hereby will have the option to execute a securities purchase agreement with us. We expect that the closing of the offering will occur one trading day after we price the securities offered hereby if we price such securities prior to 4:01 p.m. eastern time on a trading day and two trading days after we price the Securities offered hereby if we price such securities at any other time. When we price the securities, we will simultaneously enter into securities purchase agreements relating to the offering with those investors who so choose. The offering will settle delivery versus payment ("DVP")/receipt versus payment ("RVP"). That is, on the closing date, we will issue the shares of Common Stock directly to the account(s) at the Placement Agent identified by each purchaser; upon receipt of such shares, the Placement Agent shall promptly electronically deliver such shares to the applicable purchaser, and payment therefor shall be made by the Placement Agent (or its clearing firm) by wire transfer to us.

Since we will deliver the securities to be issued in this offering upon our receipt of investor funds, we and the Placement Agent have not made any arrangements to place investor funds in an escrow account or trust account. Because this is a best-efforts offering, the Placement Agent does not have an obligation to purchase any securities, and, as a result, there is a possibility that we may not be able to sell the securities. There is no minimum offering requirement as a condition of closing of this offering. Because there is no minimum offering amount required as a condition to closing this offering, we may sell fewer than all of the securities offered hereby, which may significantly reduce the amount of proceeds received by us, and investors in this offering will not receive a refund in the event that we do not sell an amount of securities sufficient to pursue our business goals described in this prospectus. In addition, because there is no escrow account and no minimum offering amount, investors could be in a position where they have invested in our company, but we are unable to fulfill all of our contemplated objectives due to a lack of interest in this offering. Further, any proceeds from the sale of securities offered by us will be available for our immediate use, despite uncertainty about whether we would be able to use such funds to effectively implement our business plan. See the section entitled "Risk Factors" for more information.

Our Common Stock is listed on the NYSE American under the symbol "TOVX." On December 9, 2024, the last reported sale price of our Common Stock on the NYSE American was \$1.30 per share. The actual public offering price per share of Common Stock and accompanying Common Warrant, and per Pre-Funded Warrant and accompanying Common Warrant, will be determined between us, the Placement Agent and the investors in this offering at the time of pricing, and may be at a discount to the current market price for the Common Stock. Therefore, the recent market price used throughout this preliminary prospectus as an assumed offering price per share of Common Stock and accompanying Common Warrant may not be indicative of the final offering price. There is no established public trading market for the Common Warrants and the Pre-Funded Warrants, and we do not expect such a market to develop. Without an active trading market, the liquidity of the Common Warrants and the Pre-Funded Warrants will be limited. In addition, we do not intend to list the Common Warrants and the Pre-Funded Warrants on NYSE American, any other national securities exchange or any other trading system.

Investing in our securities involves risks. You should review carefully the risks and uncertainties described under the heading " Risk Factors" contained in this prospectus and under similar headings in the other documents that are incorporated by reference into this prospectus, as described beginning on page 9 of this prospectus.

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

	Per Share of Common Stock and Accompanying Common Warrant	Per Pre-Funded Warrant and Accompanying Common Warrant	Total
Public offering price ⁽¹⁾	\$	\$	\$
Placement agent fees ⁽²⁾	\$	\$	\$
Proceeds to us, before expenses ⁽³⁾	\$	\$	\$

(1) The assumed combined public offering price is \$1.300 per share of Common Stock and accompanying Common Warrant and \$1.299 per Pre-Funded Warrant and accompanying Common Warrant.

(2) Represents a cash fee equal to 7.0% of the aggregate purchase price paid by investors in this offering. See "Plan of Distribution" for additional disclosure regarding compensation payable to the Placement Agent.

(3) Does not include proceeds from the exercise of the Common Warrants and/or Pre-Funded Warrants in cash, if any.

Delivery of the securities is expected to be made on or about , 2024.

Sole Placement Agent

A.G.P.

The date of this prospectus is , 2024

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ABOUT THIS PROSPECTUS

You should rely only on the information that we have provided or incorporated by reference in this prospectus. We have not authorized anyone to provide you with different or additional information. If anyone provides you with different or additional information, you should not rely on it. You should assume that the information in this prospectus is accurate only as of the date on the cover of the document and that any information we have incorporated by reference is accurate only as of the date of the document incorporated by reference, regardless of the time of delivery of this prospectus or any sale of a security. Our business, financial condition, results of operations and prospects may have changed since those dates.

We urge you to carefully read this prospectus, together with the information incorporated herein by reference as described under the heading "Where You Can Find Additional Information."

In this prospectus, unless otherwise specified or the context requires otherwise, we use the terms "Theriva," "Company," "we," "us" and "our" or similar references to refer to Theriva Biologics, Inc., a Nevada corporation, together with its consolidated subsidiaries.

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the documents incorporated by reference into this prospectus include 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, that relate to future events or our future financial performance and involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to differ materially from any future results, levels of activity, performance or achievements expressed or implied by these forward-looking statements. Words such as, but not limited to, "anticipate," "aim," "believe," "contemplate," "continue," "could," "design," "estimate," "expect," "intend," "may," "might," "plan," "predict," "poise," "project," "potential," "suggest," "should," "strategy," "target," "will," "would," and similar expressions or phrases, or the negative of those expressions or phrases, are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. Although we believe that we have a reasonable basis for each forward-looking statement contained in this prospectus and incorporated by reference into this prospectus, we caution you that these statements are based on our projections of the future that are subject to known and unknown risks and uncertainties and other factors that may cause our actual results, level of activity, performance or achievements expressed or implied by these forward-looking statements, to differ. The section in this prospectus entitled "Risk Factors" and the sections in our periodic reports, including the [Annual Report on Form 10-K for the year ended December 31, 2023](#) filed with the Securities and Exchange Commission (the "SEC"), on March 25, 2024 entitled "Business," "Risk Factors" and "Management's Discussion and Analysis of Financial Condition and Results of Operations," and the [Quarterly Report on Form 10-Q for the quarter ended September 30, 2024 filed with the SEC on November 12, 2024](#) as well as other sections in this prospectus and the documents or reports incorporated by reference into this prospectus, discuss some of the factors that could contribute to these differences.

Please consider our forward-looking statements in light of those risks as you read this prospectus and the documents incorporated by reference into this prospectus. It is not possible for our management to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. Given these uncertainties, you should not place undue reliance on these forward-looking statements.

You should not assume that the information contained in this prospectus is accurate as of any date other than as of the date of this prospectus, or that

any information incorporated by reference into this prospectus is accurate as of any date other than the date of the document so incorporated by reference. Except as required by law, we assume no obligation to update these forward-looking statements publicly, or to update the reasons actual results could differ materially from those anticipated in these forward-looking statements, even if new information becomes available in the future. Thus, you should not assume that our silence over time means that actual events are bearing out as expressed or implied in such forward-looking statements.

If one or more of these or other risks or uncertainties materializes, or if our underlying assumptions prove to be incorrect, actual results may vary materially from what we anticipate. All subsequent written and oral forward-looking statements attributable to us or individuals acting on our behalf are expressly qualified in their entirety by this Note. Before purchasing any securities, you should consider carefully all of the factors set forth or referred to in this prospectus and the documents incorporated by reference that could cause actual results to differ.

We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Forward-looking statements should be regarded solely as our current plans, estimates and beliefs. We have included important factors in the cautionary statements included in this document, particularly in the section entitled "Risk Factors" of this prospectus that we believe could cause actual results or events to differ materially from the forward-looking statements that we make. Moreover, we operate in a very competitive and rapidly changing environment. New risks emerge from time to time. It is not possible for our management to predict all risks, nor can we assess the impact of all factors on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements we may make. Given these risks and uncertainties, readers are cautioned not to place undue reliance on such forward-looking statements. All forward-looking statements are qualified in their entirety by this cautionary statement. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures or investments we may make. You should read this prospectus and the documents that we have filed as exhibits to this prospectus and incorporated by reference herein completely and with the understanding that our actual future results may be materially different from the plans, intentions and expectations disclosed in the forward-looking statements we make. The forward-looking statements contained in this prospectus are made as of the date of this prospectus and we do not assume any obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by applicable law.

PROSPECTUS SUMMARY

This summary contains basic information about us and this offering. Because it is a summary, it does not contain all of the information that you should consider before deciding to invest in our securities. Before you decide to invest in our securities, you should read this entire prospectus carefully and the documents incorporated by reference herein, including the information included under the heading titled "Risk Factors." Unless we specify otherwise, all references in this prospectus to "Theriva," "we," "our," "us" and "our company" refer to Theriva Biologics, Inc.

Overview

We are a diversified clinical-stage company developing therapeutics designed to treat cancer and related diseases in areas of high unmet need. As a result of the acquisition in March 2022 of Theriva Biologics, S.L. ("VCN", formerly named VCN Biosciences, S.L.), described in more detail below (the "Acquisition"), we began transitioning our strategic focus to oncology, which is now our primary focus, through the development of VCN's new oncolytic adenovirus platform designed for intravenous and intravitreal delivery to trigger tumor cell death, to improve access of co-administered cancer therapies to the tumor, and to promote a robust and sustained anti-tumor response by the patient's immune system. Our lead product candidate, VCN-01, a clinical stage oncolytic human adenovirus that is modified for tumor-selective replication and to express an enzyme, PH20 hyaluronidase, is currently being evaluated in a Phase 2 clinical study for the treatment of pancreatic cancer ("Virage"), and has recently been used to treat patients in a Phase 1 clinical study for the treatment of retinoblastoma, and Phase 1 clinical studies for the treatment of other solid tumors including head and neck squamous cell carcinoma.

Prior to the Acquisition, our focus was on developing therapeutics designed to treat gastrointestinal (GI) diseases which included our clinical development candidates: (1) SYN-004 (ribaxamase) which is designed to degrade certain commonly used intravenous (IV) beta-lactam antibiotics within the GI tract to prevent microbiome damage, thereby preventing overgrowth and infection by pathogenic organisms such Clostridioides difficile infection (CDI) and vancomycin resistant Enterococci (VRE), and reducing the incidence and severity of acute graft-versus-host-disease (aGVHD) in allogeneic hematopoietic cell transplant (HCT) recipients, and (2) SYN-020, a recombinant oral formulation of the enzyme intestinal alkaline phosphatase (IAP) produced under cGMP conditions and intended to treat both local GI and systemic diseases. As part of our strategic transformation into an oncology focused company, we are exploring value creation options for our SYN-004 and SYN-020 assets, including out-licensing or partnering.

Our Current Product Pipeline



*Based on management's current beliefs and expectations

Defined terms. **allo-HCT** allogeneic hematopoietic cell transplant. **CSR** clinical study report. **HNSCC** head and neck squamous cell carcinoma. **IV** intravenous. **IVt** intravitreal. For other abbreviations see the text.

¹Additional products with preclinical proof-of-concept include SYN-006 (carbapenemase) to prevent aGVHD, CDI, and microbiome damage in patients treated with carbapenem antibiotics and SYN-007 (ribaxamase) DR to prevent antibiotic associated diarrhea with oral β -lactam antibiotics.

²Depending on funding/partnership. SYN-004 may enter a U.S. Food and Drug Administration ("FDA")-agreed Phase 3 clinical trial for the treatment of CDI.

Recent Developments

Type D Meeting

On December 5, 2024, we issued a press release announcing the outcomes of a recent Type D meeting with the FDA to obtain guidance on the design of a Phase 3 clinical study of lead clinical candidate VCN-01 in combination with standard-of-care chemotherapy for the treatment of PDAC. We previously announced the completion of target enrollment into the multinational VIRAGE Phase 2b clinical study evaluating intravenous VCN-01 in combination with gemcitabine/nab-paclitaxel as a first line therapy for PDAC patients. Type D meetings are focused on a narrow set of issues that are used to discuss issues at key decision points to provide timely feedback critical to moving a drug development program forward. The FDA advised that the on-going VIRAGE Phase 2b study should not be expanded into a Phase 3 study; rather, the optimal path forward for the VCN-01 PDAC program is to conduct a stand-alone Phase 3 study of VCN-01 with gemcitabine/nab-paclitaxel. The FDA provided general agreement with the Company's proposed design for a Phase 3 clinical study and indicated that inclusion of additional standard-of-care chemotherapy for PDAC was not necessary as it would complicate the study design and analysis. The FDA meeting also highlighted the FDA's preferences regarding certain statistical elements of confirmatory clinical studies, including methods for sample size estimation and the study population(s) used for data analysis.

Reverse Stock Split

On August 15, 2024, our Board of Directors approved a reverse stock split of our authorized, issued and outstanding shares of Common Stock, at a ratio of one (1) share of Common Stock for twenty-five (25) shares of Common Stock (the "Reverse Stock Split"). The Reverse Stock Split was effective on August 26, 2024. Any share amounts and exercise or conversion prices in this prospectus and the registration statement of which it forms a part have been adjusted retrospectively for the Reverse Stock Split.

September 2024 Public Offering

On September 27, 2024, we consummated a public offering (the "September Offering") of an aggregate of (i) 918,600 shares (the "September Shares") of Common Stock, (ii) pre-funded warrants ("September Pre-Funded Warrants") to purchase up to 510,000 shares of Common Stock (the "September Pre-Funded Warrant Shares"), and (iii) Common Stock purchase warrants ("September Common Warrants") to purchase up to 1,428,600 shares of Common Stock (the "September Common Warrant Shares"). Each September Share and associated September Common Warrant to purchase one (1) September Common Warrant Share was sold at a combined public offering price of \$1.75. Each September Pre-Funded Warrant and associated September Common Warrant to purchase one (1) September Common Warrant Share was sold at a combined public offering price of \$1.7499. We received aggregate gross proceeds from the September Offering of approximately \$2.5 million, before deducting placement agent fees and other offering expenses. Each September Common Warrant has an exercise price of \$2.00 per share, is immediately exercisable for one (1) September Common Warrant Share, and expires five (5) years from its issuance date. The September Common Warrants may be exercised on a cashless basis if at the time of exercise thereof there is no effective registration statement registering, or the prospectus contained therein is not available for, the issuance of the September Common Warrant Shares to the holder. As of October 3, 2024, all of the September Pre-Funded Warrants were exercised.

Preferred Shares Conversion

On July 30, 2024, we received a notice of conversion from the holder of shares of our Series C Convertible Preferred Stock to convert 135,431 shares of Series C Convertible Preferred Stock into 35,523 shares of Common Stock at a conversion price of \$30.50 per share of Common Stock.

On September 6, 2024, we received a notice of conversion from the holder of 4,138 shares of our Series C Convertible Preferred Stock and 100,000 shares of our Series D Convertible Preferred Stock to convert the 4,138 shares of Series C Convertible Preferred Stock into 1,086 shares of our Common Stock at a conversion price of \$30.50 per share and to convert the 100,000 shares of Series D Convertible Preferred Stock into 26,230 shares of Common Stock at a conversion price of \$30.50 per share of Common Stock. On September 6, 2024, we issued an aggregate of 27,316 shares of Common Stock upon conversion of such shares of Series C Convertible Preferred Stock and Series D Convertible Preferred Stock. Upon such conversion there are no shares of Series C Convertible Preferred Stock or Series D Convertible Preferred Stock outstanding.

Other Financial Developments

On September 16, 2024, we announced that the THERICEL project has been awarded funding of €2.28 million (\$2.54 million) from the National Knowledge Transfer Program of the Spanish government's Ministry of Science, Innovation & Universities to support a collaboration between us and the Universitat Autònoma de Barcelona ("UAB") to advance our suspension cell platform for the clinical manufacture of adenovirus- and adeno-associated virus ("AAV") therapies. Under the award, we will receive an unsecured loan of €1.33 million (\$1.48 million) as a lump sum payment in the fourth quarter of 2024 which shall bear interest at a rate of 4.015% and be repaid over 7 years commencing three years from the date of award, and UAB will receive a grant of €0.95 million (\$1.06 million) dedicated to the THERICEL project and paid in annual installments over the next 3 years.

2024 Annual Stockholder's Meeting

On October 31, 2024, we held our 2024 Annual Meeting of Stockholders (the "Annual Meeting"). At the Annual Meeting, our stockholders (i) elected Jeffrey J. Kraws, John Monahan, Steven A. Shallcross and Jeffery Wolf as directors; (ii) ratified the appointment of BDO USA P.C. as our independent registered public accounting firm for the year ending December 31, 2024; (iii) approved an amendment to our 2020 Stock Incentive Plan (the "2020 Stock Incentive Plan") to (a) increase the number of shares of Common Stock that we will have authority to grant under the 2020 Stock Incentive Plan from 280,000 shares of Common Stock to 2,500,000 shares of Common Stock and (b) to amend the annual non-employee director grant limit to 250,000 shares of Common Stock; and (iv) approved an amendment to our Articles of Incorporation to increase the number of authorized shares of Common Stock to 350,000,000 shares.

On November 1, 2024, we filed a Certificate of Change to our Articles of Incorporation with the Secretary of State of the State of Nevada that was effective on such date that increased the number of our authorized shares of Common Stock, from 14,000,000 shares to 350,000,000 shares.

Corporate Information

Our predecessor, Sheffield Pharmaceuticals, Inc., was incorporated in 1986, and in 2006 engaged in a reverse merger with Pipex Therapeutics, Inc., a publicly-traded Delaware corporation formed in 2001. After the reverse merger, we changed our name to Pipex Pharmaceuticals, Inc., and in October 2008 we changed our name to Adeona Pharmaceuticals, Inc. On October 15, 2009, we engaged in a merger with a wholly owned subsidiary for the purpose of reincorporating in the State of Nevada. On February 15, 2012, we changed our name to Synthetic Biologics, Inc. On August 10, 2018, we effected a one for thirty-five reverse stock split of our authorized, issued and outstanding Common Stock. On July 15, 2022, we effected a one for ten reverse stock split of our authorized, issued and outstanding Common Stock. On October 12, 2022, we changed our name to Theriva Biologics, Inc. On August 26, 2024, we effected a one for twenty-five reverse stock split of our authorized, issued and outstanding Common Stock.

Our principal executive offices are located at 9605 Medical Center Drive, Suite 270, Rockville, Maryland 20850, and our telephone number is (301) 417-4367. Our website address is www.therivabio.com. Information contained on our website is intended for informational purposes only and is not incorporated by reference into this prospectus, and it should not be considered to be part of this prospectus or the registration statement of which this prospectus forms a part. The SEC maintains an internet site that contains reports, proxy and information statements, and other information regarding issuers like us that file documents electronically with the SEC. The address of the SEC website is www.sec.gov.

Smaller Reporting Company

We are a "smaller reporting company" as defined in the Securities Exchange Act of 1934, as amended (the "Exchange Act"). As a result, we may take advantage of certain reduced disclosure obligations available to smaller reporting companies, including the exemption from compliance with the auditor attestation requirements pursuant to the Sarbanes-Oxley Act of 2002, reduced disclosure about our executive compensation arrangements and the requirements to provide only two years of audited financial statements in our annual reports and registration statements. We will continue to be a "smaller reporting company" as long as (1) we have a public float (i.e., the market value of our common stock held by non-affiliates) less than \$250 million calculated as of the last business day of our most recently completed second fiscal quarter, or (2) our annual revenues are less than \$100 million for our previous fiscal year and we have either no public float or a public float of less than \$700 million as of the end of that fiscal year's second fiscal quarter. Decreased disclosures in our SEC filings due to our status as a "smaller reporting company" may make it harder for investors to analyze our results of operations and financial prospects.

THE OFFERING

Securities offered by us:

Up to 7,692,307 shares of Common Stock and accompanying Common Warrants to purchase up to 7,692,307 shares of Common Stock, or up to 7,692,307 Pre-Funded Warrants to purchase shares of Common Stock and accompanying Common Warrants to purchase up to 7,692,307 shares of Common Stock on a reasonable "best efforts" basis. The shares of Common Stock or the Pre-Funded Warrants, and accompanying Common Warrants are immediately separable and will be issued separately in this offering, but must initially be purchased together in this offering. The Common Warrants are exercisable immediately, have an exercise price equal to \$[.], and will expire five years after the date of issuance. This prospectus also relates to the offering of the shares of Common Stock issuable upon exercise of the Common Warrants and Pre-Funded Warrants. For more information regarding the Common Warrants and Pre-Funded Warrants, you should carefully read the section titled "Description of Securities to be Registered" in this prospectus.

Pre-funded warrants offered by us in this offering	We are also offering to each purchaser whose purchase of shares of Common Stock in this offering would otherwise result in the purchaser, together with its affiliates and certain related parties, beneficially owning more than 4.99% (or, at the election of the purchaser, 9.99%) of our outstanding Common Stock immediately following the consummation of this offering, the opportunity to purchase, if the purchaser so chooses, Pre-Funded Warrants (each Pre-Funded Warrant to purchase one share of our Common Stock) in lieu of shares that would otherwise result in the purchaser's beneficial ownership exceeding 4.99% of our outstanding Common Stock (or, at the election of the purchaser, 9.99%). The purchase price of each Pre-Funded Warrant and accompanying Common Warrant will equal the price at which one share of Common Stock and accompanying Common Warrant are being sold to the public in this offering, minus \$0.001, and the exercise price of each Pre-Funded Warrant will be \$0.001 per share. The Pre-Funded Warrants will be exercisable immediately and may be exercised at any time until all of the Pre-Funded Warrants are exercised in full. For each Pre-Funded Warrant we sell, the number of shares of Common Stock we are offering will be decreased on a one-for-one basis.
Reasonable Best Efforts Offering	We have agreed to issue and sell the securities offered hereby to the purchasers through the Placement Agent. The Placement Agent is not required to buy or sell any specific number or dollar amount of the securities offered hereby, but will use its reasonable best efforts to solicit offers to purchase the securities offered by this prospectus. See "Plan of Distribution" beginning on page 42 of this prospectus.

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Use of proceeds	Assuming all of the securities we are offering under this prospectus are sold at an assumed public offering price of \$1.30 per share of Common Stock and accompanying Common Warrant and assuming no sale of any Pre-Funded Warrants, we estimate that we will receive approximately \$8.95 million in net proceeds from this offering, after deducting the estimated placement agent fees and estimated offering expenses. However, this is a reasonable best efforts offering with no minimum number of securities or amount of proceeds as a condition to closing, and we may not sell all or any of the securities offered pursuant to this prospectus; as a result, we may receive significantly less in net proceeds.
	We currently intend to use the net proceeds from this offering primarily for working capital and general corporate purposes, including for research and development and manufacturing scale-up. We may also use a portion of the net proceeds to invest in or acquire other products, businesses or technologies, although we have no commitments or agreements with respect to any such investments or acquisitions as of the date of this prospectus. See "Use of Proceeds" for additional information.
Lock-Up	Our directors and officers have agreed with the Placement Agent, subject to certain exceptions, not to sell, transfer or dispose of, directly or indirectly, any of the Common Stock or securities convertible into or exercisable or exchangeable for the Common Stock for a period of 90 days after the completion of this offering.

Standstill

We have agreed, subject to certain exceptions, not to issue, enter into any agreement to issue or announce the issuance or proposed issuance of, any shares of Common Stock (or securities convertible into or exercisable for Common Stock) or, subject to certain exceptions, file any registration statement, including any amendments or supplements thereto (other than the registration statement or amendment to the registration statement relating to the securities offered hereunder and a registration statement on Form S-8), until 60 days after the completion of this offering. We have also agreed not to enter into or issuance any shares pursuant to a variable rate transaction (as defined in the securities purchase agreement) for six months after the completion of this offering, except that after the forty-five (45) day anniversary of the closing of this offering we may offer shares of Common Stock pursuant to the Amended and Restated Sales Agreement dated May 2, 2024 between the Company and the Placement Agent.

See "Plan of Distribution" for more information.

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Risk Factors	You should carefully read and consider the information set forth under "Risk Factors," together with all of the other information set forth in this prospectus, before deciding to invest in shares of the Common Stock.
NYSE American symbol	Our Common Stock is listed on the NYSE American under the symbol "TOVX."
Except as otherwise indicated, the number of shares of Common Stock to be outstanding immediately after this offering is based on 2,782,449 shares of our Common Stock outstanding as of December 9, 2024 and excludes the shares of Common Stock to be issued upon exercise of the Common Warrants and Pre-Funded Warrants offered in this offering and :	
<ul style="list-style-type: none"> · 175,204 shares of Common Stock issuable upon the exercise of outstanding stock options with a weighted average exercise price of \$42.01 per share; · 1,428,600 shares of Common Stock issuable upon the exercise of outstanding warrants to purchase Common Stock with a weighted average exercise price of \$1.75 per share; and · 2,332,636 additional shares of the Common Stock reserved for future issuance under our equity incentive plans. 	

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RISK FACTORS

Our business, results of operations and financial condition and the industry in which we operate are subject to various risks. Accordingly, investing in our securities involves a high degree of risk. This prospectus does not describe all of those risks. You should consider the risk factors described in this

prospectus below, as well as those described under the caption "Risk Factors" in the documents incorporated by reference herein, including our [Annual Report on Form 10-K for the fiscal year ended December 31, 2023](#) and our Quarterly Reports on Form 10-Q for the fiscal quarters ended [March 31, 2024, June 30, 2024](#) and [September 30, 2024](#), together with the other information contained or incorporated by reference in this prospectus.

We have described below and in the documents incorporated by reference herein the most significant risk factors applicable to us, but they do not constitute all of the risks that may be applicable to us. New risks may emerge from time to time, and it is not possible for us to predict all potential risks or to assess the likely impact of all risks. Before making an investment decision, you should carefully consider these risks as well as other information we include or incorporate by reference in this prospectus. This prospectus also contains forward-looking statements that involve risks and uncertainties. Our actual results could differ materially from those anticipated in the forward-looking statements as a result of a number of factors, including the risks described below. See the section titled "Special Note Regarding Forward-Looking Statements."

Risks Related to Our Business

There is uncertainty regarding our ability to maintain liquidity sufficient to operate our business effectively, which raises substantial doubt about our ability to continue as a going concern.

Our consolidated unaudited financial statements as of September 30, 2024 have been prepared under the assumption that we will continue as a going concern for the next twelve months. Our management concluded that our recurring losses from operations and the fact that as of September 30, 2024 we have an accumulated deficit of approximately \$330.5 and working capital of \$12.2 million raise substantial doubt about our ability to continue as a going concern for the next twelve months after issuance of our financial statements. As of September 30, 2024, we had a cash and cash equivalents and restricted cash balance of approximately \$16.5 million. At December 31, 2023, we had an accumulated deficit of \$309.3 million and working capital of \$20.7 million. As of December 31, 2023, we had a cash and cash equivalents and restricted cash balance of approximately \$23.3 million consisting of cash and investments in highly liquid U.S. money market funds. We expect to continue to incur losses from expenses related to the development of our product candidates and related administrative activities for the foreseeable future. We expect that our current cash will be able to fund operations into the third quarter of 2025 but will not be sufficient to fund operations for twelve months from the date of the filing of our Quarterly Report on Form 10-Q for the quarter ended September 30, 2024, and we will need to seek additional capital to fulfill our operating and capital requirement for the next 12 months to advance our clinical development program to later stages of development and commercialize our clinical product candidate. Our ability to continue as a going concern is dependent upon our ability to obtain additional equity or debt financing, attain further operating efficiencies, reduce expenditures, and, ultimately, to generate revenue. Although management has been successful in raising capital in the past, there can be no assurance that we will be successful or that any needed financing will be available in the future at terms acceptable to us. Although we expect that the proceeds from this offering will be sufficient when added to our current cash to fulfill our operating and capital requirement for the next 12 months, this is a best efforts offering and there can be no assurance as to the amount of proceeds that we will receive from this offering. As such, we cannot conclude that such plans will be effectively implemented within one year after the date that the financial statements included in our Quarterly Report on Form 10-Q for the quarter ended September 30, 2024 were filed with the SEC and there is uncertainty regarding our ability to maintain liquidity sufficient to operate our business effectively, which raises substantial doubt about our ability to continue as a going concern. Even if we raise the maximum amount offered in this offering, we will still require additional funds to advance our clinical development program to later stages of development and commercialize our clinical product candidate

We will need to raise additional capital to operate our business and our failure to obtain funding when needed may force us to delay, reduce or eliminate certain of our development programs or commercialization efforts.

During the nine months ended September 30, 2024, our operating activities used net cash of approximately \$12.2 million and our cash and cash equivalents were approximately \$16.4 million as of September 30, 2024. With the exception of the three months ended June 30, 2010 and the three months ended December 31, 2017, we have experienced significant losses since inception and have a significant accumulated deficit. As of September 30, 2024, our accumulated deficit totaled approximately \$330.5 million on a consolidated basis. Pursuant to the VCN Purchase Agreement, we have agreed to use reasonable efforts to commercialize VCN-01 and we agreed as a post-closing covenant to commit to fund VCN's research and development programs, including but not limited to VCN-01 PDAC phase 2 clinical trial, VCN-01 RB trial and necessary G&A within a budgetary plan of approximately \$27.8 million over three years. We expect to incur additional operating losses in the future and therefore expect our cumulative losses to increase. With the exception of the quarter ended June 30, 2010, and limited laboratory revenues from Adeona Clinical Laboratory, which we sold in March 2012, we have generated very minimal revenues. We do not expect to derive revenue from any source in the near future until we or our potential partners successfully commercialize our products. We expect our expenses to increase in connection with our anticipated activities, particularly as we continue research and development, initiate and conduct clinical trials, and seek marketing approval for our product candidates. Until such time as we receive approval from the FDA and other regulatory authorities for our product candidates, we will not be permitted to sell our products and therefore will not have product revenues from the sale of products. For the foreseeable future we will have to fund all of our operations and capital expenditures from equity and debt offerings, cash on hand, licensing and collaboration fees and grants, if any.

We will need to raise additional capital, even if we raise the maximum amount offered in this offering, to fund our operations and meet our current timelines and we cannot be certain that funding will be available on acceptable terms on a timely basis, or at all. Based on our current plans, our cash and cash equivalents will be sufficient to complete our planned clinical trials of VCN-01 (in PDAC and retinoblastoma), but may not be sufficient for additional trials of VCN-01, SYN-020 or SYN-004, or to complete the last cohort of the Phase 1a/2a clinical trial of SYN-004, which are expected to require significant cash expenditures. In addition, based on the significant anticipated cost of a Phase 3 clinical program in a broad indication for SYN-004, we expect it will not be feasible for us to initiate and complete this trial at this time without a partner given the capital constraints tied to our current market cap and share price. We intend to focus our capital on our VCN-01 clinical trials and do not intend to provide further funding for our development of VCN-004 internally but intend to our license or partner further development of SYN-004. Further development of VCN's product candidates will require additional funding beyond that raised in this offering. To the extent that we raise additional funds by issuing equity securities, our stockholders may experience significant dilution. Any debt financing, if available, may involve restrictive covenants that may impact our ability to conduct our business and also have a dilutive effect on our stockholders. A failure otherwise to secure additional funds when needed in the future whether through an equity or debt financing or a sufficient amount of capital without a strategic partnership could result in us being unable to complete planned preclinical and clinical trials or obtain approval of our product candidates from the FDA and other regulatory authorities. In addition, we could be forced to delay, discontinue or curtail product development, forego sales and marketing efforts, and forego licensing in attractive business opportunities. Our ability to raise capital through the sale of securities may be limited by the rules of the SEC and NYSE American that place limits on the number and dollar amount of securities that may be sold. There can be no assurances that we will be able to raise the funds needed, especially in light of the fact that our ability to sell securities registered on our registration statement on Form S-3 will be limited until such time the market value of our voting securities held by non-affiliates is \$75 million or more. We also may be required to seek collaborators for our product candidates at an earlier stage than otherwise would be desirable and on terms that are less favorable than might otherwise be available.

We have identified material weaknesses in our internal controls, and we cannot provide assurances that these weaknesses will be effectively

remediated or that additional material weaknesses will not occur in the future

If our internal control over financial reporting or our disclosure controls and procedures are not effective, we may not be able to accurately report our financial results, prevent fraud, or file our periodic reports in a timely manner, which may cause investors to lose confidence in our reported financial information and may lead to a decline in our stock price. Our management is responsible for establishing and maintaining adequate internal control over our financial reporting, as defined in Rule 13a- 15(f) under the Exchange Act. Based on our assessment, we have concluded that as of September 30, 2024 we did not maintain effective review controls at a sufficient level of precision with certain financial statement areas and over unusual transactions involving complex accounting and related disclosure requirements. We also did not maintain effective information technology general controls over user access, program change management, and segregation of duties, within certain key information systems supporting our accounting and financial reporting processes. Additionally, many of our business process controls dependent upon the information derived from these information systems were also ineffective, as we did not design and implement controls to validate the completeness and accuracy of underlying data utilized in the operation of those controls. While we plan to take remedial action to address the material weaknesses, we cannot provide any assurance that such remedial measures, or any other remedial measures we take, will be effective. If we fail to maintain effective internal control over financial reporting, we may not be able to accurately report our financial results, detect or prevent fraud, or file our periodic reports in a timely manner, which may, among other adverse consequences, cause investors to lose confidence in our reported financial information and lead to a decline in our stock price. In addition, a material weakness will not be considered remediated until the applicable controls operate for a sufficient period of time and management has concluded, through testing, that these controls are designed and operating effectively. Although management believes that the material weaknesses will be remediated by the end of the fiscal year there can be no assurance that the deficiencies will be remediated at such time or that the internal control over financial reporting, as modified, will enable us to identify or avoid material weaknesses in the future.

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Risks Related to this Offering

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

We will have broad discretion in the application of the net proceeds from this offering and could spend the proceeds in ways that do not improve our results of operations or enhance the value of the Common Stock. Our failure to apply these funds effectively could result in financial losses that could have a material adverse effect on our business, cause the price of our shares of Common Stock to decline and delay the development of our product candidates. Pending their use, we may invest the net proceeds from this offering in a manner that does not produce income or that loses value.

This is a reasonable best efforts offering, with no minimum amount of securities required to be sold, and we may sell fewer than all of the securities offered hereby.

The Placement Agent has agreed to use its reasonable best efforts to solicit offers to purchase the securities in this offering. The Placement Agent has no obligation to buy any of the securities from us or to arrange for the purchase or sale of any specific number or dollar amount of the securities. There is no required minimum number of securities that must be sold as a condition to completion of this offering, and there can be no assurance that the offering contemplated hereby will ultimately be consummated. Even if we sell securities offered hereby, because there is no minimum offering amount required as a condition to closing of this offering, the actual offering amount is not presently determinable and may be substantially less than the maximum amount set forth on the cover page of this prospectus. We may sell fewer than all of the securities offered hereby, which may significantly reduce the amount of proceeds received by us. Thus, we may not raise the amount of capital we believe is required for our operations in the short-term and may need to raise additional funds, which may not be available or available on terms acceptable to us.

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Because there is no minimum required for the offering to close, investors in this offering will not receive a refund in the event that we do not sell an amount of securities sufficient to pursue the business goals outlined in this prospectus.

We have not specified a minimum offering amount nor have or will we establish an escrow account in connection with this offering. Because there is no escrow account and no minimum offering amount, investors could be in a position where they have invested in our company, but we are unable to fulfill our objectives due to a lack of interest in this offering. Further, because there is no escrow account in operation and no minimum investment amount, any proceeds from the sale of securities offered by us will be available for our immediate use, despite uncertainty about whether we would be able to use such funds to effectively implement our business plan. Investor funds will not be returned under any circumstances whether during or after the offering.

If the price of the Common Stock fluctuates significantly, your investment could lose value.

Although the Common Stock is listed on the NYSE American, we cannot assure you that an active public market will continue for the Common Stock. If an active public market for the Common Stock does not continue, the trading price and liquidity of the Common Stock will be materially and adversely affected. If there is a thin trading market or "float" for our stock, the market price for the Common Stock may fluctuate significantly more than the stock market as a whole. Without a large float, the Common Stock would be less liquid than the stock of companies with broader public ownership and, as a result, the trading prices of the Common Stock may be more volatile. In addition, in the absence of an active public trading market, investors may be unable to liquidate their investment in us. Furthermore, the stock market is subject to significant price and volume fluctuations, and the price of the Common Stock could fluctuate widely in response to several factors, including:

- our quarterly or annual operating results;
- investment recommendations by securities analysts following our business or our industry;
- additions or departures of key personnel;
- our failure to achieve operating results consistent with securities analysts' projections;
- results of our clinical trials; and
- changes in industry, general market or economic conditions.

The stock market has experienced extreme price and volume fluctuations in recent years that have significantly affected the quoted prices of the securities of many companies, including companies in our industry. The changes often appear to occur without regard to specific operating performance. The price of the Common Stock could fluctuate based upon factors that have little or nothing to do with our company and these fluctuations could materially reduce our stock price.

We do not intend to pay dividends on the Common Stock, so any returns will be limited to increases, if any, in the Common Stock's value. Your ability to achieve a return on your investment will depend on appreciation, if any, in the price of the Common Stock.

We currently anticipate that we will retain future earnings for the development, operation and expansion of our business and do not anticipate declaring or paying any cash dividends for the foreseeable future. Any future determination to declare dividends will be made at the discretion of our board of directors and will depend on, among other factors, our financial condition, operating results, capital requirements, general business conditions and other factors that our board of directors may deem relevant. Any return to stockholders will therefore be limited to the appreciation in the value of their stock, if any.

There is no public market for the Common Warrants or Pre-Funded Warrants to purchase shares of the Common Stock being offered by us in this offering.

There is no established public trading market for the Common Warrants or Pre-Funded Warrants to purchase shares of the Common Stock that are being offered as part of this offering, and we do not expect a market to develop. In addition, we do not intend to apply to list the Common Warrants or Pre-Funded Warrants on any national securities exchange or other nationally recognized trading system, including the NYSE American. Without an active market, the liquidity of the Common Warrants and Pre-Funded Warrants will be limited.

The Common Warrants and Pre-Funded Warrants are speculative in nature.

Except as specified therein, the Common Warrants and Pre-Funded Warrants offered hereby do not confer any rights of Common Stock ownership on their holders, such as voting rights, but rather merely represent the right to acquire shares of the Common Stock at a fixed price. Specifically, commencing on the date of issuance, holders of the Common Warrants and Pre-Funded Warrants may exercise their right to acquire the shares of the Common Stock upon the payment of an exercise price of \$[.] per share in the case of Common Warrants and an exercise price of \$0.001 per share in the case of Pre-Funded Warrants. Moreover, following this offering, the market value of the Common Warrants and Pre-Funded Warrants is uncertain and there can be no assurance that the market value of the Common Warrants will equal or exceed their imputed public offering prices. Furthermore, each Common Warrant will expire five years from the original issuance date and each Pre-Funded Warrant will not expire until it has been exercised in full. In the event the price of the Common Stock does not exceed the exercise price of the Common Warrants during the period when such Common Warrants are exercisable, the Common Warrants may not have any value. There is no established public trading market for the Common Warrants and Pre-Funded Warrants being offered in this offering, and we do not expect a market to develop. In addition, we do not intend to apply to list the Common Warrants or Pre-Funded Warrants on any securities exchange or nationally recognized trading system, including NYSE American. Without an active market, the liquidity of the Common Warrants and Pre-Funded Warrants will be limited.

Except as specified therein, holders of the Common Warrants and Pre-Funded Warrants will have no rights as a common stockholder until they acquire shares of the Common Stock.

Except as specified therein, the Common Warrants and Pre-Funded Warrants in this offering do not confer any rights of share ownership on their holders, but rather merely represent the right to acquire shares of the Common Stock at a fixed price. Until holders of the Common Warrants and Pre-Funded Warrants acquire shares of the Common Stock upon exercise of the Common Warrants and Pre-Funded Warrants, as applicable, holders of Common Warrants and Pre-Funded Warrants will have no rights with respect to our shares of Common Stock underlying such Common Warrants and Pre-Funded Warrants.

Provisions of the Common Warrants and Pre-Funded Warrants offered by this prospectus could discourage an acquisition of us by a third party.

In addition to the provisions of our articles of incorporation, as amended and our second amended and restated bylaws, certain provisions of the Common Warrants and Pre-Funded Warrants offered by this prospectus could make it more difficult or expensive for a third party to acquire us. The Common Warrants and Pre-Funded Warrants prohibit us from engaging in certain transactions constituting "fundamental transactions" unless, among other things, the surviving entity assumes our obligations under the Common Warrants or Pre-Funded Warrants, as applicable. These and other provisions of the Common Warrants and Pre-Funded Warrants offered by this prospectus could prevent or deter a third party from acquiring us even where the acquisition could be beneficial to you.

We may not receive any additional funds upon the exercise of the Common Warrants or Pre-Funded Warrants.

Each Common Warrant and each Pre-Funded Warrant may be exercised by way of a cashless exercise under certain circumstances, meaning that the holder may not pay a cash purchase price upon exercise, but instead would receive upon such exercise the net number of shares of Common Stock determined according to the formula set forth in the Common Warrant or Pre-Funded Warrant, respectively. Accordingly, we may not receive any additional funds upon the exercise of the Common Warrants or Pre-Funded Warrants.

If we sell Common Stock or preferred stock in the future, stockholders may experience immediate dilution and, as a result, our stock price may decline.

We may from time-to-time issue additional shares of Common Stock or preferred stock at a discount from the current trading price of the Common Stock. As a result, our stockholders could experience immediate dilution upon the purchase of any shares sold at such discount. In addition, as opportunities present themselves, we may enter into financing or similar arrangements in the future, including the issuance of debt securities, Common Stock or preferred stock. If we issue Common Stock or securities convertible into Common Stock, the holders of the Common Stock could experience additional dilution and, as a result, our stock price may decline. In addition, to the extent that any Common Warrants, Pre-Funded Warrants or options are exercised, new options or restricted stock units are issued under our equity incentive plans, or we otherwise issue additional shares of Common Stock in the future, at a price less than the public offering price, our stockholders could experience dilution.

Purchasers who purchase our securities in this offering pursuant to a securities purchase agreement may have rights not available to

purchasers that purchase without the benefit of a securities purchase agreement.

In addition to rights and remedies available to all purchasers in this offering under federal securities and state law, the purchasers that enter into a securities purchase agreement will also be able to bring claims of breach of contract against us. The ability to pursue a claim for breach of contract provides those investors with the means to enforce the covenants uniquely available to them under the securities purchase agreement including, but not limited to: (i) timely delivery of securities; (ii) agreement to not enter into any financings for 60 days from closing; and (iii) indemnification for breach of contract.

USE OF PROCEEDS

We estimate that we will receive net proceeds from this offering of approximately \$8.95 million (assuming the sale of the maximum number of securities offered hereby), based upon an assumed public offering price of \$1.30 per share of Common Stock and accompanying Common Warrant (which is the last reported sale price of the Common Stock on the NYSE American on December 9, 2024), after deducting the estimated Placement Agent fees and estimated offering expenses payable by us and assuming no sale of any Pre-Funded Warrants and no exercise of the Common Warrants. However, because this is a reasonable best efforts offering with no minimum number of securities or amount of proceeds as a condition to closing, the actual offering amount, Placement Agent fees, and net proceeds to us are not presently determinable and may be substantially less than the maximum amounts set forth on the cover page of this prospectus, and we may not sell all or any of the securities we are offering. As a result, we may receive significantly less in net proceeds. We estimate that our net proceeds from the sale of 75%, 50%, and 25% of the maximum number of securities offered in this offering would be approximately \$6.625 million, \$4.3 million, and \$1.975 million, respectively, after deducting the estimated Placement Agent fees and estimated offering expenses payable by us, and assuming no sale of any Pre-Funded Warrants and assuming no exercise of the Common Warrants. We will only receive additional proceeds from the exercise of the Common Warrants we are selling in this offering if the Common Warrants are exercised for cash. We cannot predict when or if these Common Warrants will be exercised. It is possible that these Common Warrant may expire and may never be exercised.

Each \$0.10 increase (decrease) in the assumed public offering price of \$1.30 per share of Common Stock and accompanying Common Warrant (which is the last reported sale price of the Common Stock on the NYSE American on December 9, 2024) would increase (decrease) the net proceeds to us from this offering by approximately \$715,000, assuming the number of securities offered, as set forth on the cover page of this prospectus, remains the same, and after deducting estimated offering expenses payable by us and assuming no sale of any Pre-Funded Warrants and assuming no exercise of the Common Warrants. Each 100,000 share increase (decrease) in the number of securities offered by us in this offering would increase (decrease) the net proceeds to us from this offering by approximately \$120,000, assuming that the price per share of Common Stock and accompanying Common Warrant for the offering remains at \$1.30 (which is the last reported sale price of the Common Stock on the NYSE American on December 9, 2024), and after deducting the estimated offering expenses payable by us and assuming no sale of any Pre-Funded Warrants and assuming no exercise of the Common Warrants included in the securities in the offering. Each 500,000 share increase (decrease) in the number of securities offered by us in this offering would increase (decrease) the net proceeds to us from this offering by approximately \$600,000, assuming that the price per share of Common Stock and accompanying Common Warrant for the offering remains at \$1.30 (which is the last reported sale price of the Common Stock on the NYSE American on December 9, 2024), and after deducting the estimated offering expenses payable by us and assuming no exercise of the Common Warrants included in the securities in the offering.

We currently intend to use the net proceeds from this offering primarily for working capital and general corporate purposes, including for research and development and manufacturing scale-up. We may also use a portion of the net proceeds to invest in or acquire other products, businesses or technologies, although we have no commitments or agreements with respect to any such investments or acquisitions as of the date of this prospectus.

These estimates exclude the proceeds, if any, from the exercise of Common Warrants offered hereby. If all of the Common Warrants offered hereby were to be exercised in cash at the exercise price of \$[.] per share, we would receive additional proceeds of approximately \$[.] million. We cannot predict when or if these Common Warrants will be exercised. It is possible that these Common Warrants may expire and may never be exercised. Additionally, these Common Warrants contain a cashless exercise provision that permit exercise of such Common Warrants on a cashless basis at any time when there is no effective registration statement under the Securities Act covering the issuance of the underlying shares.

The amounts and timing of any expenditures will vary depending on the amount of cash generated by our operations, and the rate of growth, if any, of our business, and our plans and business conditions. The foregoing represents our intentions as of the date of this prospectus based upon our current plans and business conditions to use and allocate the net proceeds of the offering. However, our management will have significant flexibility and discretion in the timing and application of the net proceeds of the offering. Unforeseen events or changed business conditions may result in application of the proceeds of the offering in a manner other than as described in this prospectus.

To the extent that the net proceeds we receive from the offering are not immediately applied for the above purposes, we plan to invest the net proceeds in short-term, investment-grade, interest-bearing instruments and U.S. government securities.

DIVIDEND POLICY

We have never declared or paid any cash dividends on the Common Stock and we do not currently intend to pay any cash dividends on the Common Stock in the foreseeable future. We expect to retain all available funds and future earnings, if any, to fund the development and growth of our business. Any future determination to pay dividends, if any, on the Common Stock will be at the discretion of our board of directors and will depend on, among other factors, the terms of any outstanding preferred stock, our results of operations, financial condition, capital requirements and contractual restrictions.

The following is a description of the material terms of our capital stock. This is a summary only and does not purport to be complete. It is subject to and qualified in its entirety by reference to our Articles of Incorporation and our Bylaws, each of which are incorporated by reference as an exhibit to the registration statement of which this prospectus forms a part. We encourage you to read our Articles of Incorporation, our Bylaws and the applicable provisions of the Nevada Revised Statute (the "NRS"), for additional information.

Our authorized capital stock consists of:

- 350,000,000 shares of Common Stock, par value \$0.001 per share; and
- 10,000,000 shares of preferred stock, par value \$0.001 per share.

Common Stock

Outstanding Shares. As of December 9, 2024, there were 2,782,449 shares of Common Stock outstanding.

Voting Rights. The holders of the Common Stock are entitled to one vote for each share held of record on all matters submitted to a vote of the stockholders, including the election of directors, and do not have cumulative voting rights. Accordingly, the holders of a majority of the shares of the Common Stock entitled to vote in any election of directors can elect all of the directors standing for election.

Dividend Rights. Subject to preferences that may be applicable to any then outstanding preferred stock, the holders of Common Stock are entitled to receive dividends, if any, as may be declared from time to time by our board of directors out of legally available funds.

Liquidation Rights. In the event of our liquidation, dissolution or winding up, holders of the 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, subject to the satisfaction of any liquidation preference granted to the holders of any then outstanding shares of preferred stock.

Other Rights and Preferences. The holders of the 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 the Common Stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of our preferred stock that we may designate and issue in the future.

Fully Paid and Nonassessable. All of our outstanding shares of Common Stock are fully paid and nonassessable.

Preferred Stock

Our Board of Directors has the authority, without action by our stockholders, to designate and issue up to 10,000,000 shares of preferred stock in one or more series or classes and to designate the rights, preferences and privileges of each series or class, which may be greater than the rights of the Common Stock. It is not possible to state the actual effect of the issuance of any shares of preferred stock upon the rights of holders of the Common Stock until our Board of Directors determines the specific rights of the holders of the preferred stock. However, the effects might include:

- restricting dividends on the Common Stock;
- diluting the voting power of the Common Stock;
- impairing liquidation rights of the Common Stock; or
- delaying or preventing a change in control of us without further action by our stockholders.

The Board of Directors' authority to issue preferred stock without stockholder approval could make it more difficult for a third-party to acquire control of our company and could discourage such attempt. We have 120,000 shares of preferred stock designated as Series A Convertible Preferred Stock, 15,723 shares of preferred stock designated as Series B Convertible Preferred Stock, 275,000 shares of preferred stock designated as Series C Convertible Preferred Stock, and 100,000 shares of preferred stock designated as Series D Convertible Preferred Stock. We currently do not have any shares of preferred stock outstanding and have no present plans to issue any shares of preferred stock.

Anti-Takeover Effects of Nevada Law

The provisions of NRS, our Articles of Incorporation and our Bylaws described below may have the effect of delaying, deferring or discouraging another party from acquiring control of us.

Business Combinations

The "business combination" provisions of Sections 78.411 to 78.444, inclusive, of the NRS generally prohibit a Nevada corporation with at least 200 stockholders from engaging in various "combination" transactions with any interested stockholder for a period of two years after the date of the transaction in which the person became an interested stockholder, unless the transaction is approved by the board of directors prior to the date the interested stockholder obtained such status or the combination is approved by the board of directors and thereafter is approved at a meeting of the stockholders by the affirmative vote of stockholders representing at least 60% of the outstanding voting power held by disinterested stockholders, and extends beyond the expiration of the two-year period, unless:

- the combination was approved by the board of directors prior to the person becoming an interested stockholder or the transaction by which the person first became an interested stockholder was approved by the board of directors before the person became an interested stockholder or the combination is later approved by a majority of the voting power held by disinterested stockholders; or

- if the consideration to be paid by the interested stockholder is at least equal to the highest of: (a) the highest price per share paid by the interested stockholder within the two years immediately preceding the date of the announcement of the combination or in the transaction in which it became an interested stockholder, whichever is higher, (b) the market value per share of Common Stock on the date of announcement of the combination and the date the interested stockholder acquired the shares, whichever is higher, or (c) for holders of preferred stock, the highest liquidation value of the preferred stock, if it is higher.

A "combination" is generally defined to include mergers or consolidations or any sale, lease exchange, mortgage, pledge, transfer, or other disposition, in one transaction or a series of transactions, with an "interested stockholder" having: (a) an aggregate market value equal to 5% or more of the aggregate market value of the assets of the corporation, (b) an aggregate market value equal to 5% or more of the aggregate market value of all outstanding shares of the corporation, (c) 10% or more of the earning power or net income of the corporation, and (d) certain other transactions with an interested stockholder or an affiliate or associate of an interested stockholder.

In general, an "interested stockholder" is a person who, together with affiliates and associates, owns (or within two years, did own) 10% or more of a corporation's voting stock. The statute could prohibit or delay mergers or other takeover or change in control attempts and, accordingly, may discourage attempts to acquire our company even though such a transaction may offer our stockholders the opportunity to sell their stock at a price above the prevailing market price.

Control Share Acquisitions

The "control share" provisions of Sections 78.378 to 78.3793, inclusive, of the NRS apply to "issuing corporations" that are Nevada corporations with at least 200 stockholders, including at least 100 stockholders of record who are Nevada residents, and that conduct business directly or indirectly in Nevada. The control share statute prohibits an acquirer, under certain circumstances, from voting its shares of a target corporation's stock after crossing certain ownership threshold percentages, unless the acquirer obtains approval of the target corporation's disinterested stockholders. The statute specifies three thresholds: one-fifth or more but less than one-third, one-third but less than a majority, and a majority or more, of the outstanding voting power. Generally, once an acquirer crosses one of the above thresholds, those shares in an offer or acquisition and acquired within 90 days thereof become "control shares" and such control shares are deprived of the right to vote until disinterested stockholders restore the right. These provisions also provide that if control shares are accorded full voting rights and the acquiring person has acquired a majority or more of all voting power, all other stockholders who do not vote in favor of authorizing voting rights to the control shares are entitled to demand payment for the fair value of their shares in accordance with statutory procedures established for dissenters' rights.

A corporation may elect to not be governed by, or "opt out" of, the control share provisions by making an election in its articles of incorporation or bylaws, provided that the opt-out election must be in place on the 10th day following the date an acquiring person has acquired a controlling interest, that is, crossing any of the three thresholds described above. We have not opted out of the control share statutes, and will be subject to these statutes if we are an "issuing corporation" as defined in such statutes.

The effect of the Nevada control share statutes is that the acquiring person, and those acting in association with the acquiring person, will obtain only such voting rights in the control shares as are conferred by a resolution of the stockholders at an annual or special meeting. The Nevada control share law, if applicable, could have the effect of discouraging takeovers of our company.

Articles of Incorporation and Bylaws

Our Articles of Incorporation and Bylaws provide that:

- the authorized number of directors is determined by our board of directors;
- directors may be removed only by the affirmative vote of the holders of at least a majority of our voting stock, whether for cause or without cause;
- our Bylaws may be amended or repealed by our board of directors or by the affirmative vote of our stockholders;
- special meetings of the stockholders may be called by Chairman of the board, if any, the Vice Chairman of the board, if any, or the President;
- our board of directors may fill vacancies on the board of directors;
- our board of directors will be authorized to issue, without stockholder approval, preferred stock, the rights of which will be determined at the discretion of the board of directors and that, if issued, could operate as a "poison pill" to dilute the stock ownership of a potential hostile acquirer to prevent an acquisition that our board of directors does not approve;
- our stockholders do not have cumulative voting rights, and therefore our stockholders holding a majority of the shares of Common Stock outstanding will be able to elect all of our directors; and
- our stockholders must comply with advance notice provisions to bring business before or nominate directors for election at a stockholder meeting.

Potential Effects of Authorized but Unissued Stock

We have shares of Common Stock and preferred stock available for future issuance without stockholder approval. We may utilize these additional shares for a variety of corporate purposes, including future public offerings to raise additional capital, to facilitate corporate acquisitions or payment as a dividend on the capital stock.

The existence of unissued and unreserved Common Stock may enable our board of directors to issue shares to persons friendly to current management.

Limitations of Director Liability and Indemnification of Directors, Officers and Employees

NRS 78.138 provides that directors of a corporation is not individually liable to the corporation or its stockholders or creditors for any damages as a result of any act or failure to act in his or her capacity as a director or officer unless: (a) the presumption that directors and officers acted in good faith on an informed basis with a view toward the best interest of the corporation has been rebutted and (b) it is proven that:

- The director's or officer's act or failure to act constituted a breach of his or her fiduciary duties as a director or officer; and
- such breach involved intentional misconduct, fraud or a knowing violation of law.

Our Articles of Incorporation and Bylaws provide that we will indemnify our directors and officers to the fullest extent permitted by law and may indemnify employees and other agents. Our Articles of Incorporation also provide that we are obligated to advance expenses incurred by a director or officer in advance of the final disposition of any action or proceeding.

We have obtained a policy of directors' and officers' liability insurance.

We have entered into separate indemnification agreements with our directors and officers. These agreements, among other things, require us to indemnify our directors and officers for any and all expenses (including reasonable attorneys' fees, retainers, court costs, transcript costs, fees of experts, witness fees, travel expenses, duplicating costs, printing and binding costs, telephone charges, postage, delivery service fees) judgments, fines and amounts paid in settlement actually and reasonably incurred by such directors or officers or on his or her behalf in connection with any action or proceeding arising out of their services as one of our directors or officers, or any of our subsidiaries or any other company or enterprise to which the person provides services at our request provided that such person follows the procedures for determining entitlement to indemnification and advancement of expenses set forth in the indemnification agreement. We believe that these bylaw provisions and indemnification agreements are necessary to attract and retain qualified persons as directors and officers.

The limitation of liability and indemnification provisions in our Articles of Incorporation and Bylaws may discourage stockholders from bringing a lawsuit against directors for breach of their fiduciary duties. They may also reduce the likelihood of derivative litigation against directors and officers, even though an action, if successful, might provide a benefit to us and our stockholders. Our results of operations and financial condition may be harmed to the extent we pay the costs of settlement and damage awards against directors and officers pursuant to these indemnification provisions.

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers or persons controlling us, we have been informed that, in the opinion of the SEC, such indemnification is against public policy as expressed in the Securities Act and is therefore unenforceable.

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At present, there is no pending litigation or proceeding involving any of our directors or officers as to which indemnification is required or permitted, and we are not aware of any threatened litigation or proceeding that may result in a claim for indemnification.

Listing of the Common Stock on the NYSE American LLC

The Common Stock is listed for trading on the NYSE American LLC under the symbol "TOVX."

Transfer Agent and Registrar

The transfer agent and registrar for the Common Stock is Equiniti Trust Company.

Stock Options

As of December 9, 2024, we had options outstanding to purchase an aggregate of 175,204 shares of Common Stock that were issued under our equity compensation plans. As of December 9, 2024, there were 2,332,636 shares of Common Stock reserved for future issuance under our equity incentive plan.

Warrants

As of December 9, 2024, we had warrants outstanding to purchase an aggregate of 1,428,600 shares of Common Stock with a weighted average exercise price of \$1.75 per share.

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DESCRIPTION OF SECURITIES TO BE REGISTERED

We are offering up to 7,692,307 shares of Common Stock, or Pre-Funded Warrants in lieu of shares of Common Stock, along with Common Warrants to purchase up to 7,692,307 shares of Common Stock. For each Pre-Funded Warrant we sell, the number of shares of Common Stock we are offering will be decreased on a one-for-one basis. Each share of Common Stock or Pre-Funded Warrant is being sold together with a Common Warrant to purchase one share of Common Stock. The shares of Common Stock or Pre-Funded Warrants and accompanying Common Warrants will be issued separately. We are also registering the shares of Common Stock issuable from time to time upon exercise of the Pre-Funded Warrants offered hereby and the Common Warrants offered hereby.

Common Stock. See the description above under "Description of our Capital Stock- Common Stock"

Common Warrants to be Issued in this Offering

The following summary of certain terms and provisions of the Common Warrants included with the Common Stock that are being offered hereby is not complete and is subject to, and qualified in its entirety by, the provisions of the Common Warrants, the form of which is filed as an exhibit to our registration statement of which this prospectus forms a part.

Duration and Exercise Price

Each Common Warrant offered hereby will be a warrant to purchase one share of Common Stock and will have an initial exercise price equal to \$[·] per share ([·]% of the assumed public offering price per share of Common Stock and accompanying Common Warrant, which is based on the closing price of the Common Stock on the NYSE American on December 9, 2024 of \$1.30). The Common Warrants will be exercisable immediately upon issuance and will expire five years from the date of issuance. The exercise price and number of shares of Common Stock issuable upon exercise is subject to appropriate adjustment in the event of share dividends, share splits, reorganizations or similar events affecting the Common Stock and the exercise price. Subject to the rules and regulations of the applicable trading market, we may at any time during the term of the Common Warrant, subject to the prior written consent of the holders, reduce the then current exercise price to any amount and for any period of time deemed appropriate by our board of

directors. The Common Warrants will be issued separately from the shares of Common Stock, or the Pre-Funded Warrants, as the case may be.

Exercisability

The Common Warrants will be exercisable, at the option of each holder, in whole or in part, by delivering to us a duly executed exercise notice accompanied by payment in full for the number of shares of Common Stock purchased upon such exercise (except in the case of a cashless exercise as discussed below). A holder (together with its affiliates) may not exercise any portion of the Common Warrant to the extent that the holder would own more than 4.99% of the outstanding shares of our common warrant immediately after exercise, except that upon at least 61 days' prior notice from the holder to us, the holder may increase the amount of beneficial ownership of outstanding shares after exercising the holder's Common Warrants up to 9.99% of the number of our shares of Common Stock outstanding immediately after giving effect to the exercise, as such percentage ownership is determined in accordance with the terms of the Common Warrants. Purchasers of Common Warrants in this offering may also elect prior to the issuance of the Common Warrants to have the initial exercise limitation set at 9.99% of our outstanding shares.

Cashless Exercise

If, at the time a holder exercises its Common Warrants, a registration statement registering the issuance of the shares of Common Stock underlying the Common Warrants under the Securities Act is not then effective or available for the issuance of such shares, then in lieu of making the cash payment otherwise contemplated to be made to us upon such exercise in payment of the aggregate exercise price and subject to the nominal value of the shares being paid up as described below, the holder may elect instead to receive upon such exercise (either in whole or in part) the net number of shares determined according to a formula set forth in the Common Warrants.

Fractional Shares

No fractional shares of Common Stock or scrip representing fractional shares will be issued upon the exercise of the Common Warrants. Rather, the number of shares of Common Stock to be issued will, at our election, either be rounded up to the next whole share or we will pay a cash adjustment in respect of such final fraction in an amount equal to such fraction multiplied by the exercise price.

Transferability

Subject to applicable laws, a Common Warrant may be transferred at the option of the holder upon surrender of the Common Warrant to us together with the appropriate instruments of transfer and funds sufficient to pay any transfer taxes payable upon such transfer.

Trading Market

There is no trading market available for the Common Warrants on any securities exchange or nationally recognized trading system, and we do not expect a trading market to develop. We do not intend to list the Common Warrants on any securities exchange or nationally recognized trading market. Without a trading market, the liquidity of the Common Warrants will be extremely limited. The shares of Common Stock issuable upon exercise of the Common Warrants are currently traded on the NYSE American.

Right as a Stockholder

Except as otherwise provided in the Common Warrants or by virtue of such holder's ownership of Common Stock, the holders of the Common Warrants do not have the rights or privileges of holders of shares of Common Stock, including any voting rights, until they exercise their Common Warrants. The Common Warrants will provide that holders have the right to participate in distributions or dividends paid on Common Stock.

Fundamental Transaction

In the event of a fundamental transaction, as described in the Common Warrants and generally including (i) our merger or consolidation with or into another person, (ii) the sale, lease, license, assignment, transfer, conveyance or other disposition of all or substantially all of our assets, (iii) any purchase offer, tender offer or exchange offer pursuant to which holders of our Common Stock are permitted to sell, tender or exchange their shares for other securities, cash or property and has been accepted by the holders of 50% or more of our outstanding Common Stock or 50% or more of the voting power of our common equity, (iv) any reclassification, reorganization or recapitalization of our shares of Common Stock or any compulsory share exchange or (v) any stock or share purchase agreement or other business combination with another person or group of persons whereby such other person or group acquires 50% or more of our outstanding shares of Common Stock or 50% or more of the voting power of our common equity, the holders will be entitled to receive the number of shares of the Common Stock for which the Common Warrant is exercisable immediately prior to the occurrence of such fundamental transaction. Notwithstanding the foregoing, in the event of a fundamental transaction, the holders of the Common Warrants have the right to require us or a successor entity to redeem the Common Warrants for cash in the amount of the Black Scholes Value (as defined in each warrant) of the unexercised portion of the Common Warrants concurrently with or within 30 days following the consummation of a fundamental transaction.

However, in the event of a fundamental transaction which is not in our control, including a fundamental transaction not approved by our board of directors, the holders of the Common Warrants will only be entitled to receive from us or our successor entity, as of the date of consummation of such fundamental transaction the same type or form of consideration (and in the same proportion), at the Black Scholes Value of the unexercised portion of the Common Warrant that is being offered and paid to the holders of the Common Stock in connection with the fundamental transaction, whether that consideration is in the form of cash, stock or any combination of cash and stock, or whether the holders of the Common Stock are given the choice to receive alternative forms of consideration in connection with the fundamental transaction.

Pre-Funded Warrants to be Issued in this Offering

The following summary of certain terms and provisions of the Pre-Funded Warrants that are being offered hereby is not complete and is subject to, and qualified in its entirety by, the provisions of the Pre-Funded Warrant, the form of which is filed as an exhibit to our registration statement of which this prospectus forms a part. Prospective investors should carefully review the terms and provisions of the form of Pre-Funded Warrant for a complete description of the terms and conditions of the Pre-Funded Warrants.

Duration and Exercise Price

Each Pre-Funded Warrant offered hereby will have an initial exercise price per share equal to \$0.001. The Pre-Funded Warrants will be immediately exercisable and will expire when exercised in full. The exercise price and number of shares of Common Stock issuable upon exercise is subject to appropriate adjustment in the event of share dividends, share splits, reorganizations or similar events affecting our shares of Common Stock and the exercise price. Subject to the rules and regulations of the applicable trading market, we may at any time during the term of the Pre-Funded Warrant, subject to the prior written consent of the holders, reduce the then current exercise price to any amount and for any period of time deemed appropriate by our board of directors. The Pre-Funded Warrants will be issued separately from the common warrants.

Exercisability

The Pre-Funded Warrants will be exercisable, at the option of each holder, in whole or in part, by delivering to us a duly executed exercise notice accompanied by payment in full for the number of shares of Common Stock purchased upon such exercise (except in the case of a cashless exercise as discussed below). A holder (together with its affiliates) may not exercise any portion of the Pre-Funded Warrant to the extent that the holder would own more than 4.99% of the outstanding shares of the Common Stock immediately after exercise, except that upon at least 61 days' prior notice from the holder to us, the holder may increase the amount of beneficial ownership of outstanding shares after exercising the holder's Pre-Funded Warrants up to 9.99% of the number of our shares outstanding immediately after giving effect to the exercise, as such percentage ownership is determined in accordance with the terms of the Pre-Funded Warrants. Purchasers of Pre-Funded Warrants in this offering may also elect prior to the issuance of the Pre-Funded Warrants to have the initial exercise limitation set at 9.99% of our outstanding shares of Common Stock.

Cashless Exercise

If, at the time a holder exercises its Pre-Funded Warrants, a registration statement registering the issuance of the shares of Common Stock underlying the Pre-Funded Warrants under the Securities Act is not then effective or available for the issuance of such shares, then in lieu of making the cash payment otherwise contemplated to be made to us upon such exercise in payment of the aggregate exercise price, the holder may elect instead to receive upon such exercise (either in whole or in part) the net number of shares of Common Stock determined according to a formula set forth in the Pre-Funded Warrants.

Fractional Shares

No fractional shares of Common Stock or scrip representing fractional shares will be issued upon the exercise of the Pre-Funded Warrants. Rather, the number of shares of Common Stock to be issued will, at our election, either be rounded up to the next whole share or we will pay a cash adjustment in respect of such final fraction in an amount equal to such fraction multiplied by the exercise price.

Transferability

Subject to applicable laws, a Pre-Funded Warrant may be transferred at the option of the holder upon surrender of the Pre-Funded Warrant to us together with the appropriate instruments of transfer and funds sufficient to pay any transfer taxes payable upon such transfer.

Trading Market

There is no trading market available for the Pre-Funded Warrants on any securities exchange or nationally recognized trading system, and we do not expect a trading market to develop. We do not intend to list the Pre-Funded Warrants on any securities exchange or nationally recognized trading market. Without a trading market, the liquidity of Pre-Funded Warrants will be extremely limited. The shares of Common Stock issuable upon exercise of the Pre-Funded Warrants are currently traded on the NYSE American.

Right as a Stockholder

Except as otherwise provided in the Pre-Funded Warrants or by virtue of such holder's ownership of Common Stock, the holders of the Pre-Funded Warrants do not have the rights or privileges of holders of the Common Stock, including any voting rights, until they exercise their Pre-Funded Warrants. The Pre-Funded Warrants will provide that holders have the right to participate in distributions or dividends paid on Common Stock.

Fundamental Transaction

In the event of a fundamental transaction, as described in the Pre-Funded Warrants and generally including (i) our merger or consolidation with or into another person, (ii) the sale, lease, license, assignment, transfer, conveyance or other disposition of all or substantially all of our assets, (iii) any purchase offer, tender offer or exchange offer pursuant to which holders of the Common Stock are permitted to sell, tender or exchange their shares for other securities, cash or property and has been accepted by the holders of 50% or more of our outstanding Common Stock or 50% or more of the voting power of our common equity, (iv) any reclassification, reorganization or recapitalization of our shares of Common Stock or any compulsory share exchange or (v) any stock or share purchase agreement or other business combination with another person or group of persons whereby such other person or group acquires 50% or more of our outstanding shares of Common Stock or 50% or more of the voting power of our common equity, the holders of the Pre-Funded Warrants will be entitled to receive upon exercise of the Pre-Funded Warrants the kind and amount of securities, cash or other property that the holders would have received had they exercised the Pre-Funded Warrants immediately prior to such fundamental transaction.

MATERIAL UNITED STATES FEDERAL INCOME TAX CONSIDERATIONS

The following discussion describes the material U.S. federal income tax consequences of the acquisition, ownership and disposition of the Common Stock, Pre-Funded Warrants and Common Warrants acquired in this Offering. This discussion is based on the current provisions of the Internal Revenue Code of 1986, as amended, referred to as the Code, existing and proposed U.S. Treasury regulations promulgated thereunder, and administrative rulings and court decisions in effect as of the date hereof, all of which are subject to change at any time, possibly with retroactive effect. No ruling has been or will be sought from the Internal Revenue Service, or IRS, with respect to the matters discussed below, and there can be no assurance the IRS will not take a contrary position regarding the tax consequences of the acquisition, ownership or disposition of the Common Stock, Pre-Funded Warrants or Common Warrants, or that any such contrary position would not be sustained by a court.

We assume in this discussion that the shares of Common Stock, Pre-Funded Warrants and Common Warrants will be held as capital assets (generally, property held for investment). This discussion does not address all aspects of U.S. federal income taxes, does not discuss the potential application of the Medicare contribution tax or the alternative minimum tax and does not address state or local taxes or U.S. federal gift and estate tax laws, except as specifically provided below with respect to non-U.S. holders, or any non-U.S. tax consequences that may be relevant to holders in light of their particular circumstances. This discussion also does not address the special tax rules applicable to particular holders, such as:

- persons who acquired the Common Stock, Pre-Funded Warrants or Common Warrants as compensation for services;
- traders in securities that elect to use a mark-to-market method of accounting for their securities holdings;
- persons that own, or are deemed to own, more than 5% of the Common Stock (except to the extent specifically set forth below);
- persons required for U.S. federal income tax purposes to conform the timing of income accruals to their financial statements under Section 451(b) of the Code (except to the extent specifically set forth below);
- persons for whom the Common Stock constitutes "qualified small business stock" within the meaning of Section 1202 of the Code or "Section 1244 stock" for purposes of Section 1244 of the Code;
- persons deemed sell the Common Stock, Pre-Funded Warrants or Common Warrants under the constructive sale provisions of the Code;
- banks or other financial institutions;
- brokers or dealers in securities or currencies;

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- tax-exempt organizations or tax-qualified retirement plans;
- pension plans;
- regulated investment companies or real estate investment trusts;
- persons that hold the Common Stock, Pre-Funded Warrants or Common Warrants as part of a straddle, hedge, conversion transaction, synthetic security or other integrated investment;
- insurance companies;
- controlled foreign corporations, passive foreign investment companies, or corporations that accumulate earnings to avoid U.S. federal income tax; and
- certain U.S. expatriates, former citizens, or long-term residents of the United States.

In addition, this discussion does not address the tax treatment of partnerships (including any entity or arrangement classified as a partnership for U.S. federal income tax purposes) or other pass-through entities or persons who hold shares of Common Stock, Pre-Funded Warrants or Common Warrants through such partnerships or other entities which are pass-through entities for U.S. federal income tax purposes. If such a partnership or other pass-through entity holds shares of Common Stock, Pre-Funded Warrants or Common Warrants, the treatment of a partner in such partnership or investor in such other pass-through entity generally will depend on the status of the partner or investor and upon the activities of the partnership or other pass-through entity. A partner in such a partnership and an investor in such other pass-through entity that will hold shares of Common Stock, Pre-Funded Warrants or Common Warrants should consult his, her or its own tax advisor regarding the tax consequences of the ownership and disposition of shares of Common Stock, Pre-Funded Warrants or Common Warrants through such partnership or other pass-through entity, as applicable.

This discussion of U.S. federal income tax considerations is for general information purposes only and is not tax advice. Prospective investors should consult their own tax advisors regarding the U.S. federal, state, local and non-U.S. income and other tax considerations of acquiring, holding and disposing of the Common Stock, Pre-Funded Warrants and Common Warrants.

For the purposes of this discussion, a "U.S. Holder" means a beneficial owner of shares of Common Stock, Pre-Funded Warrants or Common Warrants that is for U.S. federal income tax purposes (a) an individual citizen or resident of the United States, (b) a corporation (or other entity taxable as a corporation for U.S. federal income tax purposes), created or organized in or under the laws of the United States, any state thereof or the District of Columbia, (c) an estate the income of which is subject to U.S. federal income taxation regardless of its source, or (d) a trust if it (1) is subject to the primary supervision of a court within the United States and one or more U.S. persons (within the meaning of Section 7701(a)(30) of the Code) has the authority to control all substantial decisions of the trust or (2) has a valid election in effect under applicable U.S. Treasury regulations to be treated as a domestic trust. A "Non-U.S. Holder" is, for U.S. federal income tax purposes, a beneficial owner of shares of Common Stock, Pre-Funded Warrants or Common Warrants that is not a U.S. Holder or a partnership for U.S. federal income tax purposes.

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Potential Acceleration of Income

Under tax legislation signed into law in December 2017 commonly known as the Tax Cuts and Jobs Act of 2017, U.S. Holders that use an accrual method of accounting for tax purposes and have certain financial statements generally will be required to include certain amounts in income no later than the time such amounts are taken into account as revenue in such financial statements.

In addition, under the Inflation Reduction Act signed into law on August 16, 2022, certain large corporations (generally, corporations reporting at least \$1 billion average adjusted pre-tax net income on their consolidated financial statements) are potentially subject to a 15% alternative minimum tax on the "adjusted financial statement income" of such large corporations for tax years beginning after December 31, 2022. The U.S. Treasury Department, the IRS, and other standard-setting bodies are expected to issue guidance on how the alternative minimum tax provisions of the Inflation Reduction Act will be applied or otherwise administered.

The application of these rules thus may require the accrual of income earlier than would be the case under the general tax rules described below,

although the precise application of these rules is unclear at this time. U.S. Holders that use an accrual method of accounting should consult with their tax advisors regarding the potential applicability of this legislation to their particular situation.

Treatment of Pre-Funded Warrants

Although it is not entirely free from doubt, a pre-funded warrant should be treated as a share of Common Stock for U.S. federal income tax purposes and a holder of Pre-Funded Warrants should generally be taxed in the same manner as a holder of Common Stock, as described below. Accordingly, no gain or loss should be recognized upon the exercise of a Pre-Funded Warrant and, upon exercise, the holding period of a Pre-Funded Warrant should carry over to the share of Common Stock received. Similarly, the tax basis of the Pre-Funded Warrant should carry over to the share of Common Stock received upon exercise, increased by the exercise price of \$0.001 per share. Each holder should consult his, her or its own tax advisor regarding the risks associated with the acquisition of Pre-Funded Warrants pursuant to this Offering (including potential alternative characterizations). The balance of this discussion generally assumes that the characterization described above is respected for U.S. federal income tax purposes.

Allocation of Purchase Price

For U.S. federal income tax purposes, each share of Common Stock (or, in lieu of Common Stock, each Pre-Funded Warrant) and the accompanying Common Warrants issued pursuant to this offering will be treated as an "investment unit" each of which consisting of one share of Common Stock or one Pre-Funded Warrant (which, as described above, should generally be treated as a share of Common Stock for U.S. federal income tax purposes), as applicable and the accompanying Common Warrant to acquire one share of Common Stock. The purchase price for each investment unit will be allocated between these components in proportion to their relative fair market values at the time the unit is purchased by the holder. This allocation of the purchase price for each unit will establish the holder's initial tax basis for U.S. federal income tax purposes in the share of Common Stock (or, in lieu of Common Stock, Pre-Funded Warrant) and the common warrant included in each unit. The separation of the share of Common Stock (or, in lieu of Common Stock, Pre-Funded Warrant) and the Common Warrant included in a unit should not be a taxable event for U.S. federal income tax purposes. Each holder should consult his, her or its own tax advisor regarding the allocation of the purchase price between the Common Stock (or, in lieu of Common Stock, Pre-Funded Warrants) and the Common Warrants..

Tax Considerations Applicable to U.S. Holders

Exercise and Expiration of Common Warrants

Except as discussed below with respect to the cashless exercise of a Common Warrant, a U.S. Holder generally will not recognize gain or loss for U.S. federal income tax purposes upon exercise of a Common Warrant. The U.S. Holder will take a tax basis in the shares acquired on the exercise of a Common Warrant equal to the exercise price of the Common Warrant, increased by the U.S. Holder's adjusted tax basis in the Common Warrant exercised (as determined pursuant to the rules discussed above). The U.S. Holder's holding period in the shares of Common Stock acquired on the exercise of a Common Warrant will begin on the date of exercise or possibly the day after such exercise, and will not include any period for which the U.S. Holder held the Common Warrant.

The lapse or expiration of a Common Warrant will be treated as if the U.S. Holder sold or exchanged the Common Warrant and recognized a capital loss equal to the U.S. Holder's tax basis in the Common Warrant. The deductibility of capital losses is subject to limitations.

The tax consequences of a cashless exercise of a Common Warrant are not clear under current tax law. A cashless exercise may be tax-free, either because the exercise is not a realization event or because the exercise is treated as a recapitalization for U.S. federal income tax purposes. In either tax-free situation, a U.S. Holder's tax basis in the Common Stock received generally would equal the U.S. Holder's tax basis in the Common Warrants. If the cashless exercise was not a realization event, it is unclear whether a U.S. Holder's holding period for the Common Stock would be treated as commencing on the date of exercise of the Common Warrant or the day following the date of exercise of the Common Warrant. If the cashless exercise were treated as a recapitalization, the holding period of the Common Stock would include the holding period of the Common Warrants.

It is also possible that a cashless exercise could be treated as a taxable exchange in which gain or loss would be recognized. In such event, a U.S. Holder could be deemed to have surrendered Common Warrants having an aggregate fair market value equal to the exercise price for the total number of Common Warrants to be exercised. The U.S. Holder would recognize capital gain or loss in an amount equal to the difference between the fair market value of the Common Stock received in respect of the Common Warrants deemed surrendered and the U.S. Holder's tax basis in such Common Warrants. Such gain or loss would be long-term or short-term, depending on the U.S. Holder's holding period in the Common Warrants deemed surrendered. In this case, a U.S. Holder's tax basis in the Common Stock received would equal the sum of the U.S. Holder's initial investment in the exercised Common Warrants (i.e., the portion of the U.S. Holder's purchase price for the investment unit that is allocated to the common warrants, as described above under "Allocation of Purchase Price") and the exercise price of such Common Warrants. It is unclear whether a U.S. Holder's holding period for the Common Stock would commence on the date of exercise of the Common Warrant or the day following the date of exercise of the Common Warrant. There may also be alternative characterizations of any such taxable exchange that would result in similar tax consequences, except that a U.S. Holder's gain or loss would be short-term. Due to the absence of authority on the U.S. federal income tax treatment of a cashless exercise, there can be no assurance which, if any, of the alternative tax consequences and holding periods described above would be adopted by the IRS or a court of law. Accordingly, U.S. Holders should consult their tax advisors regarding the tax consequences of a cashless exercise of the Common Warrants.

Distributions

As discussed above, we currently anticipate that we will retain future earnings, if any, to finance the growth and development of our business and do not intend to pay cash dividends in respect of shares of Common Stock in the foreseeable future. In the event that we do make distributions on the Common Stock to a U.S. Holder, those distributions generally will constitute dividends for U.S. tax purposes to the extent paid out of our current or accumulated earnings and profits (as determined under U.S. federal income tax principles). Distributions in excess of our current and accumulated earnings and profits will constitute a return of capital that is applied against and reduces, but not below zero, a U.S. Holder's adjusted tax basis in the Common Stock. Any remaining excess will be treated as gain realized on the sale or exchange of shares of Common Stock as described below under the section titled "Disposition of Common Stock, Pre-Funded Warrants or Common Warrants."

Certain Adjustments to Pre-Funded Warrants or Common Warrants

The number of shares of Common Stock issued upon the exercise of the Pre-Funded Warrants or Common Warrants and the exercise price of Pre-Funded Warrants or Common Warrants are subject to adjustment in certain circumstances. Adjustments (or failure to make adjustments) that have the effect of increasing a U.S. Holder's proportionate interest in our assets or earnings and profits may, in some circumstances, result in a constructive

distribution to the U.S. Holder. Adjustments to the conversion rate made pursuant to a bona fide reasonable adjustment formula which has the effect of preventing the dilution of the interest of the holders of Pre-Funded Warrants or Common Warrants generally should not be deemed to result in a constructive distribution. If an adjustment is made that does not qualify as being made pursuant to a bona fide reasonable adjustment formula, a U.S. Holder of Pre-Funded Warrants or Common Warrants may be deemed to have received a constructive distribution from us, even though such U.S. Holder has not received any cash or property as a result of such adjustment. The tax consequences of the receipt of a distribution from us are described above under "Distributions."

Disposition of Common Stock, Pre-Funded Warrants or Common Warrants

Upon a sale or other taxable disposition (other than a redemption treated as a distribution, which will be taxed as described above under "Distributions") of shares of Common Stock, Pre-Funded Warrants or Common Warrants, a U.S. Holder generally will recognize capital gain or loss in an amount equal to the difference between the amount realized and the U.S. Holder's adjusted tax basis in the Common Stock, Pre-Funded Warrants or Common Warrants sold. Capital gain or loss will constitute long-term capital gain or loss if the U.S. Holder's holding period for the Common Stock, Pre-Funded Warrants or Common Warrants exceeds one year. The deductibility of capital losses is subject to certain limitations. U.S. Holders who recognize losses with respect to a disposition of shares of Common Stock, Pre-Funded Warrants or Common Warrants should consult their own tax advisors regarding the tax treatment of such losses.

Information Reporting and Backup Reporting

Information reporting requirements generally will apply to payments of distributions (including constructive distributions) on the Common Stock, Pre-Funded Warrants and Common Warrants and to the proceeds of a sale or other disposition of Common Stock, Pre-Funded Warrants and Common Warrants paid by us to a U.S. Holder unless such U.S. Holder is an exempt recipient, such as a corporation. Backup withholding will apply to those payments if the U.S. Holder fails to provide the holder's taxpayer identification number, or certification of exempt status, or if the holder otherwise fails to comply with applicable requirements to establish an exemption.

Backup withholding is not an additional tax. Rather, any amounts withheld under the backup withholding rules will be allowed as a refund or a credit against the U.S. Holder's U.S. federal income tax liability provided the required information is timely furnished to the IRS. U.S. Holders should consult their own tax advisors regarding their qualification for exemption from information reporting and backup withholding and the procedure for obtaining such exemption.

Tax Considerations Applicable to Non-U.S. Holders

Exercise and Expiration of Common Warrants

In general, a Non-U.S. Holder will not recognize gain or loss for U.S. federal income tax purposes upon the exercise of Common Warrants into shares of Common Stock, however, to the extent a cashless exercise results in a taxable exchange, the consequences would be similar to those described in the discussion below under "Disposition of Common Stock, Pre-Funded Warrants or Common Warrants."

The expiration of a Common Warrant will be treated as if the Non-U.S. Holder sold or exchanged Common Warrant and recognized a capital loss equal to the Non-U.S. Holder's tax basis in the common warrants. However, a Non-U.S. Holder will not be able to utilize a loss recognized upon expiration of a Common Warrant against the Non-U.S. Holder's U.S. federal income tax liability unless the loss is effectively connected with the Non-U.S. Holder's conduct of a trade or business within the United States (and, if an income tax treaty applies, is attributable to a permanent establishment or fixed base in the United States) or is treated as a U.S.-source loss and the Non-U.S. Holder is present 183 days or more in the taxable year of disposition and certain other conditions are met.

Certain Adjustments to Warrants

As described under "—U.S. Holders—Certain Adjustments to Pre-Funded Warrants or Common Warrants," an adjustment to the Pre-Funded Warrants or Common Warrants could result in a constructive distribution to a Non-U.S. Holder, which would be treated as described under "Distributions" below. Any resulting withholding tax attributable to deemed dividends would be collected from other amounts payable or distributable to the Non-U.S. Holder. Non-U.S. Holders should consult their tax advisors regarding the proper treatment of any adjustments to the Pre-Funded Warrants or Common Warrants.

In addition, regulations governing "dividend equivalents" under Section 871(m) of the Code may apply to the Pre-Funded Warrants. Under those regulations, an implicit or explicit payment under Pre-Funded Warrants that references a dividend distribution on the Common Stock would possibly be taxable to a Non-U.S. Holder as described under "Distributions" below. Such dividend equivalent amount would be taxable and subject to withholding whether or not there is actual payment of cash or other property, and the Company may satisfy any withholding obligations it has in respect of the Pre-Funded Warrants by withholding from other amounts due to the Non-U.S. Holder. Non-U.S. Holders are encouraged to consult their own tax advisors regarding the application of Section 871(m) of the Code to the Pre-Funded Warrants.

Distributions

As discussed above, we currently anticipate that we will retain future earnings, if any, to finance the growth and development of our business and do not intend to pay cash dividends in respect of the Common Stock in the foreseeable future. In the event that we do make distributions on the Common Stock to a Non-U.S. Holder, those distributions generally will constitute dividends for U.S. federal income tax purposes as described in "—U.S. Holders—Distributions." To the extent those distributions do not constitute dividends for U.S. federal income tax purposes (i.e., the amount of such distributions exceeds both our current and our accumulated earnings and profits), they will constitute a return of capital and will first reduce a Non-U.S. Holder's basis in the Common Stock (determined separately with respect to each share of Common Stock), but not below zero, and then will be treated as gain from the sale of that share Common Stock as described below under the section titled "—Disposition of Common Stock, Pre-Funded Warrants or Common Warrants."

Any distribution (including constructive distributions) on shares of Common Stock that is treated as a dividend paid to a Non-U.S. Holder that is not effectively connected with the holder's conduct of a trade or business in the United States will generally be subject to withholding tax at a 30% rate or such lower rate as may be specified by an applicable income tax treaty between the United States and the Non-U.S. Holder's country of residence. To obtain a reduced rate of withholding under a treaty, a Non-U.S. Holder generally will be required to provide the applicable withholding agent with a properly executed IRS Form W-8BEN, IRS Form W-8BEN-E or other appropriate form, certifying the Non-U.S. Holder's entitlement to benefits under that treaty. Such form must be provided prior to the payment of dividends and must be updated periodically. 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 may then be required to provide certification to the applicable withholding agent, either directly or through other intermediaries. If you are eligible for a reduced rate of U.S. withholding tax under an income tax treaty, you should consult with your own tax advisor to determine if you are 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 (or constructive dividends deemed paid) to a Non-U.S. Holder that are effectively connected with the 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 or fixed base that the 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 the applicable withholding agent). In general, such effectively connected dividends will be subject to U.S. federal income tax on a net income basis at the regular tax rates applicable to U.S. persons. 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.

See also the sections below titled "—Backup Withholding and Information Reporting" and "—Foreign Accounts" for additional withholding rules that may apply to dividends paid to certain foreign financial institutions or non-financial foreign entities.

Disposition of Common Stock, Pre-Funded Warrants or Common Warrants

Subject to the discussions below under the sections titled "—Backup Withholding and Information Reporting" and "—Foreign Accounts," a Non-U.S. Holder generally will not be subject to U.S. federal income or withholding tax with respect to gain recognized on a sale or other disposition (other than a redemption treated as a distribution, which will be taxable as described above under "Distributions") of shares of Common Stock, Pre-Funded Warrants or Common Warrants unless:

- the gain is effectively connected with the Non-U.S. Holder's conduct of a trade or business in the United States, and if an applicable income tax treaty so provides, the gain is attributable to a permanent establishment or fixed base maintained by the Non-U.S. Holder in the United States; in these cases, the Non-U.S. Holder will be taxed on a net income basis at the regular tax rates and in the manner applicable to U.S. persons, and if the Non-U.S. Holder is a corporation, an additional branch profits tax at a rate of 30%, or a lower rate as may be specified by an applicable income tax treaty, may also apply;
- the Non-U.S. Holder is a nonresident alien present in the United States for 183 days or more in the taxable year of the disposition and certain other requirements are met, in which case the Non-U.S. Holder will be subject to a 30% tax (or such lower rate as may be specified by an applicable income tax treaty between the United States and such holder's country of residence) on the net gain derived from the disposition, which may be offset by certain U.S.-source capital losses of the Non-U.S. Holder, if any; or

- the Common Stock constitutes a U.S. real property interest because we are, or have been at any time during the five-year period preceding such disposition (or the Non-U.S. Holder's holding period of the Common Stock, Pre-Funded Warrants or Common Warrants, if shorter), a "U.S. real property holding corporation," unless the Common Stock is regularly traded on an established securities market, as defined by applicable Treasury Regulations, and the Non-U.S. Holder held no more than 5% of our outstanding Common Stock, directly or indirectly, during the shorter of the five-year period ending on the date of the disposition or the period that the Non-U.S. Holder held the Common Stock. Special rules may apply to the determination of the 5% threshold in the case of a holder of Pre-Funded Warrants or Common Warrants. Non-U.S. Holders are urged to consult their own tax advisors regarding the effect of holding Pre-Funded Warrants or Common Warrants on the calculation of such 5% threshold. Generally, a corporation is a "U.S. real property holding corporation" if the fair market value of its "U.S. real property interests" (as defined in the Code and applicable regulations) equals or exceeds 50% of the sum of the fair market value of its worldwide real property interests plus its other assets used or held for use in a trade or business. Although there can be no assurance, we believe that we are not currently, and we do not anticipate becoming, a "U.S. real property holding corporation" for U.S. federal income tax purposes. No assurance can be provided that the Common Stock will be regularly traded on an established securities market for purposes of the rules described above. Non-U.S. Holders are urged to consult their own tax advisors regarding the U.S. federal income tax considerations that could result if we are, or become a "U.S. real property holding corporation."

See the sections titled "—Backup Withholding and Information Reporting" and "—Foreign Accounts" for additional information regarding withholding rules that may apply to proceeds of a disposition of the Common Stock, Pre-Funded Warrants or Common Warrants paid to foreign financial institutions or non-financial foreign entities.

Backup Withholding and Information Reporting

We must report annually to the IRS and to each Non-U.S. Holder the gross amount of the distributions (including constructive distributions) on the Common Stock, pre-funded warrants or common warrants paid to such holder and the tax withheld, if any, with respect to such distributions. Non-U.S. Holders may have to comply with specific certification procedures to establish that the holder is not a U.S. person (as defined in the Code) in order to avoid backup withholding at the applicable rate, currently 24%, with respect to dividends (or constructive dividends) on the Common Stock, Pre-Funded Warrants or Common Warrants. Generally, a holder will comply with such procedures if it provides a properly executed IRS Form W-8BEN (or other applicable Form W-8) or otherwise meets documentary evidence requirements for establishing that it is a Non-U.S. Holder, or otherwise establishes an exemption. Dividends paid to Non-U.S. Holders subject to withholding of U.S. federal income tax, as described above under the heading "Distributions," will generally be exempt from U.S. backup withholding.

Information reporting and backup withholding generally will apply to the proceeds of a disposition of the Common Stock, pre-funded warrants or common warrants by a Non-U.S. Holder effected by or through the U.S. office of any broker, U.S. or foreign, unless the holder certifies its status as a Non-U.S. Holder and satisfies certain other requirements, or otherwise establishes an exemption. Generally, information reporting and backup withholding will not apply to a payment of disposition proceeds to a Non-U.S. Holder where the transaction is effected outside the United States through a non-U.S. office of a broker. However, for information reporting purposes, dispositions effected through a non-U.S. office of a broker with substantial U.S. ownership or

operations generally will be treated in a manner similar to dispositions effected through a U.S. office of a broker. Non-U.S. Holders should consult their own tax advisors regarding the application of the information reporting and backup withholding rules to them.

Copies of information returns may be made available to the tax authorities of the country in which the Non-U.S. Holder resides or is incorporated under the provisions of a specific treaty or agreement.

Backup withholding is not an additional tax. Any amounts withheld under the backup withholding rules from a payment to a Non-U.S. Holder can be refunded or credited against the Non-U.S. Holder's U.S. federal income tax liability, if any, provided that an appropriate claim is timely filed with the IRS.

Foreign Accounts

The Foreign Account Tax Compliance Act, or FATCA, generally imposes a 30% withholding tax on dividends (including constructive dividends) on the Common Stock, pre-funded warrants and common warrants if paid to a non-U.S. entity unless (i) if the non-U.S. entity is a "foreign financial institution," the non-U.S. entity undertakes certain due diligence, reporting, withholding, and certification obligations, (ii) if the non-U.S. entity is not a "foreign financial institution," the non-U.S. entity identifies certain of its U.S. investors, if any, or (iii) the non-U.S. entity is otherwise exempt under FATCA.

Withholding under FATCA generally will apply to payments of dividends (including constructive dividends) on the Common Stock, Pre-Funded Warrants and Common Warrants. While withholding under FATCA would have also applied to payments of gross proceeds from a sale or other disposition of the Common Stock, pre-funded warrants or common warrants, under proposed U.S. Treasury Regulations withholding on payments of gross proceeds is not required. Although such regulations are not final, applicable withholding agents may rely on the proposed regulations until final regulations are issued.

An intergovernmental agreement between the United States and an applicable foreign country may modify the requirements described in this section. Under certain circumstances, a holder may be eligible for refunds or credits of the tax. Holders should consult their own tax advisors regarding the possible implications of FATCA on their investment in the Common Stock, Pre-Funded Warrants or Common Warrants.

Federal Estate Tax

Common Stock owned or treated as owned by an individual who is not a citizen or resident of the United States (as specially defined for U.S. federal estate tax purposes) at the time of death will be included in the individual's gross estate for U.S. federal estate tax purposes and, therefore, may be subject to U.S. federal estate tax, unless an applicable estate tax or other treaty provides otherwise. The foregoing may also apply to common warrants and pre-funded warrants. A Non-U.S. Holder should consult his, her, or its own tax advisor regarding the U.S. federal estate tax consequences of the ownership or disposition of shares of the Common Stock, Pre-Funded Warrants and Common Warrants.

The preceding discussion of material U.S. federal tax considerations is for information only. It is not tax advice. Prospective investors should consult their own tax advisors regarding the particular U.S. federal, state, local and non-U.S. tax consequences of purchasing, holding and disposing of the Common Stock, Pre-Funded Warrants or Common Warrants, including the consequences of any proposed changes in applicable laws.

PLAN OF DISTRIBUTION

A.G.P./Alliance Global Partners has agreed to act as our sole Placement Agent in connection with this offering subject to the terms and conditions of the placement agency agreement dated [], 2024. The Placement Agent is not purchasing or selling any of the securities offered by this prospectus, nor is it required to arrange for the purchase and sale of any specific number or dollar amount of such securities, other than to use its reasonable "best efforts" to arrange for the sale of such securities by us. Therefore, we may not sell all of the securities being offered pursuant to this prospectus. The securities will be offered at a fixed price and are expected to be issued in a single closing. We will enter into a securities purchase agreement directly with certain investors, at the investor's option, who purchase our securities in this offering. Investors who do not enter into a securities purchase agreement shall rely solely on this prospectus in connection with the purchase of our securities in this offering.

We will deliver the securities being issued to the investors upon receipt of investor funds for the purchase of the securities offered pursuant to this prospectus. We expect to deliver the securities being offered pursuant to this prospectus on or about [] , 2024.

Fees and Expenses

We have agreed to pay the Placement Agent an aggregate fee equal to 7.0% of the purchase price paid by all purchasers in this offering. In addition, we have agreed to reimburse the Placement Agent for its legal fees in an amount up to \$85,000 and non-accountable expenses of up to \$15,000.

We estimate the total expenses of this offering paid or payable by us, exclusive of the placement agent fee and reimbursements, will be approximately \$250,000. After deducting the fees due to the Placement Agent and our estimated expenses in connection with this offering, we expect the net proceeds from this offering will be approximately \$8.95 million (based on an assumed combined public offering price per share of Common Stock and accompanying Common Warrant of \$1.30, which was the last reported sales price of the Common Stock on the NYSE American on December 9, 2024).

The following table shows the per share and total cash fees we will pay to the Placement Agent in connection with the sale of the securities pursuant to this prospectus.

	Per Share of Common Stock and Accompanying Common Warrant	Per Pre-Funded Warrant and Accompanying Common Warrant	Total
Public offering price ⁽¹⁾	\$	\$	\$
Placement agent fees	\$	\$	\$
Proceeds before expenses to us ⁽²⁾	\$	\$	\$

(1) The assumed combined public offering price is \$1.300 per share of Common Stock and accompanying Common Warrant and \$1.299 per Pre-Funded Warrant and accompanying Common Warrant.

(2) Does not include proceeds from the exercise of the Pre-Funded Warrants or Common Warrants in cash, if any.

Indemnification

We have agreed to indemnify the Placement Agent and specified other persons against specified liabilities, including liabilities under the Securities Act, and to contribute to payments the Placement Agent may be required to make in respect thereof.

Lock-Up Agreements

Our directors and officers have entered into lock-up agreements. Under these agreements, these individuals agreed, subject to specified exceptions, not to sell or transfer any shares of Common Stock or securities convertible into, or exchangeable or exercisable for, Common Stock during a period ending 90 days after the completion of this offering, without first obtaining the written consent of the Placement Agent. Specifically, these individuals agreed, in part, subject to certain exceptions, not to:

- offer for sale, sell, pledge, or otherwise transfer or dispose of (or enter into any transaction or device that is designed to, or could be expected to, result in the transfer or disposition by any person at any time in the future of) any shares of Common Stock or securities convertible into or exercisable or exchangeable for Common Stock;
- enter into any swap or other derivatives transaction that transfers to another, in whole or in part, any of the economic benefits or risks of ownership of shares of Common Stock; or
- make any demand for or exercise any right or cause to be filed a registration statement, including any amendments thereto, with respect to the registration of any of our securities.

No Sales of Similar Securities

We have agreed, subject to certain exceptions, not to issue, enter into any agreement to issue or announce the issuance or proposed issuance of, any shares of Common Stock (or securities convertible into or exercisable for Common Stock) or, subject to certain exceptions, file any registration statement, including any amendments or supplements thereto (other than the registration statement or amendment to the registration statement relating to the securities offered hereunder and a registration statement on Form S-8), until 60 days after the completion of this offering. We have also agreed not to enter into or issue any shares under a variable rate transaction (as defined in the securities purchase agreement) for six months after the completion of this offering, except that after the forty-five (45) day anniversary of the closing of this offering we may offer shares of Common Stock pursuant to the Amended and Restated Sales Agreement dated May 2, 2024 between the Company and the Placement Agent.

Regulation M

The Placement Agent may be deemed to be an underwriter within the meaning of Section 2(a)(11) of the Securities Act, and any commissions received by it and any profit realized on the resale of the shares sold by it while acting as principal might be deemed to be underwriting discounts or commissions under the Securities Act. As an underwriter, the Placement Agent would be required to comply with the requirements of the Securities Act and the Exchange Act, including, without limitation, Rule 415(a)(4) under the Securities Act and Rule 10b-5 and Regulation M under the Exchange Act. These rules and regulations may limit the timing of purchases and sales of shares by the Placement Agent acting as principal. Under these rules and regulations, the placement agents:

- may not engage in any stabilization activity in connection with our securities; and
- may not bid for or purchase any of our securities or attempt to induce any person to purchase any of our securities, other than as permitted under the Exchange Act, until it has completed its participation in the distribution.

Discretionary Accounts

The Placement Agent does not intend to confirm sales of the securities offered hereby to any accounts over which it has discretionary authority.

Other Activities and Relationships

The Placement Agent and certain of its affiliates are full service financial institutions engaged in various activities, which may include securities trading, commercial and investment banking, financial advisory, investment management, investment research, principal investment, hedging, financing and brokerage activities. The Placement Agent and certain of its affiliates have, from time to time, performed, and may in the future perform, various commercial and investment banking and financial advisory services for us and our affiliates, for which they received or will receive customary fees and expenses. For example, A.G.P./Alliance Global Partners was the placement agent for our public offering that was consummated on September 27, 2024 and received a fee of 7% of the gross proceeds of such offering plus an expense reimbursement of \$100,000 and is the sales agent under an Amended and Restated Sales Agreement, dated May 2, 2024, with us. Under the Amended and Restated Sales Agreement, we may offer and sell, from time to time, shares of Common Stock through A.G.P./Alliance Global Partners in an "at the market offering" as defined in Rule 415(a)(4) under the Securities Act.

In the ordinary course of its various business activities, the Placement Agent and certain of its affiliates may make or hold a broad array of investments and actively trade debt and equity securities (or related derivative securities) and financial instruments (including bank loans) for its own account and for the accounts of its customers, and such investment and securities activities may involve securities and/or instruments issued by us and our affiliates. If the Placement Agent or its affiliates have a lending relationship with us, they routinely hedge their credit exposure to us consistent with their customary risk management policies. The Placement Agent and its affiliates may hedge such exposure by entering into transactions that consist of either the purchase of credit default swaps or the creation of short positions in our securities or the securities of our affiliates, including potentially the Common Stock offered hereby. Any such short positions could adversely affect future trading prices of the Common Stock offered hereby. The Placement Agent and certain of its affiliates may also communicate independent investment recommendations, market color or trading ideas and/or publish or express independent research views in respect of such securities or instruments and may at any time hold, or recommend to clients that they acquire, long and/or short positions in such securities and instruments.

LEGAL MATTERS

Blank Rome LLP, New York, New York will pass upon certain legal matters relating to the sale of the Common Warrants and Pre-Funded Warrants, offered hereby on our behalf and Parsons Behle & Latimer, Reno, Nevada will pass on certain legal matters related to the issuance of the Common Stock, Common Warrants and Pre-Funded Warrants offered hereby on our behalf. Additional legal matters may be passed upon for us or any underwriters, dealers, of agents, by counsel that we will name in the applicable prospectus supplement.

Thompson Hine LLP, New York, New York, is acting as counsel to the Placement Agent in connection with certain legal matters related to this offering.

As of the date of this prospectus, an attorney of Blank Rome LLP beneficially owns securities exercisable to purchase shares of the Common Stock that represent less than 1% of our outstanding shares of Common Stock.

EXPERTS

The consolidated financial statements of Theriva Biologics, Inc. as of December 31, 2023 and 2022 and for each of the two years in the period ended December 31, 2023 incorporated by reference in this prospectus and in the registration statement have been so incorporated in reliance on the report of BDO USA, P.C., an independent registered public accounting firm, given on the authority of said firm as experts in auditing and accounting. The report on the consolidated financial statements contains an explanatory paragraph regarding the Company's ability to continue as a going concern.

WHERE YOU CAN FIND ADDITIONAL INFORMATION

We have filed with the SEC a registration statement under the Securities Act for the securities offered by this prospectus. This prospectus, which constitutes a part of the registration statement, does not contain all of the information set forth in the registration statement or the exhibits and schedules filed therewith. For further information about us and the securities offered hereby, we refer you to the registration statement and the exhibits and schedules filed thereto. Any statements made in this prospectus concerning legal documents are not necessarily complete and you should read the documents that are filed as exhibits to the registration statement or otherwise filed with the SEC for a more complete understanding of the document or matter.

We file annual, quarterly and current reports, proxy statements and other information with the SEC. Our SEC filings are available to the public at the SEC's website at www.sec.gov. We are subject to the information and periodic reporting requirements of the Exchange Act, and we file periodic reports, proxy statements and other information with the SEC. These periodic reports, proxy statements and other information are available at the website of the SEC referred to above. We maintain a website at <https://ir.therivabiologics.com/sec-filings>. You may access our Annual Reports on Form 10-K, Quarterly Reports on Form 10-Q, Current Reports on Form 8-K and amendments to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Exchange Act with the SEC free of charge at our website as soon as reasonably practicable after such material is electronically filed with, or furnished to, the SEC. The information contained in, or that can be accessed through, our website is not incorporated by reference in, and is not part of, 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 (Commission File No. 001-12584):

- [Our Annual Report on Form 10-K for the fiscal year ended December 31, 2023 filed with the SEC on March 25, 2024](#);
- Our [Quarterly Report on Form 10-Q for the quarter ended March 31, 2024](#) filed with the SEC on May 7, 2024, our [Quarterly Report on Form 10-Q for the quarter ended June 30, 2024](#) filed with the SEC on August 13, 2024, and our [Quarterly Report on Form 10-Q for the quarter ended September 30, 2024](#) filed with the SEC on November 12, 2024;
- Our Current Reports on Form 8-K filed with the SEC on [February 7, 2024, April 22, 2024](#) (other than as set forth therein), [April 23, 2024](#) (other than as set forth therein), [May 2, 2024, May 16, 2024, May 23, 2024](#) (other than as set forth therein), [July 31, 2024](#) (other than as set forth therein), [August 16, 2024, August 26, 2024, September 9, 2024, September 16, 2024](#) (other than as set forth therein), [September 23, 2024](#) (other than as set forth therein), [September 30, 2024, October 3, 2024](#) (other than as set forth therein), [October 16, 2024](#) (other than as set forth therein), [November 1, 2024](#); and [December 5, 2024](#) (other than as set forth therein).
- Our [Preliminary Proxy Statement on Schedule 14A](#) filed with the SEC on September 18, 2024; and
- The description of the Common Stock set forth in (i) our registration statements on [Form 8-A12B](#), filed with the SEC on June 20, 2007 (File No. 001-12584) and (ii) [Exhibit 4.3](#)—Description of Securities to our Annual Report on Form 10-K for the fiscal year ended December 31, 2023.

We also incorporate by reference any future filings (other than current reports furnished under Item 2.02 or Item 7.01 of Form 8-K and exhibits filed on such form that are related to such items unless such Form 8-K expressly provides to the contrary) made with the SEC pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act, including those made (i) on or after the date of the initial filing of the registration statement of which this prospectus forms a part and prior to effectiveness of such registration statement, and (ii) on or after the date of this prospectus but prior to the termination of the offering (i.e., until the earlier of the date on which all of the securities registered hereunder have been sold or the registration statement of which this prospectus forms a part has been withdrawn). Information in such future filings updates and supplements the information provided in this prospectus. Any statements in any such future filings will automatically be deemed to modify and supersede any information in any document we previously filed with the SEC that is incorporated or deemed to be incorporated herein by reference to the extent that statements in the later filed document modify or replace such earlier

We will furnish without charge to each person, including any beneficial owner, to whom a prospectus is delivered, upon written or oral request, a copy of any or all of the documents incorporated by reference into this prospectus but not delivered with the prospectus, including exhibits that are specifically incorporated by reference into such documents. You should direct any requests for documents to:

Theriva Biologics, Inc.
9605 Medical Center Drive, Suite 270
Rockville, Maryland 20850
Telephone: (301) 417-4364
Attention: Corporate Secretary

You may also access these documents, free of charge, on the SEC's website at www.sec.gov or on our website at <https://ir.therivabio.com/sec-filings>. The information contained in, or that can be accessed through, our website is not incorporated by reference in, and is not part of, this prospectus or any accompanying prospectus supplement.

In accordance with Rule 412 of the Securities Act, any statement contained in a document incorporated by reference herein shall be deemed modified or superseded to the extent that a statement contained herein or in any other subsequently filed document which also is or is deemed to be incorporated by reference herein modifies or supersedes such statement.

You should rely only on information contained in, or incorporated by reference into, this prospectus and any prospectus supplement. We have not authorized anyone to provide you with information different from that contained in this prospectus or incorporated by reference into this prospectus. We are not making offers to sell the securities in any jurisdiction in which such an offer or solicitation is not authorized or in which the person making such offer or solicitation is not qualified to do so or to anyone to whom it is unlawful to make such an offer or solicitation.



**Up to 7,692,307 Shares of Common Stock
Up to 7,692,307 Common Warrants to Purchase Up to 7,692,307 Shares of Common Stock
Up to 7,692,307 Pre-Funded Warrants to Purchase Up to 7,692,307 Shares of Common Stock
Up to 15,384,614 Shares of Common Stock Underlying the Common Warrants and Pre-Funded Warrants**

PROSPECTUS

Sole Placement Agent

A.G.P.

, 2024

PART II

INFORMATION NOT REQUIRED IN PROSPECTUS

Item 13. Other Expenses of Issuance and Distribution

The following table sets forth all expenses to be paid by the registrant, other than any estimated placement agent fee and reimbursements, in connection with the offering and sale of the shares of Common Stock being registered. All amounts shown are estimates except for the SEC registration fee.

	Amount
SEC registration fee	\$ 3,062
FINRA filing fee	3,500
Accounting fees and expenses	30,000
Legal fees and expenses	175,000
Other miscellaneous expenses	38,438
Total expenses	<u><u>\$ 250,000</u></u>

Item 14. Indemnification of Directors and Officers

Section 78.138 of the Nevada Revised Statute provides that, subject to certain exceptions, a director or officer is not individually liable to the corporation or its stockholders or creditors for any damages as a result of any act or failure to act in his capacity as a director or officer unless the presumption that the director or officer acted in good faith, on an informed basis and with a view to the interest of the corporation is rebutted and it is proven that (1) his act or failure to act constituted a breach of his fiduciary duties as a director or officer and (2) his breach of those duties involved intentional misconduct, fraud or a knowing violation of law.

This provision is intended to afford directors and officers protection against and to limit their potential liability for monetary damages resulting from suits

alleging a breach of the duty of care by a director or officer. As a consequence of this provision, stockholders of our company will be unable to recover monetary damages against directors or officers for action taken by them that may constitute negligence or gross negligence in performance of their duties unless such conduct falls within one of the foregoing exceptions. The provision, however, does not alter the applicable standards governing a director's or officer's fiduciary duty and does not eliminate or limit the right of our company or any stockholder to obtain an injunction or any other type of non-monetary relief in the event of a breach of fiduciary duty.

The Registrant's Articles of Incorporation, as amended, and second amended and restated bylaws provide for indemnification of directors, officers, employees or agents of the Registrant to the fullest extent permitted by Nevada law (as amended from time to time). Section 78.7502 of the Nevada Revised Statute provides that a corporation may indemnify any person who was or is a party or is threatened to be made a party to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative, except an action by or in the right of the corporation, by reason of the fact that the person is or was a director, officer, employee or agent of the corporation, or is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise or as a manager of a limited-liability company, against expenses, including attorneys' fees, judgments, fines and amounts paid in settlement actually and reasonably incurred by the person in connection with the action, suit or proceeding if the person is not liable as provided above and acted in good faith and in a manner he or she reasonably believed to be in, or not opposed to, the best interest of a company and, with respect to any criminal action or proceeding, had no reasonable cause to believe his conduct was unlawful.

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The registrant has entered into separate indemnification agreements with each of the registrant's directors and certain of the registrant's officers which require the registrant, among other things, to indemnify them against certain liabilities which may arise by reason of their status as directors or officers.

The Registrant has an insurance policy in place that covers its officers and directors with respect to certain liabilities, including liabilities arising under the Securities Act or otherwise.

Any underwriting agreement, agency agreement, equity distribution agreement or similar agreement that the Registrant may enter into will likely provide for indemnification by any underwriters or agents of the Registrant, its directors, its officers who sign the registration statement and the Registrant's controlling persons for some liabilities, including liabilities arising under the Securities Act.

Item 15. Recent Sales of Unregistered Securities

During the last three years, we have issued unregistered securities to the persons described below. None of these transactions involved any underwriters, underwriting discounts or commissions, or any public offering. We believe that each transaction was exempt from the registration requirements of the Securities Act by virtue of Section 4(a)(2) thereof and Regulation S thereof or Rule 506(b) of Regulation D thereunder as a transaction not involving a public offering other than exchanges of securities that were exempt from the registration requirements of the Securities Act by virtue of Section 3(a)(9). The recipients both had access, through their relationship with us, to information about us.

On March 10, 2022, we acquired all the outstanding shares of VCN Biosciences, S.L., a corporation organized under the laws of Spain ("VCN"). As consideration for the purchase we paid \$4,700,000 (the "Closing Cash Consideration") to Grifols Innovation and New Technologies Limited ("Grifols"), the owner of approximately 86% of the equity of VCN, and issued to the remaining sellers and certain key employees and consultants of VCN 1,055,812 shares of Common Stock.

On July 29, 2022, we closed a private placement offering pursuant to the terms of a Securities Purchase Agreement (the "Purchase Agreement") dated as of July 28, 2022 entered into with MSD Credit Opportunity Master Fund, L.P. (the "Investor"), pursuant to which we issued and sold 275,000 shares of the Company's Series C Convertible Preferred Stock, par value \$0.001 per share (the "Series C Preferred Stock"), and 100,000 shares of the Company's Series D Convertible Preferred Stock, par value \$0.001 per share (the "Series D Preferred Stock," and together with the Series C Preferred Stock, the "Preferred Stock"), at an offering price of \$8.00 per share, for gross proceeds of approximately \$3.0 million in the aggregate, before the deduction of discounts, fees and offering expenses, all of which have been converted as of this date (as set forth below).

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In May 2024, July 2024 and September 2024, we issued 72,132 shares of Common Stock upon the conversion effected on such dates by the holder of 275,000 shares of the Company's Series C Preferred Stock at a conversion price of \$30.50 per share.

In September 2024, we issued 26,230 shares of Common Stock upon the conversion effected on such date by the holder of 100,000 shares of the Company's Series D Preferred Stock at a conversion price of \$30.50 per share.

Item 16. Exhibits and Financial Statement Schedules

The exhibits to this registration statement are listed in the Exhibit Index to this registration statement, which immediately precedes the Signature Page and which Exhibit Index is hereby incorporated by reference.

Item 17. Undertakings

The undersigned registrant hereby undertakes:

- (1) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:
 - i. To include any prospectus required by Section 10(a)(3) of the Securities Act of 1933, as amended, or the Securities Act;
 - ii. To reflect in the prospectus any facts or events arising after the effective date of the registration statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information set forth in the registration statement. Notwithstanding the foregoing, any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the SEC pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than a 20% change in the maximum aggregate offering price set forth in the "Calculation of Registration Fee" table in the effective registration statement; and
 - iii. To include any material information with respect to the plan of distribution not previously disclosed in the registration statement or any material change to such information in the registration statement;

provided, however, that paragraphs (i), (ii) and (iii) above do not apply if the information required to be included in a post-effective amendment by those paragraphs is contained in periodic reports filed with or furnished to the SEC by the registrant pursuant to Section 13 or Section 15(d) of the Securities Exchange Act of 1934, as amended, or the Exchange Act, that are incorporated by reference in the registration statement, or is contained in a form of prospectus filed pursuant to Rule 424(b) that is a part of the registration statement.

- (2) That, for the purpose of determining any liability under the Securities Act, each such post-effective amendment 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.
- (3) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.
- (4) That, for the purpose of determining liability under the Securities Act of 1933 to any purchaser, each prospectus filed pursuant to Rule 424(b) as part of a registration statement relating to an offering, other than registration statements relying on Rule 430B or other than prospectuses filed in reliance on Rule 430A, shall be deemed to be part of and included in the registration statement as of the date it is first used after effectiveness. Provided, however, that no statement made in a registration statement or prospectus that is part of the registration statement or made in a document incorporated or deemed incorporated by reference into the registration statement or prospectus that is part of the registration statement will, as to a purchaser with a time of contract of sale prior to such first use, supersede or modify any statement that was made in the registration statement or prospectus that was part of the registration statement or made in any such document immediately prior to such date of first use.
- (5) That, for the purpose of determining liability under the Securities Act of 1933 to any purchaser in the initial distribution of the securities: the undersigned registrant undertakes that in a primary offering of securities of the undersigned registrant pursuant to this registration statement, regardless of the underwriting method used to sell the securities to the purchaser, if the securities are offered or sold to such purchaser by means of any of the following communications, the undersigned registrant will be a seller to the purchaser and will be considered to offer or sell such securities to such purchaser: (i) any preliminary prospectus or prospectus of the undersigned registrant relating to the offering required to be filed pursuant to Rule 424; (ii) any free writing prospectus relating to the offering prepared by or on behalf of the undersigned registrant or used or referred to by the undersigned registrant; (iii) the portion of any other free writing prospectus relating to the offering containing material information about the undersigned registrant or its securities provided by or on behalf of the undersigned registrant; and (iv) any other communication that is an offer in the offering made by the undersigned registrant to the purchaser.

- (6) That, for purposes of determining any liability under the Securities Act, each filing of the registrant's annual report pursuant to Section 13(a) or Section 15(d) of the Exchange Act (and, where applicable, each filing of an employee benefit plan's annual report pursuant to Section 15(d) of the Exchange Act) that is incorporated by reference in the registration statement 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.
- (7) Insofar as indemnification 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.

EXHIBIT INDEX

The following is a list of exhibits filed as a part of this registration statement:

The exhibits listed in the accompanying Exhibit Index are filed or incorporated by reference as part of this registration statement.

Exhibit No.	Description
1.1	Amended and Restated At Market Issuance Sales Agreement by and among Theriva Biologics, Inc., B. Riley Securities, Inc. and A.G.P./Alliance Global Partners, dated February 9, 2021 (Incorporated by reference to Exhibit 1.1 of the Registrant's Current Report on Form 8-K filed February 10, 2021, File No. 001-12584.)
1.2	Amendment No. 1, dated May 3, 2021, to the Amended and Restated At Market Issuance Sales Agreement by and among Theriva Biologics, Inc., B. Riley Securities, Inc. and A.G.P./Alliance Global Partners, dated February 9, 2021 ((Incorporated by reference to Exhibit 1.2 of the Registrant's Current Report on Form 8-K filed May 3, 2021)
1.3	Amendment No. 2, dated May 2, 2024, to the Amended and Restated At Market Issuance Sales Agreement by and among Theriva Biologics, Inc., and A.G.P./Alliance Global Partners, dated February 9, 2021 (Incorporated by reference to Exhibit 10.3 of the Registrant's Current Report on Form 8-K filed May 2, 2024)
1.4^	Form of Placement Agency Agreement
2.1	Share Purchase Agreement by and among Theriva Biologics, Inc., VCN Biosciences, S.L. and the shareholders of VCN Biosciences, S.L. dated December 14, 2021 (Incorporated by reference to Exhibit 2.1 of the Registrant's Current Report on Form 8-K filed December 14, 2021, File No. 001-12584.)

2.2 [Amendment, dated March 9, 2022, to the Share Purchase Agreement, by and among Theriva Biologics, Inc., VCN Biosciences, S.L. and the shareholders of VCN Biosciences, S.L., dated December 14, 2021 \(Incorporated by reference to Exhibit 2.2 of the Registrant's Current Report on Form 8-K filed March 11, 2022, File No. 001-12584.\)](#)

3.1 [Certificate of Incorporation, as amended \(Incorporated by reference to \(i\) Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed October 16, 2008, File No. 001-12584, \(ii\) Exhibit 3.1 of the Registrant's Quarterly Report on Form 10-Q for the quarterly period ended June 30, 2001 filed August 14, 2001, File No. 001-12584; and \(iii\) Exhibits 3.1, 4.1 and 4.2 of the Registrant's Quarterly Report on Form 10-Q for the quarterly period ended June 30, 1998 filed August 14, 1998, File No. 001-12584.\)](#)

3.2 [Articles of Merger \(Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed October 19, 2009, File No. 001-12584.\)](#)

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3.3 [Certificate of Merger filed with the Secretary of State of Delaware \(Incorporated by reference to Exhibit 3.2 of the Registrant's Current Report on Form 8-K filed October 19, 2009, File No. 001-12584.\)](#)

3.4 [Articles of Incorporation filed with the Nevada Secretary of State \(Incorporated by reference to Exhibit 3.3 of the Registrant's Current Report on Form 8-K filed October 19, 2009, File No. 001-12584.\)](#)

3.5 [Certificate of Amendment to Articles of Incorporation \(Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed February 16, 2012, File No. 001-12584.\)](#)

3.6 [Certificate of Amendment to Certificate of Incorporation. \(Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed May 18, 2015, File No. 001-12584.\)](#)

3.7 [Certificate of Amendment to Certificate of Incorporation. \(Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed September 8, 2017, File No. 001-12584.\)](#)

3.8 [Certificate of Designations for Series A Preferred Stock to Certificate of Incorporation \(Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed September 12, 2017, File No. 001-12584.\)](#)

3.9 [Certificate of Change Pursuant to NRS 78. 209 \(Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed August 13, 2018, File No. 001-12584.\)](#)

3.10 [Certificate of Amendment to Articles of Incorporation \(Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed September 26, 2018, File No. 001-12584.\)](#)

3.11 [Certificate of Designations for Series B Preferred Stock to Certificate of Incorporation \(Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed October 15, 2018, File No. 001-12584.\)](#)

3.12 [Certificate of Amendment to Certificate of Designations for Series B Preferred Stock to Certificate of Incorporation \(Incorporated by reference to Exhibit 3.2 of the Registrant's Current Report on Form 8-K filed October 15, 2018, File No. 001-12584.\)](#)

3.13 [Certificate of Amendment to the Certificate of Designation for the Series A Convertible Preferred Stock \(Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K/A filed on February 1, 2021 File No. 001-12584.\)](#)

3.14 [Certificate of Change filed with the Secretary of State of the State of Nevada on July 21, 2022 \(effective as of July 25, 2022\) \(Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed on July 25, 2022 \(File No. 001-12584.\)](#)

3.15 [Form of Certificate of Designation of Series C Convertible Preferred Stock \(Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed on July 29, 2022 \(File No. 001-12584.\)](#)

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3.16 [Form of Certificate of Designation of Series D Convertible Preferred Stock \(Incorporated by reference to Exhibit 3.2 of the Registrant's Current Report on Form 8-K filed on July 29, 2022 \(File No. 001-12584.\)](#)

3.17 [Certificate of Amendment to Articles of Incorporation \(Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed on October 12, 2022 \(File No. 001-12584.\)](#)

3.18 [Certificate of Change to Articles of Incorporation \(Incorporated by reference to Exhibit 3.2 of the Registrant's Current Report on Form 8-K filed on October 12, 2022 \(File No. 001-12584.\)](#)

3.19 [Certificate of Change filed with the Secretary of State of the State of Nevada on August 22, 2024 \(effective as of August 26, 2024\) \(Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed August 26, 2024, File No. 001-12584.\)](#)

3.20 [Second Amended and Restated Bylaws \(Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed August 11, 2023, File No. 001-12584.\)](#)

3.21 [Certificate of Change to the Articles of Incorporation \(Incorporated by reference to Exhibit 3.1 of the Registrant's Current Report on Form 8-K filed November 1, 2024, File No. 001-12584.\)](#)

4.1 [Specimen Stock Certificate \(Incorporated by reference to Exhibit 4.1 to the Registrant's Registration Statement on Form S-3 filed on July 3, 2013, File No. 333-189794.\)](#)

4.2 [Form of Warrant issued December 26, 2017 to InSite Communications \(Incorporated by reference to Exhibit 4.1 of the Registrant's Current Report on Form 10-Q filed May 8, 2018, File No. 001-12584.\)](#)

4.3 [Form of Common Warrant \(Incorporated by reference to Exhibit 4.1 of the Registrant's Current Report on Form 8-K filed September 30, 2024, File No. 001-12584.\)](#)

4.4 [Form of Pre-Funded Warrant \(Incorporated by reference to Exhibit 4.2 of the Registrant's Current Report on Form 8-K filed September 30, 2024, File No. 001-12584.\)](#)

4.5^ [Form of Common Warrant](#)

4.6^ [Form of Pre-Funded Warrant](#)

5.1(a)^ [Opinion of Parsons Behle & Latimer](#)

5.1(b)^ [Opinion of Blank Rome LLP](#)

10.1* [2007 Stock Incentive Plan \(Incorporated by reference to Exhibit 4.2 of the Registrant's Registration Statement on Form S-8 filed January 18, 2008, File No. 333-148764.\)](#)

10.3* [2010 Stock Incentive Plan \(Incorporated by reference to Exhibit 4.1 of the Registrant's Registration Statement on Form S-8 filed November 29, 2010, File No. 333-170858.\)](#)

10.4 [Asset Purchase Agreement dated November 8, 2012 between Theriva Biologics, Inc. and Prev ABR LLC \(Incorporated by reference to Exhibit 10.4 of the Registrant's Annual Report on Form 10-K filed on March 16, 2022, File No. 001-12584\)](#)

10.5+ [Patent License Agreement dated December 19, 2012 between Theriva Biologics, Inc. and The University of Texas at Austin \(Incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K filed December 21, 2012, File No. 001-12584.\)](#)

10.6* [Amended and Restated 2010 Stock Incentive Plan \(Incorporated by reference to Exhibit 4.1 to the Registrant's Registration Statement on Form S-8 filed on November 15, 2013, File No. 333-192355.\)](#)

10.7* [Amended and Restated 2010 Stock Incentive Plan. \(Incorporated by reference to Exhibit B to the Definitive Proxy Statement filed on April 13, 2015, File No. 001-12584.\)](#)

10.8 [Lease dated April 14, 2015 between Registrant, and MCC3, LLC \(Incorporated by reference to Exhibit 10.8 to the Registrant's Annual Report on Form 10-K filed on March 25, 2024, File No. 001-12584.\)](#)

10.9* [Theriva Biologics, Inc. 2010 Stock Incentive Plan, as amended and restated on May 15, 2015. \(Incorporated by reference to Exhibit 4.1 to the Registrant's Registration Statement on Form S-8 filed on August 10, 2015, File No. 333-206268.\)](#)

10.10* [Form of Stock Option Agreement. \(Incorporated by reference to Exhibit 10.2 of the Registrant's Current Report on Form 8-K filed December 10, 2015, File No. 001-12584.\)](#)

10.11* [Theriva Biologics, Inc. 2010 Stock Incentive Plan, as amended and restated on May 31, 2016. \(Incorporated by reference to Exhibit 4.1 to the Registrant's Registration Statement on Form S-8 filed on August 31, 2016, File No. 333-206268.\)](#)

10.12* [Amended and Restated 2010 Stock Incentive Plan \(Incorporated by reference to Exhibit 4.1 to the Registrant's Registration Statement on Form S-8 filed on September 8, 2017, File No. 333-220401.\)](#)

10.13* [Theriva Biologics, Inc. 2010 Stock Incentive Plan, as amended \(incorporated by reference to Appendix A to the Definitive Proxy Statement filed with the Securities and Exchange Commission on July 15, 2019, File No. 001-12584\)](#)

10.14+ [Clinical Trial Agreement between Washington University School of Medicine in St. Louis and Theriva Biologics, Inc. dated August 7, 2019 \(Incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K filed on August 8, 2019, File No. 001-12584\)](#)

10.15* [Theriva Biologics, Inc. 2020 Stock Incentive Plan \(Incorporated by reference to Appendix A to the Registrant's Definitive Proxy Statement on Schedule 14A filed on August 4, 2020, File No. 001-12584\)](#)

10.16* [Form of Incentive Stock Option Grant Agreement \(Incorporated by reference to Exhibit 4.11 to the Registration Statement on Form S-8 filed on October 28, 2020, File No. 333-249712\)](#)

10.17* [Form of Nonqualified Stock Option Grant Agreement \(Incorporated by reference to Exhibit 4.12 to the Registration Statement on Form S-8 filed on October 28, 2020, File No. 333-249712\)](#)

10.18* [Form of Restricted Stock Unit Award Agreement \(Incorporated by reference to Exhibit 4.13 to the Registration Statement on Form S-8 filed on October 28, 2020, File No. 333-249712\)](#)

10.19+ [Second Amendment to Lease dated May 6, 2021 by and between Registrant and ARE-Maryland No. 50, LLC \(Incorporated by reference to Exhibit 10.19 of the Registrant's Annual Report on Form 10-K filed on March 25, 2024, File No. 001-12584\)](#)

10.20* [Employment Agreement with Steven Shallcross dated January 3, 2022 \(Incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K filed on January 4, 2022, File No. 001-12584\)](#)

10.21+ [Contract to Grant Marketing License for Catalan Institute of Oncology Patent Ownership Application to VCN Biosciences S.L. \(Incorporated by reference to Exhibit 10.32 of the Registrant's Annual Report on Form 10-K filed on March 16, 2022, File No. 001-12584\)](#)

10.22+ [License Agreement between Bellvitge Biomedical Research Institute Foundation \(Idibell\) and VCN Biosciences S.L. dated May 4, 2016 \(Incorporated by reference to Exhibit 10.33 of the Registrant's Annual Report on Form 10-K filed on March 16, 2022, File No. 001-12584\)](#)

10.23+ [Technology Transfer Agreement between Bellvitge Biomedical Research Institute and VCN Biosciences S.L. dated August 31, 2010 \(Incorporated by reference to Exhibit 10.34 of the Registrant's Annual Report on Form 10-K filed on March 16, 2022, File No. 001-12584\)](#)

10.24+ [Collaboration Agreement to Conduct a Clinical Trial and Grant Operating License Agreement between Hospital Sant Joan Deu and VCN Biosciences, S.L dated February 15, 2016 \(Incorporated by reference to Exhibit 10.35 of the Registrant's Annual Report on Form 10-K filed on March 16, 2022, File No. 001-12584\)](#)

10.25* [Employment Agreement with Frank Tufaro dated March 22, 2022 \(Incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K filed on March 23, 2022, File No. 001-12584\)](#)

10.26* [Employment Agreement with Mary Ann Shallcross dated April 8, 2022 \(Incorporated by reference to Exhibit 10.26 of the Registrant's Annual Report on Form 10-K filed on March 25, 2024, File No. 001-12584\)](#)

10.27	Securities Purchase Agreement between Synthetic Biologics Inc. and MSD Credit Opportunity Master Fund, L.P., dated as of July 28, 2022 (Incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K filed on July 29, 2022, File No. 001-12584)
10.28	Amendment No. 1 dated as of August 9, 2022 to Securities Purchase Agreement between Synthetic Biologics Inc. and MSD Credit Opportunity Master Fund, L.P., dated as of July 28, 2022 (Incorporated by reference to Exhibit 10.2 of the Registrant's Quarterly Report on Form 10-Q filed on August 11, 2022, File No. 001-12584)
10.29*	Amendment No. 1 to Employment Agreement between Theriva Biologics, Inc. and Steven A. Shallcross, dated as of December 15, 2022 (Incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K filed on December 20, 2022, File No. 001-12584)
10.30*	Amendment No. 1 to Employment Agreement between Theriva Biologics, Inc. and Francis Tufaro, dated as of December 15, 2022 (Incorporated by reference to Exhibit 10.2 of the Registrant's Current Report on Form 8-K filed on December 20, 2022, File No. 001-12584)
10.31	Form of Share Repurchase Agreement between Theriva Biologics, Inc. and certain selling stockholders (Incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K filed on December 23, 2022, File No. 001-12584)
10.32*	Separation Agreement, dated as of May 8, 2023, between Theriva Biologics, Inc. and Frank Tufaro (Incorporated by reference to Exhibit 10.1 of the Registrant's Quarterly Report on Form 10-Q filed on May 11, 2023, File No. 001-12584)
10.33*	Consulting Agreement, dated as of May 8, 2023, between Theriva Biologics, Inc. and Frank Tufaro (Incorporated by reference to Exhibit 10.2 of the Registrant's Quarterly Report on Form 10-Q filed on May 11, 2023, File No. 001-12584)
10.34	Amendment No. 2 to the Theriva Biologics, Inc. 2020 Stock Incentive Plan (Incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K filed November 1, 2024, File No. 001-12584)
10.35	Form of Securities Purchase Agreement (Incorporated by reference to Exhibit 10.1 of the Registrant's Current Report on Form 8-K Filed September 30, 2024, File No. 001-12584)
10.36^	Form of Securities Purchase Agreement
21.1	List of Subsidiaries (Incorporated by reference to Exhibit 21.1 of the Registrant's Annual Report on Form 10-K filed on March 25, 2024, File No. 001-12584)
23.1^	Consent of BDO USA, P.C., Independent Registered Public Accounting Firm
23.2^	Consent of Parsons Behle & Latimer (included in Exhibit 5.1(a))
23.3^	Consent of Blank Rome LLP (included in Exhibit 5.1(b))
24.1^	Power of Attorney (included in signature page hereto)
107^	Filing Fee Table

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[^] Filed herewith.

- * Management contract or compensatory plan or arrangement required to be identified pursuant to Item 15(a)(3) of this report.
- + The Company submitted certain portions of these agreements in accordance with Item 601 (b)(10) of Regulation S-K. The Company agrees to furnish unredacted copies of these exhibits to the SEC upon request.

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SIGNATURES

Pursuant to the requirements of the Securities Exchange Act of 1934, the registrant has duly caused this Registration Statement to be signed on its behalf by the undersigned hereunto duly authorized, on this 10th day of December, 2024.

THERIVA BIOLOGICS, INC.

By: /s/ Steven A. Shallcross

Name: Steven A. Shallcross
Title: Chief Executive Officer and Chief Financial Officer

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below hereby constitutes and appoints Steven A. Shallcross, as his true and lawful agent, proxy and attorney-in-fact, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to (i) 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, (ii) act on, sign and file such certificates, instruments, agreements and other documents as may be necessary or appropriate in connection therewith, (iii) 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 (iv) take any and all actions which may be necessary or appropriate to be done, as fully for all intents and purposes as he 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, this registration statement has been signed by the following persons in the capacities and on the dates indicated.

Signature	Title	Date
/s/ Steven A. Shallcross	Chief Executive Officer, Chief Financial Officer	December 10, 2024

Steven A. Shallcross	(Principal Executive Officer, Principal Financial Officer and Principal Accounting Officer) and Member of the Board of Directors	
<u>/s/ Jeffrey J. Kraws</u> Jeffrey J. Kraws	Member of the Board of Directors	December 10, 2024
<u>/s/ Jeffrey Wolf</u> Jeffrey Wolf	Member of the Board of Directors	December 10, 2024
<u>/s/ John Monahan, Ph.D.</u> John Monahan, Ph.D.	Member of the Board of Directors	December 10, 2024

PLACEMENT AGENCY AGREEMENT

December [], 2024

Theriva Biologics, Inc.
 9605 Medical Center Drive, Suite 270
 Rockville, MD 20850
 Attention: Steven A. Shallcross

Dear Mr. Shallcross:

This letter (the "Agreement") constitutes the agreement between A.G.P./Alliance Global Partners, as placement agent (the "Placement Agent"), and Theriva Biologics, Inc., a company incorporated under the laws of the State of Nevada (the "Company"), that the Placement Agent shall serve as the exclusive placement agent for the Company, on a "reasonable best efforts" basis, in connection with the proposed placement (the "Placement") of (i) shares (the "Shares") of the Company's common stock, par value \$0.001 per share (the "Common Stock"), (ii) warrants to purchase shares of Common Stock of the Company (the "Common Warrants"), and/or (iii) pre-funded warrants to purchase shares of Common Stock (the "Pre-Funded Warrants", and together with the Common Warrants, the "Warrants," and collectively with the Shares, the "Securities"), depending on the beneficial ownership percentage of the purchaser of the Common Stock following its purchase. The Shares, Common Warrants and Pre-Funded Warrants, along with the shares of Common Stock underlying the Pre-Funded Warrants and Common Warrants shall be offered and sold under the Company's registration statement on Form S-1 (File No. 333-[]) (the "Registration Statement"). The Securities actually placed by the Placement Agent are referred to herein as the "Placement Agent Securities."

The terms of the Placement shall be mutually agreed upon by the Company and the purchasers (each, a "Purchaser" and collectively, the "Purchasers"); *provided, however*, that nothing herein shall obligate the Company to issue any Securities or complete the Placement. The Company expressly acknowledges and agrees that the Placement Agent's obligations hereunder are on a reasonable best efforts basis only and that the execution of this Agreement does not constitute a commitment by the Placement Agent to purchase the Securities and does not ensure the successful placement of the Securities or any portion thereof or the success of the Placement Agent with respect to securing any other financing on behalf of the Company. The Placement Agent may retain other brokers or dealers to act as sub-agents or selected-dealers on its behalf in connection with the Placement. Certain affiliates of the Placement Agent may participate in the Placement by purchasing some of the Placement Agent Securities. The sale of Placement Agent Securities to any Purchaser will be evidenced by a securities purchase agreement (the "Purchase Agreement") between the Company and such Purchaser, in a form reasonably acceptable to the Company and the Purchaser. Capitalized terms that are not otherwise defined herein have the meanings given to such terms in the Purchase Agreement. Prior to the signing of any Purchase Agreement, officers of the Company will be available to answer inquiries from prospective Purchasers.

SECTION 1. REPRESENTATIONS AND WARRANTIES OF THE COMPANY; COVENANTS OF THE COMPANY.

A. Representations of the Company. With respect to the Placement Agent Securities, each of the representations and warranties (together with any related disclosure schedules thereto) and covenants made by the Company to the Purchasers in the Purchase Agreement in connection with the Placement, is hereby incorporated herein by reference into this Agreement (as though fully restated herein) and is, as of the date of this Agreement and as of the Closing Date, hereby made to, and in favor of, the Placement Agent. In addition to the foregoing, the Company represents and warrants that there are no affiliations with any FINRA member firm among the Company's officers, directors or, to the knowledge of the Company, any five percent (5.0%) or greater stockholder of the Company, except as set forth in the Purchase Agreement, the FINRA questionnaires and SEC Reports.

B. Covenants of the Company. The Company covenants and agrees to continue to retain (i) an independent public accounting firm registered with the Public Company Accounting Oversight Board (the "PCAOB") for a period of at least three (3) years after the Closing Date and (ii) a competent transfer agent with respect to the Placement Agent Securities for a period of three (3) years after the Closing Date. In addition, from the date hereof until sixty (60) days after the Closing Date, subject to certain exceptions provided for in the Purchase Agreement, neither the Company nor any Subsidiary shall issue, enter into any agreement to issue or announce the issuance or proposed issuance of any shares of Common Stock or Common Stock Equivalents, except that such restriction shall not apply with respect to an Exempt Issuance (as defined in the Purchase Agreement). In addition, from the date hereof until six (6) months after the Closing Date, neither the Company nor any Subsidiary shall effect or enter into an agreement to effect any issuance by the Company or any of its Subsidiaries of shares of Common Stock or Common Stock Equivalents (as defined in the Purchase Agreement) (or a combination of units thereof) involving a Variable Rate Transaction (as defined in the Purchase Agreement). The foregoing shall not apply, forty-five (45) days after the Closing Date, to the "at-the-market" offering with the Placement Agent as sales agent, pursuant to the Amended and Restated Sales Agreement dated May 2, 2024.

SECTION 2. REPRESENTATIONS OF THE PLACEMENT AGENT. The Placement Agent represents and warrants that it (i) is a member in good standing of FINRA, (ii) is registered as a broker/dealer under the Exchange Act, (iii) is licensed as a broker/dealer under the laws of the United States of America, applicable to the offers and sales of the Placement Agent Securities by the Placement Agent, (iv) is and will be a corporate body validly existing under the laws of its place of incorporation, and (v) has full power and authority to enter into and perform its obligations under this Agreement. The Placement Agent will immediately notify the Company in writing of any change in its status with respect to subsections (i) through (v) above. The Placement Agent covenants that it will use its reasonable best efforts to conduct the Placement hereunder in compliance with the provisions of this Agreement and the requirements of applicable law.

SECTION 3. COMPENSATION AND EXPENSES.

A. In consideration of the services to be provided for hereunder, the Company shall pay to the Placement Agent or its respective designees a total cash fee equal to seven percent (7.0%) of the gross proceeds from the total amount of Placement Agent Securities sold in the Placement (the "Cash Fee"). The Cash Fee shall be paid on the Closing Date. The Company shall not be required to pay the Placement Agent any fees or expenses except for the Cash Fee and the reimbursement of (i) accountable legal fees and other reasonable and documented out-of-pocket expenses incurred by the Placement Agent in connection with the transaction in the amount of up to \$85,000 and (ii) non-accountable expenses equal to \$15,000. The Placement Agent reserves the right to reduce any item of compensation or adjust the terms thereof as specified herein in the event that a determination shall be made by FINRA to the effect that the Placement Agent's aggregate compensation is in excess of FINRA Rules or that the terms thereof require adjustment. Notwithstanding the foregoing, upon a termination of this Agreement the fees owed by the Company under this paragraph 3.A. shall be reduced to a maximum of \$25,000.

B. The Company agrees to pay all costs, fees and expenses incurred by the Company in connection with the performance of its obligations hereunder and in connection with the transactions contemplated hereby, including, without limitation: (i) all expenses incident to the issuance, delivery and qualification of the Placement Agent Securities (including all printing and engraving costs); (ii) all fees and expenses of the registrar and transfer

agent of the Shares; (iii) all necessary issue, transfer and other stamp taxes in connection with the issuance and sale of the Placement Agent Securities; (iv) all fees and expenses of the Company's counsel, independent public or certified public accountants and other advisors; (v) all costs and expenses incurred in connection with the preparation, printing, filing, shipping and distribution of the Registration Statement (including financial statements, exhibits, schedules, consents and certificates of experts), the Preliminary Prospectus and the Prospectus, and all amendments and supplements thereto, and this Agreement; (vi) all filing fees, reasonable attorneys' fees and expenses incurred by the Company in connection with qualifying or registering (or obtaining exemptions from the qualification or registration of) all or any part of the Placement Agent Securities for offer and sale under the state securities or blue sky laws or the securities laws of any other country; and (vii) the fees and expenses associated with including the Placement Agent Securities on the Trading Market.

SECTION 4. INDEMNIFICATION.

A. To the extent permitted by law, with respect to the Placement Agent Securities, the Company will indemnify the Placement Agent and its affiliates, stockholders, directors, officers, employees, members and controlling persons (within the meaning of Section 15 of the Securities Act or Section 20 of the Exchange Act) against all losses, claims, damages, expenses and liabilities, as the same are incurred (including the reasonable fees and expenses of counsel), relating to or arising out of its activities hereunder or pursuant to this Agreement, except to the extent that any losses, claims, damages, expenses or liabilities (or actions in respect thereof) are found in a final judgment (not subject to appeal) by a court of law to have resulted from a Placement Agent's fraud, willful misconduct or gross negligence in executing this Agreement or performing the services described herein. For the avoidance of doubt, this Section 4 is not intended to govern claims between the parties hereto.

B. Promptly after receipt by the Placement Agent of notice of any claim or the commencement of any action or proceeding with respect to which the Placement Agent is entitled to indemnity hereunder, the Placement Agent will notify the Company in writing of such claim or of the commencement of such action or proceeding, but failure to so notify the Company shall not relieve the Company from any obligation it may have hereunder, except and only to the extent such failure results in the forfeiture by the Company of substantial rights or defenses or prejudice to the Company's substantial rights or defenses. If the Company so elects or is requested by the Placement Agent, the Company will assume the defense of such action or proceeding and will employ counsel reasonably satisfactory to the Placement Agent and will pay the fees and expenses of such counsel. Notwithstanding the preceding sentence, the Placement Agent will be entitled to employ its own counsel separate from counsel for the Company and from any other party in such action if counsel for the Placement Agent reasonably determines that it would be inappropriate under the applicable rules of professional responsibility for the same counsel to represent both the Company and the Placement Agent. In such event, the reasonable fees and disbursements of no more than one such separate counsel will be paid by the Company, in addition to fees of local counsel. The Company will have the right to settle the claim or proceeding, provided that the Company will not settle any such claim, action or proceeding without the prior written consent of the Placement Agent, which will not be unreasonably withheld or delayed unless such settlement includes an unconditional, irrevocable release of each Indemnified Person from any and all liability arising out of such claim.

C. The Company agrees to notify the Placement Agent promptly of the assertion against it or any other person of any claim or the commencement of any action or proceeding relating to a transaction contemplated by this Agreement.

D. If for any reason the foregoing indemnity is unavailable to the Placement Agent or insufficient to hold the Placement Agent harmless, then the Company shall contribute to the amount paid or payable by the Placement Agent as a result of such losses, claims, damages or liabilities in such proportion as is appropriate to reflect not only the relative benefits received by the Company on the one hand and the Placement Agent on the other, but also the relative fault of the Company on the one hand and the Placement Agent on the other that resulted in such losses, claims, damages or liabilities, as well as any relevant equitable considerations. The amounts paid or payable by a party in respect of losses, claims, damages and liabilities referred to above shall be deemed to include any legal or other fees and expenses incurred in defending any litigation, proceeding or other action or claim. Notwithstanding the provisions hereof, the liable Placement Agent's share of the liability hereunder shall not be in excess of the amount of fees actually received, or to be received, by the Placement Agent under this Agreement (excluding any amounts received as reimbursement of expenses incurred by the Placement Agent).

E. These indemnification provisions shall remain in full force and effect whether or not the transaction contemplated by this Agreement is completed and shall survive the expiration or termination of this Agreement, and shall be in addition to any liability that the Company might otherwise have to any indemnified party under this Agreement or otherwise.

SECTION 5. ENGAGEMENT TERM. The Placement Agent's engagement hereunder will be until the earlier of (i) December [27], 2024 and (ii) the Closing Date. The date of termination of this Agreement is referred to herein as the "**Termination Date**." In the event, however, in the course of the Placement Agent's performance of due diligence it deems, it necessary to terminate the engagement, the Placement Agent may do so prior to the Termination Date. The Company may elect to terminate the engagement hereunder for any reason prior to the Termination Date but will remain responsible for up to \$25,000 of expenses incurred by the Placement Agent. The Placement Agent agrees not to use any confidential information concerning the Company provided to the Placement Agent by the Company for any purposes other than those contemplated under this Agreement.

SECTION 6. PLACEMENT AGENT INFORMATION. The Company agrees that any information or advice rendered by the Placement Agent in connection with this engagement is for the confidential use of the Company only in its evaluation of the Placement and, except as otherwise required by law, the Company will not disclose or otherwise refer to the advice or information in any manner without the Placement Agent's prior written consent.

SECTION 7. NO FIDUCIARY RELATIONSHIP. This Agreement does not create, and shall not be construed as creating rights enforceable by any person or entity not a party hereto, except those entitled hereto by virtue of the indemnification provisions hereof. The Company acknowledges and agrees that the Placement Agent is not and shall not be construed as a fiduciary of the Company and shall have no duties or liabilities to the equity holders or the creditors of the Company or any other person by virtue of this Agreement or the retention of the Placement Agent hereunder, all of which are hereby expressly waived.

SECTION 8. CLOSING. The obligations of the Placement Agent, and the closing of the sale of the Placement Agent Securities hereunder are subject to the accuracy, when made and on the Closing Date, of the representations and warranties on the part of the Company contained herein and in the Purchase Agreement, to the performance by the Company of its obligations hereunder, and to each of the following additional terms and conditions, except as otherwise disclosed to and acknowledged and waived by the Placement Agent:

A. All corporate proceedings and other legal matters incident to the authorization, form, execution, delivery and validity of each of this Agreement, the Placement Agent Securities, and all other legal matters relating to this Agreement and the transactions contemplated hereby with respect to the Placement Agent Securities shall be reasonably satisfactory in all material respects to the Placement Agent.

B. The Placement Agent shall have received from Company Counsel and Company Nevada Counsel such counsel's written opinion with respect to the Placement Agent Securities and negative assurance letter (with respect to the Company Counsel), addressed to the Placement Agent and, with respect to the opinion, the Purchasers, dated as of the Closing Date, in form and substance reasonably satisfactory to the Placement Agent.

C. The Common Stock shall be registered under the Exchange Act and, as of the Closing Date, the Placement Agent Securities shall be listed and admitted and authorized for trading on the Trading Market or other applicable U.S. national exchange and satisfactory evidence of such action shall have been provided to the Placement Agent. The Company shall have taken no action designed to, or likely to have the effect of terminating the registration of the Common Stock under the Exchange Act or removing or suspending from trading the Common Stock from the Trading Market or other applicable U.S. national exchange, nor has the Company received any information suggesting that the Commission or the Trading Market or other U.S. applicable national exchange is contemplating terminating such registration or listing.

D. No action shall have been taken and no statute, rule, regulation or order shall have been enacted, adopted or issued by any governmental agency or body which would, as of the Closing Date, prevent the issuance or sale of the Placement Agent Securities or materially and adversely affect or potentially and adversely affect the business or operations of the Company; and no injunction, restraining order or order of any other nature by any federal or state court of competent jurisdiction shall have been issued as of the Closing Date which would prevent the issuance or sale of the Placement Agent Securities or materially and adversely affect or potentially and adversely affect the business or operations of the Company.

E. The Company shall have entered into a Purchase Agreement with each of the Purchasers of the Placement Agent Securities that choose to do so and such agreements shall be in full force and effect and shall contain representations, warranties and covenants of the Company as agreed upon between the Company and the Purchasers.

F. FINRA shall have raised no objection to the fairness and reasonableness of the terms and arrangements of this Agreement. In addition, the Company shall, if requested by the Placement Agent, make or authorize Placement Agent's counsel to make on the Company's behalf, any filing with the FINRA Corporate Financing Department pursuant to FINRA Rule 5110, if applicable, with respect to the Placement and pay all filing fees required in connection therewith.

G. The Placement Agent shall have received customary certificates of the Company's executive officers (the "Officer's Certificate") as to the accuracy of the representations and warranties contained in the Purchase Agreement, and a certificate of the Company's secretary (the "Secretary's Certificate") certifying (i) that the Company's organizational documents are true and complete, have not been modified and are in full force and effect; (ii) that the resolutions of the Company's Board of Directors relating to the Placement are in full force and effect and have not been modified; and (iii) as to the incumbency of the officers of the Company. Each of the Officer's Certificate and Secretary's Certificate shall be dated as of the Closing Date, and all documents referenced in the Secretary's Certificate shall be attached thereto.

H. The Placement Agent shall have received an executed Lock-Up Agreement from each of the Company's directors, officers and 5% stockholders prior to the Closing Date.

I. On the date hereof, the Placement Agent shall have received, a letter from BDO USA, P.C (the independent registered public accounting firm of the Company), addressed to the Placement Agent, dated as of the date hereof, and a bring-down "comfort letter" addressed to the Placement Agent on the Closing Date, each in form and substance satisfactory to the Placement Agent. The letters shall not disclose any change in the condition (financial or other), earnings, operations or business of the Company, which, in the Placement Agent's sole judgment, is material and adverse and that makes it, in the Placement Agent's sole judgment, impracticable or inadvisable to proceed with the Placement of the Securities.

If any of the conditions specified in this Section 8 shall not have been fulfilled when and as required by this Agreement, all obligations of the Placement Agent hereunder may be cancelled by the Placement Agent at, or at any time prior to, the Closing Date. Notice of such cancellation shall be given to the Company in writing or orally. Any such oral notice shall be confirmed promptly thereafter in writing.

SECTION 9. GOVERNING LAW. This Agreement will be governed by, and construed in accordance with, the laws of the State of New York applicable to agreements made and to be performed entirely in such State. This Agreement may not be assigned by either party without the prior written consent of the other party. This Agreement shall be binding upon and inure to the benefit of the parties hereto, and their respective successors and permitted assigns. Any right to trial by jury with respect to any dispute arising under this Agreement or any transaction or conduct in connection herewith is waived. Any dispute arising under this Agreement may be brought into the courts of the State of New York or into the Federal Court located in New York, New York and, by execution and delivery of this Agreement, the Company hereby accepts for itself and in respect of its property, generally and unconditionally, the jurisdiction of aforesaid courts. Each party hereto hereby irrevocably waives personal service of process and consents to process being served in any such suit, action or proceeding by delivering a copy thereof via overnight delivery (with evidence of delivery) to such party at the address in effect for notices to it under this Agreement and agrees that such service shall constitute good and sufficient service of process and notice thereof. Nothing contained herein shall be deemed to limit in any way any right to serve process in any manner permitted by law. If either party shall commence an action or proceeding to enforce any provisions of this Agreement, then the prevailing party in such action or proceeding shall be reimbursed by the other party for its attorney's fees and other costs and expenses incurred with the investigation, preparation and prosecution of such action or proceeding.

SECTION 10. ENTIRE AGREEMENT/MISCELLANEOUS. This Agreement embodies the entire agreement and understanding between the parties hereto, and supersedes all prior agreements and understandings, relating to the subject matter hereof. If any provision of this Agreement is determined to be invalid or unenforceable in any respect, such determination will not affect such provision in any other respect or any other provision of this Agreement, which will remain in full force and effect. This Agreement may not be amended or otherwise modified or waived except by an instrument in writing signed by the Placement Agent and the Company. The representations, warranties, agreements and covenants contained herein shall survive the Closing Date of the Placement and delivery of the Placement Agent Securities. This Agreement may be executed in two or more counterparts, all of which when taken together shall be considered one and the same agreement and shall become effective when counterparts have been signed by each party and delivered to the other party, it being understood that both parties need not sign the same counterpart. In the event that any signature is delivered by facsimile transmission or a .pdf format file, such signature shall create a valid and binding obligation of the party executing (or on whose behalf such signature is executed) with the same force and effect as if such facsimile or .pdf signature page were an original thereof.

SECTION 11. NOTICES. Any and all notices or other communications or deliveries required or permitted to be provided hereunder shall be in writing and shall be deemed given and effective on the earliest of (a) the date of transmission, if such notice or communication is sent to the email address specified on the signature pages attached hereto prior to 6:30 p.m. (New York City time) on a business day, (b) the next business day after the

date of transmission, if such notice or communication is sent to the email address on the signature pages attached hereto on a day that is not a business day or later than 6:30 p.m. (New York City time) on any business day, (c) the third business day following the date of mailing, if sent by U.S. internationally recognized air courier service, or (d) upon actual receipt by the party to whom such notice is required to be given. The address for such notices and communications shall be as set forth on the signature pages hereto.

SECTION 12. PRESS ANNOUNCEMENTS. The Company agrees that the Placement Agent shall, on and after the Closing Date, have the right to reference the Placement and the Placement Agent's role in connection therewith in the Placement Agent's marketing materials and on its website and to place advertisements in financial and other newspapers and journals, in each case at its own expense.

[The remainder of this page has been intentionally left blank.]

Please confirm that the foregoing correctly sets forth our agreement by signing and returning to the Placement Agents the enclosed copy of this Agreement.

Very truly yours,
A.G.P./ALLIANCE GLOBAL PARTNERS

By: _____
Name: Thomas Higgins
Title: Managing Director

Address for notice:
590 Madison Avenue 28th Floor New York,
New York 10022
Attn: Thomas Higgins
Email:

[Signature Page to Placement Agency Agreement.]

Accepted and Agreed to as of the date first written above:

THERIVA BIOLOGICS, INC.

By: _____
Name: _____
Title: _____

Address for notice:
9605 Medical Center Drive, Suite 270
Rockville, MD 20850
Attention: []
Email: []

[Signature Page to Placement Agency Agreement.]

COMMON STOCK PURCHASE WARRANT

THERIVA BIOLOGICS, INC.

Warrant Shares:**Issue Date:** December [], 2024

THIS COMMON STOCK PURCHASE WARRANT (the "Warrant") certifies that, for value received, _____ or its assigns (the "Holder") is entitled, upon the terms and subject to the limitations on exercise and the conditions hereinafter set forth, at any time on or after the date hereof (the "Initial Exercise Date") and on or prior to 5:00 p.m. (New York City time) on the five (5) year anniversary of the Initial Exercise Date (the "Termination Date") but not thereafter, to subscribe for and purchase from **Theriva Biologics, Inc.**, a Nevada corporation (the "Company"), up to _____ shares (as subject to adjustment hereunder, the "Warrant Shares") of the Company's common stock, par value \$0.001 per share (the "Common Stock"). The purchase price of one share of Common Stock under this Warrant shall be equal to the Exercise Price, as defined in Section 2(b).

Section 1. Definitions. Capitalized terms used and not otherwise defined herein shall have the meanings set forth in that certain Securities Purchase Agreement (the "Purchase Agreement"), dated December [], 2024, among the Company and the purchasers signatory thereto.

Section 2. Exercise

a) **Exercise of Warrant.** Subject to the terms and conditions hereof, exercise of the purchase rights represented by this Warrant may be made, in whole or in part, at any time or times on or after the Initial Exercise Date and on or before the Termination Date by delivery to the Company of a duly executed facsimile copy or PDF copy submitted by e-mail (or e-mail attachment) of the Notice of Exercise in the form attached hereto as Exhibit A (the "Notice of Exercise"). Within the earlier of (i) one (1) Trading Day and (ii) the number of Trading Days comprising the Standard Settlement Period (as defined in Section 2(d)(i) herein) following the date of exercise as aforesaid, the Holder shall deliver the aggregate Exercise Price for the Warrant Shares specified in the applicable Notice of Exercise by wire transfer or cashier's check drawn on a United States bank unless the cashless exercise procedure specified in Section 2(c) below is applicable and specified in the attached Notice of Exercise. The Company shall have no obligation to inquire with respect to or otherwise confirm the authenticity of the signature(s) contained on any Notice of Exercise nor the authority of the person executing such Notice of Exercise. No ink-original Notice of Exercise shall be required, nor shall any medallion guarantee (or other type of guarantee or notarization) of any Notice of Exercise be required. Notwithstanding anything herein to the contrary, the Holder shall not be required to physically surrender this Warrant to the Company until the Holder has purchased all of the Warrant Shares available hereunder and the Warrant has been exercised in full, in which case, the Holder shall surrender this Warrant to the Company for cancellation within three (3) Trading Days of the date on which the final Notice of Exercise is delivered to the Company. Partial exercises of this Warrant resulting in purchases of a portion of the total number of Warrant Shares available hereunder shall have the effect of lowering the outstanding number of Warrant Shares purchasable hereunder in an amount equal to the applicable number of Warrant Shares purchased. The Holder and the Company shall maintain records showing the number of Warrant Shares purchased and the date of such purchases. The Company shall deliver any objection to any Notice of Exercise within one (1) Trading Day of receipt of such notice. **The Holder and any assignee, by acceptance of this Warrant, acknowledge and agree that, by reason of the provisions of this paragraph, following the purchase of a portion of the Warrant Shares hereunder, the number of Warrant Shares available for purchase hereunder at any given time may be less than the amount stated on the face hereof.**

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b) **Exercise Price.** The exercise price per share of Common Stock under this Warrant shall be \$[•], subject to adjustment hereunder (the "Exercise Price").

c) **Cashless Exercise.** If at the time of exercise hereof there is no effective registration statement registering, or the prospectus contained therein is not available for, the issuance of the Warrant Shares to the Holder, then this Warrant may also be exercised, in whole or in part, at such time by means of a "cashless exercise" in which the Holder shall be entitled to receive a number of Warrant Shares equal to the quotient obtained by dividing [(A-B) (X)] by (A), where:

- (A) = as applicable: (i) the VWAP on the Trading Day immediately preceding the date of the applicable Notice of Exercise if such Notice of Exercise is (1) both executed and delivered pursuant to Section 2(a) hereof on a day that is not a Trading Day or (2) both executed and delivered pursuant to Section 2(a) hereof on a Trading Day prior to the opening of "regular trading hours" (as defined in Rule 600(b)(68) of Regulation NMS promulgated under the federal securities laws) on such Trading Day, (ii) the VWAP on the Trading Day immediately preceding the date of the applicable Notice of Exercise or (iii) the VWAP on the date of the applicable Notice of Exercise if the date of such Notice of Exercise is a Trading Day and such Notice of Exercise is both executed and delivered pursuant to Section 2(a) hereof after the close of "regular trading hours" on such Trading Day;
- (B) = the Exercise Price of this Warrant, as adjusted hereunder; and
- (X) = the number of Warrant Shares that would be issuable upon exercise of this Warrant in accordance with the terms of this Warrant if such exercise were by means of a cash exercise rather than a cashless exercise.

"**Bid Price**" means, for any date, the price determined by the first of the following clauses that applies: (a) if the Common Stock is then listed or quoted on a Trading Market, the bid price of the Common Stock for the time in question (or the nearest preceding date) on the Trading Market on which the Common Stock is then listed or quoted as reported by Bloomberg L.P. (based on a Trading Day from 9:30 a.m. (New York City time) to 4:02 p.m. (New York City time)), (b) if the Common Stock is not then listed or quoted on a Trading Market and if prices for the Common Stock are then reported on the OTCQB Venture Market ("**OTCQB**") or the OTCQX Best Market ("**OTCQX**"), as applicable, the volume weighted average price of the Common Stock for such date (or the nearest preceding date) on OTCQB or OTCQX, as applicable, (c) if the Common Stock is not then listed or quoted for trading on a Trading Market or on OTCQB or OTCQX and if prices for the Common Stock are then reported on The Pink Open Market (or a similar organization or agency succeeding to its functions of reporting prices), the most recent bid price per share of the Common Stock so reported, or (d) in all other cases, the fair market value of a share of Common Stock as determined by an independent appraiser selected in good faith by the Holders of a majority in interest of the Securities then outstanding and reasonably acceptable to the Company, the fees and expenses of which shall be paid by the Company.

"**VWAP**" means, for any date, the price determined by the first of the following clauses that applies: (a) if the Common Stock is then listed or quoted on a Trading Market, the daily volume weighted average price of the Common Stock for such date (or the nearest preceding date) on the Trading Market on which the Common Stock is then listed or quoted as reported by Bloomberg L.P. (based on a Trading Day from 9:30 a.m. (New York City time) to 4:02 p.m. (New York City time)), (b) if the Common Stock is not then listed or quoted on a Trading Market and if prices for the Common Stock are then reported on OTCQB or OTCQX, as applicable, the volume weighted average price of the Common Stock for such date (or the nearest preceding date) on OTCQB or OTCQX, as applicable, (c) if the Common Stock is not then listed or quoted for trading on a Trading Market or on OTCQB or OTCQX and if prices for the Common Stock are then reported on The Pink Open Market (or a similar organization or agency succeeding to its functions of reporting

prices), the most recent bid price per share of the Common Stock so reported, or (d) in all other cases, the fair market value of a share of Common Stock as determined by an independent appraiser selected in good faith by the Holders of a majority in interest of the Securities then outstanding and reasonably acceptable to the Company, the fees and expenses of which shall be paid by the Company.

If Warrant Shares are issued in such a cashless exercise, the parties acknowledge and agree that in accordance with Section 3(a)(9) of the Securities Act, the Warrant Shares shall take on the registered characteristics of the Warrants being exercised. The Company agrees not to take any position contrary to this Section 2(c).

d) Mechanics of Exercise

i. Delivery of Warrant Shares Upon Exercise. The Company shall cause the Warrant Shares purchased hereunder to be transmitted by the Transfer Agent to the Holder by crediting the account of the Holder's or its designee's balance account with The Depository Trust Company through its Deposit or Withdrawal at Custodian system if the Company is then a participant in such system and either (A) there is an effective registration statement permitting the issuance of the Warrant Shares or (B) this Warrant is being exercised via cashless exercise, and otherwise by physical delivery of a certificate, registered in the Company's share register in the name of the Holder or its designee, for the number of Warrant Shares to which the Holder is entitled pursuant to such exercise to the address specified by the Holder in the Notice of Exercise by the date that is the earlier of (A) the earlier of (i) two (2) Trading Days and (ii) the number of days comprising the Standard Settlement Period, in each case after the delivery to the Company of the Notice of Exercise and (B) one (1) Trading Day after delivery of the aggregate Exercise Price to the Company (such date, the "Warrant Share Delivery Date"). Upon delivery of the Notice of Exercise, the Holder shall be deemed for all corporate purposes to have become the holder of record of the Warrant Shares with respect to which this Warrant has been exercised, irrespective of the date of delivery of the Warrant Shares, provided that payment of the aggregate Exercise Price (other than in the case of a cashless exercise) is received by the Warrant Share Delivery Date. If the Company fails for any reason to deliver to the Holder the Warrant Shares subject to a Notice of Exercise by the Warrant Share Delivery Date, provided that payment of the aggregate Exercise Price (other than in the instance of a cashless exercise) is received by the Company by such date, the Company shall pay to the Holder, in cash, as liquidated damages and not as a penalty, for each \$1,000 of Warrant Shares subject to such exercise (based on the VWAP of the Common Stock on the date of the applicable Notice of Exercise), \$10 per Trading Day (increasing to \$20 per Trading Day on the third Trading Day after the Warrant Share Delivery Date) for each Trading Day after such Warrant Share Delivery Date until such Warrant Shares are delivered or Holder rescinds such exercise. The Company agrees to maintain a transfer agent that is a participant in the FAST program so long as this Warrant remains outstanding and exercisable. As used herein, "Standard Settlement Period" means the standard settlement period, expressed in a number of Trading Days, on the Company's primary Trading Market with respect to the Common Stock as in effect on the date of delivery of the Notice of Exercise.

ii. Delivery of New Warrants Upon Exercise. If this Warrant shall have been exercised in part, the Company shall, at the request of a Holder and upon surrender of this Warrant certificate, at the time of delivery of the Warrant Shares, deliver to the Holder a new Warrant evidencing the rights of the Holder to purchase the unpurchased Warrant Shares called for by this Warrant, which new Warrant shall in all other respects be identical with this Warrant.

iii. Rescission Rights. If the Company fails to cause the Transfer Agent to transmit to the Holder the Warrant Shares pursuant to Section 2(d)(i) by the Warrant Share Delivery Date, then the Holder will have the right to rescind such exercise by delivering written notice to the Company at any time prior to the delivery of such Warrant Shares (in which case any liquidated damages payable under Section 2(d)(i) shall no longer be payable).

iv. Compensation for Buy-In on Failure to Timely Deliver Warrant Shares Upon Exercise. In addition to any other rights available to the Holder, if the Company fails to cause the Transfer Agent to transmit to the Holder the Warrant Shares in accordance with the provisions of Section 2(d)(i) above pursuant to an exercise on or before the Warrant Share Delivery Date (other than any such failure that is solely due to any action or inaction by the Holder with respect to such exercise), and if after such date the Holder is required by its broker to purchase (in an open market transaction or otherwise) or the Holder's brokerage firm otherwise purchases, shares of Common Stock to deliver in satisfaction of a sale by the Holder of the Warrant Shares which the Holder anticipated receiving upon such exercise (a "Buy-In"), then the Company shall (A) pay in cash to the Holder the amount, if any, by which (x) the Holder's total purchase price (including brokerage commissions, if any) for the shares of Common Stock so purchased exceeds (y) the amount obtained by multiplying (1) the number of Warrant Shares that the Company was required to deliver to the Holder in connection with the exercise at issue times (2) the price at which the sell order giving rise to such purchase obligation was executed, and (B) at the option of the Holder, either reinstate the portion of the Warrant and equivalent number of Warrant Shares for which such exercise was not honored (in which case such exercise shall be deemed rescinded) or deliver to the Holder the number of shares of Common Stock that would have been issued had the Company timely complied with its exercise and delivery obligations hereunder. For example, if the Holder purchases Common Stock having a total purchase price of \$11,000 to cover a Buy-In with respect to an attempted exercise of Warrants with an aggregate sale price giving rise to such purchase obligation of \$10,000, under clause (A) of the immediately preceding sentence the Company shall be required to pay the Holder \$1,000. The Holder shall provide the Company written notice indicating the amounts payable to the Holder in respect of the Buy-In and, upon request of the Company, evidence of the amount of such loss. Nothing herein shall limit a Holder's right to pursue any other remedies available to it hereunder, at law or in equity including, without limitation, a decree of specific performance and/or injunctive relief with respect to the Company's failure to timely deliver shares of Common Stock upon exercise of the Warrant as required pursuant to the terms hereof.

v. No Fractional Shares or Scrip. No fractional shares or scrip representing fractional shares shall be issued upon the exercise of this Warrant. As to any fraction of a share which the Holder would otherwise be entitled to purchase upon such exercise, the Company shall, at its election, either pay a cash adjustment in respect of such final fraction in an amount equal to such fraction multiplied by the Exercise Price or round up to the next whole share.

vi. Charges, Taxes and Expenses. Issuance of Warrant Shares shall be made without charge to the Holder for any issue or transfer tax or other incidental expense in respect of the issuance of such Warrant Shares, all of which taxes and expenses shall be paid by the Company, and such Warrant Shares shall be issued in the name of the Holder or in such name or names as may be directed by the Holder; provided, however, that in the event that Warrant Shares are to be issued in a name other than the name of the Holder, this Warrant when surrendered for exercise shall be accompanied by the Assignment Form, attached hereto as Exhibit B, duly executed by the Holder and the Company may require, as a condition thereto, the payment of a sum sufficient to reimburse it for any transfer tax incidental thereto. The Company shall pay all Transfer Agent fees required for same-day processing of any Notice of Exercise and all fees to the Depository Trust Company (or another established clearing corporation performing similar functions) required for same-day electronic delivery of the Warrant Shares.

e) Holder's Exercise Limitations. The Company shall not effect any exercise of this Warrant, and a Holder shall not have the right to exercise any portion of this Warrant, pursuant to Section 2 or otherwise, to the extent that after giving effect to such issuance after exercise as set forth on the applicable Notice of Exercise, the Holder (together with the Holder's Affiliates, and any other Persons acting as a group together with the Holder or any of the Holder's Affiliates (such Persons, "Attribution Parties")), would beneficially own in excess of the Beneficial Ownership Limitation (as defined below). For purposes of the foregoing sentence, the number of shares of Common Stock beneficially owned by the Holder and its Affiliates and Attribution Parties shall include the number of shares of Common Stock issuable upon exercise of this Warrant with respect to which such determination is being made, but shall exclude the number of shares of Common Stock which would be issuable upon (i) exercise of the remaining, nonexercised portion of this Warrant beneficially owned by the Holder or any of its Affiliates or Attribution Parties and (ii) exercise or conversion of the unexercised or nonconverted portion of any other securities of the Company (including, without limitation, any other Common Stock Equivalents) subject to a limitation on conversion or exercise analogous to the limitation contained herein beneficially owned by the Holder or any of its Affiliates or Attribution Parties. Except as set forth in the preceding sentence, for purposes of this Section 2(e), beneficial ownership shall be calculated in accordance with Section 13(d) of the Exchange Act and the rules and regulations promulgated thereunder, it being acknowledged by the Holder that the Company is not representing to the Holder that such calculation is in compliance with Section 13(d) of the Exchange Act and the Holder is solely responsible for any schedules required to be filed in accordance therewith. To the extent that the limitation contained in this Section 2(e) applies, the determination of whether this Warrant is exercisable (in relation to other securities owned by the Holder together with any Affiliates and Attribution Parties) and of which portion of this Warrant is exercisable shall be in the sole discretion of the Holder, and the submission of a Notice of Exercise shall be deemed to be the Holder's determination of whether this Warrant is exercisable (in relation to other securities owned by the Holder together with any Affiliates and Attribution Parties) and of which portion of this Warrant is exercisable, in each case subject to the Beneficial Ownership Limitation, and the Company shall have no obligation to verify or confirm the accuracy of such determination and shall have no liability for exercises of the Warrant that are not in compliance with the Beneficial Ownership Limitation, except to the extent the Holder relies on a number of outstanding shares of Common Stock that was provided by the Company. In addition, a determination as to any group status as contemplated above shall be determined in accordance with Section 13(d) of the Exchange Act and the rules and regulations promulgated thereunder, and the Company shall have no obligation to verify or confirm the accuracy of such determination and shall have no liability for exercises of the Warrant that are not in compliance with the Beneficial Ownership Limitation, except to the extent the Holder relies on the number of outstanding shares of Common Stock that was provided by the Company. For purposes of this Section 2(e), in determining the number of outstanding shares of Common Stock, a Holder may rely on the number of outstanding shares of Common Stock as reflected in (A) the Company's most recent periodic or annual report filed with the Commission, as the case may be, (B) a more recent public announcement by the Company or (C) a more recent written notice by the Company or the Transfer Agent setting forth the number of shares of Common Stock outstanding. Upon the written request of a Holder, the Company shall within two (2) Trading Days confirm orally and in writing to the Holder the number of shares of Common Stock then outstanding. In any case, the number of outstanding shares of Common Stock shall be determined after giving effect to the conversion or exercise of securities of the Company, including this Warrant, by the Holder or its Affiliates or Attribution Parties since the date as of which such number of outstanding shares of Common Stock was reported. The "Beneficial Ownership Limitation" shall be [4.99/9.99)% of the number of shares of the Common Stock outstanding immediately after giving effect to the issuance of shares of Common Stock issuable upon exercise of this Warrant. The Holder, upon written notice to the Company, may increase or decrease the Beneficial Ownership Limitation provisions of this Section 2(e), provided that the Beneficial Ownership Limitation in no event exceeds 9.99% of the number of shares of the Common Stock outstanding immediately after giving effect to the issuance of shares of Common Stock upon exercise of this Warrant held by the Holder and the provisions of this Section 2(e) shall continue to apply. Any increase in the Beneficial Ownership Limitation will not be effective until the 61st day after such notice is delivered to the Company. The provisions of this paragraph shall be construed and implemented in a manner otherwise than in strict conformity with the terms of this Section 2(e) to correct this paragraph (or any portion hereof) which may be defective or inconsistent with the intended Beneficial Ownership Limitation herein contained or to make changes or supplements necessary or desirable to properly give effect to such limitation. The limitations contained in this paragraph shall apply to a successor holder of this Warrant. If the Warrant is unexercisable as a result of the Holder's Beneficial Ownership Limitation, no alternate consideration is owing to the Holder.

Section 3. Certain Adjustments

a) Stock Dividends and Splits. If the Company, at any time while this Warrant is outstanding: (i) pays a stock dividend or otherwise makes a distribution or distributions on shares of its Common Stock or any other equity or equity equivalent securities payable in shares of Common Stock (which, for avoidance of doubt, shall not include any shares of Common Stock issued by the Company upon exercise of this Warrant or pursuant to any other Transaction Documents), (ii) subdivides outstanding shares of Common Stock into a larger number of shares, (iii) combines (including by way of reverse stock split) outstanding shares of Common Stock into a smaller number of shares, or (iv) issues by reclassification of shares of the Common Stock any shares of capital stock of the Company, then in each case the Exercise Price shall be multiplied by a fraction of which the numerator shall be the number of shares of Common Stock (excluding treasury shares, if any) outstanding immediately before such event and of which the denominator shall be the number of shares of Common Stock outstanding immediately after such event, and the number of shares issuable upon exercise of this Warrant shall be proportionately adjusted such that the aggregate Exercise Price of this Warrant shall remain unchanged. Any adjustment made pursuant to this Section 3(a) shall become effective immediately after the record date for the determination of stockholders entitled to receive such dividend or distribution and shall become effective immediately after the effective date in the case of a subdivision, combination or re-classification.

b) Subsequent Rights Offerings. In addition to any adjustments pursuant to Section 3(a) above, if at any time that this Warrant is outstanding the Company grants, issues or sells any Common Stock Equivalents or rights to purchase stock, warrants, securities or other property pro rata to all of the record holders of any class of shares of Common Stock (the "Purchase Rights"), then the Holder will be entitled to acquire, upon the terms applicable to such Purchase Rights, the aggregate Purchase Rights which the Holder could have acquired if the Holder had held the number of shares of Common Stock acquirable upon complete exercise of this Warrant (without regard to any limitations on exercise hereof, including without limitation, the Beneficial Ownership Limitation) immediately before the date on which a record is taken for the grant, issuance or sale of such Purchase Rights, or, if no such record is taken, the date as of which the record holders of shares of Common Stock are to be determined for the grant, issue or sale of such Purchase Rights (provided, however, that to the extent that the Holder's right to participate in any such Purchase Right would result in the Holder exceeding the Beneficial Ownership Limitation, then the Holder shall not be entitled to participate in such Purchase Right to such extent (or beneficial ownership of such shares of Common Stock as a result of such Purchase Right to such extent) and such Purchase Right to such extent shall be held in abeyance for the Holder until such time, if ever, as its right thereto would not result in the Holder exceeding the Beneficial Ownership Limitation).

c) Pro Rata Distributions. During such time as this Warrant is outstanding, if the Company shall declare or make any dividend or other distribution of its assets (or rights to acquire its assets) to all of the holders of shares of Common Stock, by way of return of capital or otherwise (including, without limitation, any distribution of cash, stock or other securities, property or options by way of a dividend, spin off, reclassification, corporate rearrangement,

scheme of arrangement or other similar transaction) (a "Distribution"), at any time after the issuance of this Warrant, then, in each such case, the Holder shall be entitled to participate in such Distribution to the same extent that the Holder would have participated therein if the Holder had held the number of shares of Common Stock acquirable upon complete exercise of this Warrant (without regard to any limitations on exercise hereof, including without limitation, the Beneficial Ownership Limitation) immediately before the date of which a record is taken for such Distribution, or, if no such record is taken, the date as of which the record holders of shares of Common Stock are to be determined for the participation in such Distribution (provided, however, that to the extent that the Holder's right to participate in any such Distribution would result in the Holder exceeding the Beneficial Ownership Limitation, then the Holder shall not be entitled to participate in such Distribution to such extent (or in the beneficial ownership of any shares of Common Stock as a result of such Distribution to such extent) and the portion of such Distribution shall be held in abeyance for the benefit of the Holder until such time, if ever, as its right thereto would not result in the Holder exceeding the Beneficial Ownership Limitation).

d) **Fundamental Transaction.** If, at any time while this Warrant is outstanding, (i) the Company, directly or indirectly, in one or more related transactions effects any merger or consolidation of the Company with or into another Person, (ii) the Company (or any Subsidiary), directly or indirectly, effects any sale, lease, license, assignment, transfer, conveyance or other disposition of all or substantially all of the Company's assets in one or a series of related transactions, (iii) any, direct or indirect, purchase offer, tender offer or exchange offer (whether by the Company or another Person) is completed pursuant to which holders of Common Stock are permitted to sell, tender or exchange their shares for other securities, cash or property and has been accepted by the holders of more than 50% of the aggregate voting power of the outstanding common and preferred stocks of the Company, (iv) the Company, directly or indirectly, in one or more related transactions effects any reclassification, reorganization or recapitalization of shares of Common Stock or any compulsory share exchange pursuant to which the shares of Common Stock are effectively converted into or exchanged for other securities, cash or property, or (v) the Company, directly or indirectly, in one or more related transactions consummates a stock or share purchase agreement or other business combination (including, without limitation, a reorganization, recapitalization, spin-off, merger or scheme of arrangement) with another Person or group of Persons whereby such other Person or group acquires more than 50% of the aggregate voting power of the outstanding common and preferred stocks of the Company (not including any shares of Common Stock held by the other Person or other Persons making or party to, or associated or affiliated with the other Persons making or party to, such stock or share purchase agreement or other business combination) (each a "Fundamental Transaction"), then, upon any subsequent exercise of this Warrant, the Holder shall have the right to receive, for each Warrant Share that would have been issuable upon such exercise immediately prior to the occurrence of such Fundamental Transaction, at the option of the Holder (without regard to any limitation in Section 2(e) on the exercise of this Warrant), the number of shares of Common Stock of the successor or acquiring corporation or of the Company, if it is the surviving corporation, and any additional consideration (the "Alternate Consideration") receivable as a result of such Fundamental Transaction by a holder of the number of shares of Common Stock for which this Warrant is exercisable immediately prior to such Fundamental Transaction (without regard to any limitation in Section 2(e) on the exercise of this Warrant). For purposes of any such exercise, the determination of the Exercise Price shall be appropriately adjusted to apply to such Alternate Consideration based on the amount of Alternate Consideration issuable in respect of one share of Common Stock in such Fundamental Transaction, and the Company shall apportion the Exercise Price among the Alternate Consideration in a reasonable manner reflecting the relative value of any different components of the Alternate Consideration. If holders of Common Stock are given any choice as to the securities, cash or property to be received in a Fundamental Transaction, then the Holder shall be given the same choice as to the Alternate Consideration it receives upon any exercise of this Warrant following such Fundamental Transaction. Notwithstanding anything to the contrary, in the event of a Fundamental Transaction other than a Fundamental Transaction in which the Company is the surviving entity and at such time the Common Stock continues to be quoted or listed on a Trading Market, the Company or any Successor Entity (as defined below) shall, at the Holder's option, exercisable at any time concurrently with the consummation of the Fundamental Transaction (or, if later, the date of the public announcement of the applicable Fundamental Transaction), purchase this Warrant from the Holder by paying to the Holder, as described below, an amount of consideration equal to the Black Scholes Value (as defined below) of the remaining unexercised portion of this Warrant on the date of the consummation of such Fundamental Transaction, provided, however, that, if the Fundamental Transaction is not within the Company's control, including not approved by the Company's Board of Directors, the Holder shall only be entitled to receive from the Company or any Successor Entity, as of the date of the consummation of such Fundamental Transaction, the same type or form of consideration (and in the same proportion), valued at the Black Scholes Value of the unexercised portion of this Warrant, that is being offered and paid to the holders of Common Stock of the Company in connection with the Fundamental Transaction, whether that consideration be in the form of cash, stock or any combination thereof, or whether the holders of Common Stock are given the choice to receive from among alternative forms of consideration in connection with the Fundamental Transaction; provided further, that if holders of Common Stock of the Company are not offered or paid any consideration in such Fundamental Transaction, such holders of Common Stock will be deemed to have received shares of the Successor Entity (which Successor Entity may be the Company following such Fundamental Transaction) in such Fundamental Transaction. "Black Scholes Value" means the value of this Warrant based on the Black-Scholes Option Pricing Model obtained from the "OV" function on Bloomberg determined as of the day of consummation of the applicable Fundamental Transaction for pricing purposes and reflecting (A) a risk-free interest rate corresponding to the U.S. Treasury rate for a period equal to the time between the date of the public announcement of the applicable contemplated Fundamental Transaction and the Termination Date, (B) an expected volatility equal to 100 day volatility obtained from the HVT function on Bloomberg (determined utilizing a 365-day annualization factor) as of the Trading Day immediately following the public announcement of the applicable Fundamental Transaction, (C) the underlying price per share used in such calculation shall be the sum of the price per share being offered in cash, if any, plus the value of any non-cash consideration, if any, being offered in such Fundamental Transaction, and ending on the Trading Day of such announcement or consummation, as applicable, (D) a remaining option time equal to the time between the date of the public announcement of the applicable Fundamental Transaction and the Termination Date, and (E) a zero cost of borrow. The payment of the Black Scholes Value will be made by wire transfer of immediately available funds within five Business Days of the Holder's election (or, if later, on the effective date of the Fundamental Transaction). The Company shall cause any successor entity in a Fundamental Transaction in which the Company is not the survivor (the "Successor Entity") to assume in writing all of the obligations of the Company under this Warrant and the other Transaction Documents in accordance with the provisions of this Section 3(d) pursuant to written agreements in form and substance reasonably satisfactory to the Holder prior to such Fundamental Transaction and shall, at the option of the Holder, deliver to the Holder in exchange for this Warrant a security of the Successor Entity evidenced by a written instrument substantially similar in form and substance to this Warrant which is exercisable for a corresponding number of shares of capital stock of such Successor Entity (or its parent entity) equivalent to the shares of Common Stock acquirable and receivable upon exercise of this Warrant (without regard to any limitations on the exercise of this Warrant) prior to such Fundamental Transaction, and with an exercise price which applies the exercise price hereunder to such shares of capital stock (but taking into account the relative value of the shares of Common Stock pursuant to such Fundamental Transaction and the value of such shares of capital stock, such number of shares of capital stock and such exercise price being for the purpose of protecting the economic value of this Warrant immediately prior to the consummation of such Fundamental Transaction), and which is reasonably satisfactory in form and substance to the Holder. Upon the occurrence of any such Fundamental Transaction, the Successor Entity shall succeed to, and be substituted for (so that from and after the date of such Fundamental Transaction, the provisions of this Warrant and the other Transaction Documents referring to the "Company" shall refer instead to the Successor Entity), and may exercise every right and power of the Company and shall assume all of the obligations of the Company under this Warrant and the other Transaction Documents with the same effect as if such Successor Entity had been named as the Company herein.

e) **Calculations.** All calculations under this Section 3 shall be made to the nearest cent or the nearest 1/100th of a share, as the case may be. For purposes of this Section 3, the number of shares of Common Stock deemed to be issued and outstanding as of a given date shall be the sum of the

number of shares of Common Stock (excluding treasury shares, if any) issued and outstanding.

f) Notice to Holder

i. **Adjustment to Exercise Price.** Whenever the Exercise Price is adjusted pursuant to any provision of this Section 3, the Company shall promptly deliver to the Holder by facsimile or email a notice setting forth the Exercise Price after such adjustment and any resulting adjustment to the number of Warrant Shares and setting forth a brief statement of the facts requiring such adjustment; provided, however, that the Company may satisfy this notice requirement in this Section 3(f) by filing such notice with the Commission pursuant to a Current Report on Form 8-K, Quarterly Report on Form 10-Q or Annual Report on Form 10-K.

ii. **Notice to Allow Exercise by Holder.** If (A) the Company shall declare a dividend (or any other distribution in whatever form) on the Common Stock other than a stock split, (B) the Company shall declare a special nonrecurring cash dividend on or a redemption of the Common Stock, (C) the Company shall authorize the granting to all holders of the Common Stock rights or warrants to subscribe for or purchase any shares of capital stock of any class or of any rights, (D) the approval of any stockholders of the Company shall be required in connection with any reclassification of the Common Stock, any consolidation or merger to which the Company is a party, any sale or transfer of all or substantially all of the assets of the Company, or any compulsory share exchange whereby the Common Stock is converted into other securities, cash or property, or (E) the Company shall authorize the voluntary or involuntary dissolution, liquidation or winding up of the affairs of the Company, then, in each case, the Company shall cause to be delivered by facsimile or email to the Holder at its last facsimile number or email address as it shall appear upon the Warrant Register of the Company, at least 4 calendar days prior to the applicable record or effective date hereinafter specified, a notice stating (x) the date on which a record is to be taken for the purpose of such dividend, distribution, redemption, rights or warrants, or if a record is not to be taken, the date as of which the holders of the Common Stock of record to be entitled to such dividend, distributions, redemption, rights or warrants are to be determined or (y) the date on which such reclassification, consolidation, merger, sale, transfer or share exchange is expected to become effective or close, and the date as of which it is expected that holders of the Common Stock of record shall be entitled to exchange their shares of the Common Stock for securities, cash or other property deliverable upon such reclassification, consolidation, merger, sale, transfer or share exchange; provided that the failure to deliver such notice or any defect therein or in the delivery thereof shall not affect the validity of the corporate action required to be specified in such notice. To the extent that any notice provided in this Warrant constitutes, or contains, material, non-public information regarding the Company or any of the Company's subsidiaries, the Company shall simultaneously file such notice with the Commission pursuant to a Current Report on Form 8-K. The Holder shall remain entitled to exercise this Warrant during the period commencing on the date of such notice to the effective date of the event triggering such notice except as may otherwise be expressly set forth herein.

g) **Voluntary Adjustment by Company.** Subject to the rules and regulations of the Trading Market, the Company may at any time during the term of this Warrant, subject to the prior written consent of the Holder, reduce the then current Exercise Price to any amount and for any period of time deemed appropriate by the board of directors of the Company.

Section 4. Transfer of Warrant

a) **Transferability.** Subject to compliance with any applicable securities laws and the conditions set forth in Section 4(d) hereof, this Warrant and all rights hereunder (including, without limitation, any registration rights) are transferable, in whole or in part, upon surrender of this Warrant at the principal office of the Company or its designated agent, together with a written assignment of this Warrant substantially in the form attached hereto duly executed by the Holder or its agent or attorney and funds sufficient to pay any transfer taxes payable upon the making of such transfer. Upon such surrender and, if required, such payment, the Company shall execute and deliver a new Warrant or Warrants in the name of the assignee or assignees, as applicable, and in the denomination or denominations specified in such instrument of assignment, and shall issue to the assignor a new Warrant evidencing the portion of this Warrant not so assigned, and this Warrant shall promptly be cancelled. Notwithstanding anything herein to the contrary, the Holder shall not be required to physically surrender this Warrant to the Company unless the Holder has assigned this Warrant in full, in which case, the Holder shall surrender this Warrant to the Company within three (3) Trading Days of the date on which the Holder delivers an assignment form to the Company assigning this Warrant in full. The Warrant, if properly assigned in accordance herewith, may be exercised by a new holder for the purchase of Warrant Shares without having a new Warrant issued.

b) **New Warrants.** This Warrant may be divided or combined with other Warrants upon presentation hereof at the aforesaid office of the Company, together with a written notice specifying the names and denominations in which new Warrants are to be issued, signed by the Holder or its agent or attorney. Subject to compliance with Section 4(a), as to any transfer which may be involved in such division or combination, the Company shall execute and deliver a new Warrant or Warrants in exchange for the Warrant or Warrants to be divided or combined in accordance with such notice. All Warrants issued on transfers or exchanges shall be dated the Issue Date of this Warrant and shall be identical with this Warrant except as to the number of Warrant Shares issuable pursuant thereto.

c) **Warrant Register.** The Company shall register this Warrant, upon records to be maintained by the Company for that purpose (the " Warrant Register"), in the name of the record Holder hereof from time to time. The Company may deem and treat the registered Holder of this Warrant as the absolute owner hereof for the purpose of any exercise hereof or any distribution to the Holder, and for all other purposes, absent actual notice to the contrary.

Section 5. Miscellaneous

a) **No Rights as Stockholder Until Exercise; No Settlement in Cash.** This Warrant does not entitle the Holder to any voting rights, dividends or other rights as a stockholder of the Company prior to the exercise hereof as set forth in Section 2(d)(i), except as expressly set forth in Section 3. Without limiting the rights of a Holder to receive Warrant Shares on a "cashless exercise" as permitted in Section 2(c), and to receive the cash payments contemplated pursuant to Section 2(d)(i) and Section 2(d)(iv), in no event will the Company be required to net cash settle an exercise of this Warrant.

b) **Loss, Theft, Destruction or Mutilation of Warrant.** The Company covenants that upon receipt by the Company of evidence reasonably satisfactory to it of the loss, theft, destruction or mutilation of this Warrant or any stock certificate relating to the Warrant Shares, and in case of loss, theft or destruction, or indemnity or security reasonably satisfactory to it (which, in the case of the Warrant, shall not include the posting of any bond), and upon surrender and cancellation of such Warrant or stock certificate, if mutilated, the Company will make and deliver a new Warrant or stock certificate of like tenor and dated as of such cancellation, in lieu of such Warrant or stock certificate.

c) **Saturdays, Sundays, Holidays, etc.** If the last or appointed day for the taking of any action or the expiration of any right required or granted herein shall not be a Trading Day, then, such action may be taken or such right may be exercised on the next succeeding Trading Day.

d) **Authorized Shares.** The Company covenants that, at all times during the period the Warrant is outstanding, it will reserve from its authorized and unissued Common Stock a sufficient number of shares to provide for the issuance of the Warrant Shares upon the exercise of any purchase rights under this Warrant. The Company further covenants that its issuance of this Warrant shall constitute full authority to its officers who are charged with the duty of issuing the necessary Warrant Shares upon the exercise of the purchase rights under this Warrant. The Company will take all such reasonable

action as may be necessary to assure that such Warrant Shares may be issued as provided herein without violation of any applicable law or regulation, or of any requirements of the Trading Market upon which the Common Stock may be listed. The Company covenants that all Warrant Shares which may be issued upon the exercise of the purchase rights represented by this Warrant will, upon exercise of the purchase rights represented by this Warrant and payment for such Warrant Shares in accordance herewith, be duly authorized, validly issued, fully paid and nonassessable and free from all taxes, liens and charges created by the Company in respect of the issue thereof (other than taxes in respect of any transfer occurring contemporaneously with such issue).

Except and to the extent as waived or consented to by the Holder, the Company shall not by any action, including, without limitation, amending its certificate of incorporation or through any reorganization, transfer of assets, consolidation, merger, dissolution, issue or sale of securities or any other voluntary action, avoid or seek to avoid the observance or performance of any of the terms of this Warrant, but will at all times in good faith assist in the carrying out of all such terms and in the taking of all such actions as may be necessary or appropriate to protect the rights of Holder as set forth in this Warrant against impairment (it being understood that this Warrant shall not in any case prevent the Company from effecting any such amendment, reorganization, transfer, consolidation, merger, dissolution, issuance or sale). Without limiting the generality of the foregoing, the Company will (i) not increase the par value of any Warrant Shares above the amount payable therefor upon such exercise immediately prior to such increase in par value, (ii) take all such action as may be necessary or appropriate in order that the Company may validly and legally issue fully paid and nonassessable Warrant Shares upon the exercise of this Warrant and (iii) use commercially reasonable efforts to obtain all such authorizations, exemptions or consents from any public regulatory body having jurisdiction thereof, as may be, necessary to enable the Company to perform its obligations under this Warrant.

Before taking any action, which would result in an adjustment in the number of Warrant Shares for which this Warrant is exercisable or in the Exercise Price, the Company shall obtain all such authorizations or exemptions thereof, or consents thereto, as may be necessary from any public regulatory body or bodies having jurisdiction thereof.

e) **Jurisdiction.** All questions concerning the construction, validity, enforcement and interpretation of this Warrant shall be determined in accordance with the provisions of the Purchase Agreement.

f) **Restrictions.** The Holder acknowledges that the Warrant Shares acquired upon the exercise of this Warrant, if not registered, and the Holder does not utilize cashless exercise, will have restrictions upon resale imposed by state and federal securities laws.

g) **Nonwaiver and Expenses.** No course of dealing or any delay or failure to exercise any right hereunder on the part of Holder shall operate as a waiver of such right or otherwise prejudice the Holder's rights, powers or remedies, notwithstanding the fact that the right to exercise this Warrant terminates on the Termination Date. Without limiting any other provision of this Warrant, if the Company willfully and knowingly fails to comply with any provision of this Warrant, which results in any material damages to the Holder, the Company shall pay to the Holder such amounts as shall be sufficient to cover any costs and expenses including, but not limited to, reasonable attorneys' fees, including those of appellate proceedings, incurred by the Holder in collecting any amounts due pursuant hereto or in otherwise enforcing any of its rights, powers or remedies hereunder.

h) **Notices.** Any notice, request or other document required or permitted to be given or delivered to the Holder by the Company shall be delivered in accordance with the notice provisions of the Purchase Agreement.

i) **Limitation of Liability.** No provision hereof, in the absence of any affirmative action by the Holder to exercise this Warrant to purchase Warrant Shares, and no enumeration herein of the rights or privileges of the Holder, shall give rise to any liability of the Holder for the purchase price of any Common Stock or as a stockholder of the Company, whether such liability is asserted by the Company or by creditors of the Company.

j) **Remedies.** The Holder, in addition to being entitled to exercise all rights granted by law, including recovery of damages, will be entitled to specific performance of its rights under this Warrant. The Company agrees that monetary damages would not be adequate compensation for any loss incurred by reason of a breach by it of the provisions of this Warrant and hereby agrees to waive and not to assert the defense in any action for specific performance that a remedy at law would be adequate.

k) **Successors and Assigns.** Subject to applicable securities laws, this Warrant and the rights and obligations evidenced hereby shall inure to the benefit of and be binding upon the successors and permitted assigns of the Company and the successors and permitted assigns of Holder. The provisions of this Warrant are intended to be for the benefit of any Holder from time to time of this Warrant and shall be enforceable by the Holder or holder of Warrant Shares.

l) **Amendment.** This Warrant may be modified or amended or the provisions hereof waived with the written consent of the Company, on the one hand, and the Holder of this Warrant, on the other hand.

m) **Severability.** Wherever possible, each provision of this Warrant shall be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Warrant shall be prohibited by or invalid under applicable law, such provision shall be ineffective to the extent of such prohibition or invalidity, without invalidating the remainder of such provisions or the remaining provisions of this Warrant.

n) **Headings.** The headings used in this Warrant are for the convenience of reference only and shall not, for any purpose, be deemed a part of this Warrant.

(Signature Page Follows)

IN WITNESS WHEREOF, the Company has caused this Warrant to be executed by its officer thereunto duly authorized as of the date first above indicated.

THERIVA BIOLOGICS, INC.

By: _____
Name: _____
Title: _____

EXHIBIT A

NOTICE OF EXERCISE

TO: **THERIVA BIOLOGICS, INC.**

(1) The undersigned hereby elects to purchase _____ Warrant Shares of the Company pursuant to the terms of the attached Warrant (only if exercised in full), and tenders herewith payment of the exercise price in full, together with all applicable transfer taxes, if any.

(2) Payment shall take the form of (check applicable box):

" in lawful money of the United States; or

" if permitted the cancellation of such number of Warrant Shares as is necessary, in accordance with the formula set forth in subsection 2(c), to exercise this Warrant with respect to the maximum number of Warrant Shares purchasable pursuant to the cashless exercise procedure set forth in subsection 2(c).

(3) Please issue said Warrant Shares in the name of the undersigned or in such other name as is specified below:

The Warrant Shares shall be delivered to the following DWAC Account Number:

[SIGNATURE OF HOLDER]

Name of Investing Entity: _____

Signature of Authorized Signatory of Investing Entity : _____

Name of Authorized Signatory: _____

Title of Authorized Signatory: _____

Date: _____

EXHIBIT B

ASSIGNMENT FORM

(To assign the foregoing Warrant, execute this form and supply required information. Do not use this form to exercise the Warrant to purchase shares.)

FOR VALUE RECEIVED, the foregoing Warrant and all rights evidenced thereby are hereby assigned to

Name: _____
(Please Print)

Address: _____
(Please Print)

Phone Number: _____

Email Address: _____

Dated: _____, _____

Holder's Signature: _____
Holder's Address: _____

PRE-FUNDED COMMON STOCK PURCHASE WARRANT

THERIVA BIOLOGICS, INC.

Warrant Shares: _____

Issue Date: December [], 2024

THIS PRE-FUNDED COMMON STOCK PURCHASE WARRANT (the "Warrant") certifies that, for value received, _____ or its assigns (the "Holder") is entitled, upon the terms and subject to the limitations on exercise and the conditions hereinafter set forth, at any time on or after the date hereof (the "Initial Exercise Date") and until this Warrant is exercised in full (the "Termination Date") but not thereafter, to subscribe for and purchase from **Theriva Biologics, Inc.**, a Nevada corporation (the "Company"), up to _____ shares (as subject to adjustment hereunder, the "Warrant Shares") of the Company's common stock, par value \$0.001 per share (the "Common Stock"). The purchase price of one share of Common Stock under this Warrant shall be equal to the Exercise Price, as defined in Section 2(b).

Section 1. Definitions. Capitalized terms used and not otherwise defined herein shall have the meanings set forth in that certain Securities Purchase Agreement (the "Purchase Agreement"), dated December [], 2024, among the Company and the purchasers signatory thereto.

Section 2. Exercise

a) **Exercise of Warrant.** Subject to the terms and conditions hereof, exercise of the purchase rights represented by this Warrant may be made, in whole or in part, at any time or times on or after the Initial Exercise Date and on or before the Termination Date by delivery to the Company of a duly executed facsimile copy or PDF copy submitted by e-mail (or e-mail attachment) of the Notice of Exercise in the form attached hereto as Exhibit A (the "Notice of Exercise"). Within the earlier of (i) one (1) Trading Day and (ii) the number of Trading Days comprising the Standard Settlement Period (as defined in Section 2(d)(i) herein) following the date of exercise as aforesaid, the Holder shall deliver the unpaid portion of the aggregate Exercise Price for the Warrant Shares specified in the applicable Notice of Exercise by wire transfer or cashier's check drawn on a United States bank unless the cashless exercise procedure specified in Section 2(c) below is applicable and specified in the attached Notice of Exercise. The Company shall have no obligation to inquire with respect to or otherwise confirm the authenticity of the signature(s) contained on any Notice of Exercise nor the authority of the person executing such Notice of Exercise. No ink-original Notice of Exercise shall be required, nor shall any medallion guarantee (or other type of guarantee or notarization) of any Notice of Exercise be required. Notwithstanding anything herein to the contrary, the Holder shall not be required to physically surrender this Warrant to the Company until the Holder has purchased all of the Warrant Shares available hereunder and the Warrant has been exercised in full, in which case, the Holder shall surrender this Warrant to the Company for cancellation within three (3) Trading Days of the date on which the final Notice of Exercise is delivered to the Company. Partial exercises of this Warrant resulting in purchases of a portion of the total number of Warrant Shares available hereunder shall have the effect of lowering the outstanding number of Warrant Shares purchasable hereunder in an amount equal to the applicable number of Warrant Shares purchased. The Holder and the Company shall maintain records showing the number of Warrant Shares purchased and the date of such purchases. The Company shall deliver any objection to any Notice of Exercise within one (1) Trading Day of receipt of such notice. **The Holder and any assignee, by acceptance of this Warrant, acknowledge and agree that, by reason of the provisions of this paragraph, following the purchase of a portion of the Warrant Shares hereunder, the number of Warrant Shares available for purchase hereunder at any given time may be less than the amount stated on the face hereof.**

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b) **Exercise Price.** The aggregate exercise price of this Warrant, except for a nominal exercise price of \$0.0001 per Warrant Share, was pre-funded to the Company on or prior to the Initial Exercise Date and, consequently, no additional consideration (other than the nominal exercise price of \$0.0001 per Warrant Share) shall be required to be paid by the Holder to the Company to effect any exercise of this Warrant. The Holder shall not be entitled to the return or refund of all, or any portion, of such pre-paid aggregate exercise price under any circumstance or for any reason. The remaining exercise price per Warrant Share shall be \$0.0001, subject to adjustment hereunder (the "Exercise Price").

c) **Cashless Exercise.** Subject to the terms and conditions of this Warrant, the Holder may exercise, in whole or in part, at such time by means of a "cashless exercise" in which the Holder shall be entitled to receive a number of Warrant Shares equal to the quotient obtained by dividing [(A-B) (X)] by (A), where:

(A) = as applicable: (i) the VWAP on the Trading Day immediately preceding the date of the applicable Notice of Exercise if such Notice of Exercise is (1) both executed and delivered pursuant to Section 2(a) hereof on a day that is not a Trading Day or (2) both executed and delivered pursuant to Section 2(a) hereof on a Trading Day prior to the opening of "regular trading hours" (as defined in Rule 600(b)(68) of Regulation NMS promulgated under the federal securities laws) on such Trading Day, (ii) the VWAP on the Trading Day immediately preceding the date of the applicable Notice of Exercise or (iii) the VWAP on the date of the applicable Notice of Exercise if the date of such Notice of Exercise is a Trading Day and such Notice of Exercise is both executed and delivered pursuant to Section 2(a) hereof after the close of "regular trading hours" on such Trading Day;

(B) = the Exercise Price of this Warrant, as adjusted hereunder; and

(X) = the number of Warrant Shares that would be issuable upon exercise of this Warrant in accordance with the terms of this Warrant if such exercise were by means of a cash exercise rather than a cashless exercise.

"Bid Price" means, for any date, the price determined by the first of the following clauses that applies: (a) if the Common Stock is then listed or quoted on a Trading Market, the bid price of the Common Stock for the time in question (or the nearest preceding date) on the Trading Market on which the Common Stock is then listed or quoted as reported by Bloomberg L.P. (based on a Trading Day from 9:30 a.m. (New York City time) to 4:02 p.m. (New York City time)), (b) if the Common Stock is not then listed or quoted on a Trading Market and if prices for the Common Stock are then reported on the OTCQB Venture Market ("OTCQB") or the OTCQX Best Market ("OTCQX"), as applicable, the volume weighted average price of the Common Stock for such date (or the nearest preceding date) on OTCQB or OTCQX, as applicable, (c) if the Common Stock is not then listed or quoted for trading on a Trading Market or on OTCQB or OTCQX and if prices for the Common Stock are then reported on The Pink Open Market (or a similar organization or agency succeeding to its functions of reporting prices), the most recent bid price per share of the Common Stock so reported, or (d) in all other cases, the fair market value of a share of Common Stock as determined by an independent appraiser selected in good faith by the Holders of a majority in interest of the Securities then outstanding and reasonably acceptable to the Company, the fees and expenses of which shall be paid by the Company.

"VWAP" means, for any date, the price determined by the first of the following clauses that applies: (a) if the Common Stock is then listed or quoted on a Trading Market, the daily volume weighted average price of the Common Stock for such date (or the nearest preceding date) on the Trading Market on which the Common Stock is then listed or quoted as reported by Bloomberg L.P. (based on a Trading Day from 9:30 a.m. (New York City time) to 4:02 p.m. (New York City time)), (b) if the Common Stock is not then listed or quoted on a Trading Market and if prices for the Common Stock are then reported on OTCQB or OTCQX, as applicable, the volume weighted average price of the Common Stock for such date (or the nearest preceding date) on OTCQB or OTCQX, as applicable, (c) if the Common Stock is not then listed or quoted for trading on a Trading Market or on OTCQB or OTCQX and if

prices for the Common Stock are then reported on The Pink Open Market (or a similar organization or agency succeeding to its functions of reporting prices), the most recent bid price per share of the Common Stock so reported, or (d) in all other cases, the fair market value of a share of Common Stock as determined by an independent appraiser selected in good faith by the Holders of a majority in interest of the Securities then outstanding and reasonably acceptable to the Company, the fees and expenses of which shall be paid by the Company.

If Warrant Shares are issued in such a cashless exercise, the parties acknowledge and agree that in accordance with Section 3(a)(9) of the Securities Act, the Warrant Shares shall take on the registered characteristics of the Warrants being exercised. The Company agrees not to take any position contrary to this Section 2(c).

d) Mechanics of Exercise

i. Delivery of Warrant Shares Upon Exercise. The Company shall cause the Warrant Shares purchased hereunder to be transmitted by the Transfer Agent to the Holder by crediting the account of the Holder's or its designee's balance account with The Depository Trust Company through its Deposit or Withdrawal at Custodian system if the Company is then a participant in such system and either (A) there is an effective registration statement permitting the issuance of the Warrant Shares or (B) this Warrant is being exercised via cashless exercise, and otherwise by physical delivery of a certificate, registered in the Company's share register in the name of the Holder or its designee, for the number of Warrant Shares to which the Holder is entitled pursuant to such exercise to the address specified by the Holder in the Notice of Exercise by the date that is the earlier of (A) the earlier of (i) two (2) Trading Days and (ii) the number of days comprising the Standard Settlement Period, in each case after the delivery to the Company of the Notice of Exercise and (B) one (1) Trading Day after delivery of the aggregate Exercise Price to the Company (such date, the "Warrant Share Delivery Date"). Upon delivery of the Notice of Exercise, the Holder shall be deemed for all corporate purposes to have become the holder of record of the Warrant Shares with respect to which this Warrant has been exercised, irrespective of the date of delivery of the Warrant Shares, provided that payment of the aggregate Exercise Price (other than in the case of a cashless exercise) is received by the Warrant Share Delivery Date. If the Company fails for any reason to deliver to the Holder the Warrant Shares subject to a Notice of Exercise by the Warrant Share Delivery Date, provided that payment of the aggregate Exercise Price (other than in the instance of a cashless exercise) is received by the Company by such date, the Company shall pay to the Holder, in cash, as liquidated damages and not as a penalty, for each \$1,000 of Warrant Shares subject to such exercise (based on the VWAP of the Common Stock on the date of the applicable Notice of Exercise), \$10 per Trading Day (increasing to \$20 per Trading Day on the third Trading Day after the Warrant Share Delivery Date) for each Trading Day after such Warrant Share Delivery Date until such Warrant Shares are delivered or Holder rescinds such exercise. The Company agrees to maintain a transfer agent that is a participant in the FAST program so long as this Warrant remains outstanding and exercisable. As used herein, "Standard Settlement Period" means the standard settlement period, expressed in a number of Trading Days, on the Company's primary Trading Market with respect to the Common Stock as in effect on the date of delivery of the Notice of Exercise.

ii. Delivery of New Warrants Upon Exercise. If this Warrant shall have been exercised in part, the Company shall, at the request of a Holder and upon surrender of this Warrant certificate, at the time of delivery of the Warrant Shares, deliver to the Holder a new Warrant evidencing the rights of the Holder to purchase the unpurchased Warrant Shares called for by this Warrant, which new Warrant shall in all other respects be identical with this Warrant.

iii. Rescission Rights. If the Company fails to cause the Transfer Agent to transmit to the Holder the Warrant Shares pursuant to Section 2(d)(i) by the Warrant Share Delivery Date, then the Holder will have the right to rescind such exercise by delivering written notice to the Company at any time prior to the delivery of such Warrant Shares (in which case any liquidated damages payable under Section 2(d)(i) shall no longer be payable).

iv. Compensation for Buy-In on Failure to Timely Deliver Warrant Shares Upon Exercise. In addition to any other rights available to the Holder, if the Company fails to cause the Transfer Agent to transmit to the Holder the Warrant Shares in accordance with the provisions of Section 2(d)(i) above pursuant to an exercise on or before the Warrant Share Delivery Date (other than any such failure that is solely due to any action or inaction by the Holder with respect to such exercise), and if after such date the Holder is required by its broker to purchase (in an open market transaction or otherwise) or the Holder's brokerage firm otherwise purchases, shares of Common Stock to deliver in satisfaction of a sale by the Holder of the Warrant Shares which the Holder anticipated receiving upon such exercise (a "Buy-In"), then the Company shall (A) pay in cash to the Holder the amount, if any, by which (x) the Holder's total purchase price (including brokerage commissions, if any) for the shares of Common Stock so purchased exceeds (y) the amount obtained by multiplying (1) the number of Warrant Shares that the Company was required to deliver to the Holder in connection with the exercise at issue times (2) the price at which the sell order giving rise to such purchase obligation was executed, and (B) at the option of the Holder, either reinstate the portion of the Warrant and equivalent number of Warrant Shares for which such exercise was not honored (in which case such exercise shall be deemed rescinded) or deliver to the Holder the number of shares of Common Stock that would have been issued had the Company timely complied with its exercise and delivery obligations hereunder. For example, if the Holder purchases Common Stock having a total purchase price of \$11,000 to cover a Buy-In with respect to an attempted exercise of Warrants with an aggregate sale price giving rise to such purchase obligation of \$10,000, under clause (A) of the immediately preceding sentence the Company shall be required to pay the Holder \$1,000. The Holder shall provide the Company written notice indicating the amounts payable to the Holder in respect of the Buy-In and, upon request of the Company, evidence of the amount of such loss. Nothing herein shall limit a Holder's right to pursue any other remedies available to it hereunder, at law or in equity including, without limitation, a decree of specific performance and/or injunctive relief with respect to the Company's failure to timely deliver shares of Common Stock upon exercise of the Warrant as required pursuant to the terms hereof.

v. No Fractional Shares or Scrip. No fractional shares or scrip representing fractional shares shall be issued upon the exercise of this Warrant. As to any fraction of a share which the Holder would otherwise be entitled to purchase upon such exercise, the Company shall, at its election, either pay a cash adjustment in respect of such final fraction in an amount equal to such fraction multiplied by the Exercise Price or round up to the next whole share.

vi. Charges, Taxes and Expenses. Issuance of Warrant Shares shall be made without charge to the Holder for any issue or transfer tax or other incidental expense in respect of the issuance of such Warrant Shares, all of which taxes and expenses shall be paid by the Company, and such Warrant Shares shall be issued in the name of the Holder or in such name or names as may be directed by the Holder; provided, however, that in the event that Warrant Shares are to be issued in a name other than the name of the Holder, this Warrant when surrendered for exercise shall be accompanied by the Assignment Form, attached hereto as Exhibit B, duly executed by the Holder and the Company may require, as a condition thereto, the payment of a sum sufficient to reimburse it for any transfer tax incidental thereto. The Company shall pay all Transfer Agent fees required for same-day processing of any Notice of Exercise and all fees to the Depository Trust Company (or another

established clearing corporation performing similar functions) required for same-day electronic delivery of the Warrant Shares.

vii. Closing of Books. The Company will not close its stockholder books or records in any manner which prevents the timely exercise of this Warrant, pursuant to the terms hereof.

e) Holder's Exercise Limitations. The Company shall not effect any exercise of this Warrant, and a Holder shall not have the right to exercise any portion of this Warrant, pursuant to Section 2 or otherwise, to the extent that after giving effect to such issuance after exercise as set forth on the applicable Notice of Exercise, the Holder (together with the Holder's Affiliates, and any other Persons acting as a group together with the Holder or any of the Holder's Affiliates (such Persons, "Attribution Parties")), would beneficially own in excess of the Beneficial Ownership Limitation (as defined below). For purposes of the foregoing sentence, the number of shares of Common Stock beneficially owned by the Holder and its Affiliates and Attribution Parties shall include the number of shares of Common Stock issuable upon exercise of this Warrant with respect to which such determination is being made, but shall exclude the number of shares of Common Stock which would be issuable upon (i) exercise of the remaining, nonexercised portion of this Warrant beneficially owned by the Holder or any of its Affiliates or Attribution Parties and (ii) exercise or conversion of the unexercised or nonconverted portion of any other securities of the Company (including, without limitation, any other Common Stock Equivalents) subject to a limitation on conversion or exercise analogous to the limitation contained herein beneficially owned by the Holder or any of its Affiliates or Attribution Parties. Except as set forth in the preceding sentence, for purposes of this Section 2(e), beneficial ownership shall be calculated in accordance with Section 13(d) of the Exchange Act and the rules and regulations promulgated thereunder, it being acknowledged by the Holder that the Company is not representing to the Holder that such calculation is in compliance with Section 13(d) of the Exchange Act and the Holder is solely responsible for any schedules required to be filed in accordance therewith. To the extent that the limitation contained in this Section 2(e) applies, the determination of whether this Warrant is exercisable (in relation to other securities owned by the Holder together with any Affiliates and Attribution Parties) and of which portion of this Warrant is exercisable shall be in the sole discretion of the Holder, and the submission of a Notice of Exercise shall be deemed to be the Holder's determination of whether this Warrant is exercisable (in relation to other securities owned by the Holder together with any Affiliates and Attribution Parties) and of which portion of this Warrant is exercisable, in each case subject to the Beneficial Ownership Limitation, and the Company shall have no obligation to verify or confirm the accuracy of such determination and shall have no liability for exercises of the Warrant that are not in compliance with the Beneficial Ownership Limitation, except to the extent the Holder relies on a number of outstanding shares of Common Stock that was provided by the Company. In addition, a determination as to any group status as contemplated above shall be determined in accordance with Section 13(d) of the Exchange Act and the rules and regulations promulgated thereunder, and the Company shall have no obligation to verify or confirm the accuracy of such determination and shall have no liability for exercises of the Warrant that are not in compliance with the Beneficial Ownership Limitation, except to the extent the Holder relies on the number of outstanding shares of Common Stock that was provided by the Company. For purposes of this Section 2(e), in determining the number of outstanding shares of Common Stock, a Holder may rely on the number of outstanding shares of Common Stock as reflected in (A) the Company's most recent periodic or annual report filed with the Commission, as the case may be, (B) a more recent public announcement by the Company or (C) a more recent written notice by the Company or the Transfer Agent setting forth the number of shares of Common Stock outstanding. Upon the written request of a Holder, the Company shall within two (2) Trading Days confirm orally and in writing to the Holder the number of shares of Common Stock then outstanding. In any case, the number of outstanding shares of Common Stock shall be determined after giving effect to the conversion or exercise of securities of the Company, including this Warrant, by the Holder or its Affiliates or Attribution Parties since the date as of which such number of outstanding shares of Common Stock was reported. The "Beneficial Ownership Limitation" shall be [4.99/9.99)% of the number of shares of the Common Stock outstanding immediately after giving effect to the issuance of shares of Common Stock issuable upon exercise of this Warrant. The Holder, upon written notice to the Company, may increase or decrease the Beneficial Ownership Limitation provisions of this Section 2(e), provided that the Beneficial Ownership Limitation in no event exceeds 9.99% of the number of shares of the Common Stock outstanding immediately after giving effect to the issuance of shares of Common Stock upon exercise of this Warrant held by the Holder and the provisions of this Section 2(e) shall continue to apply. Any increase in the Beneficial Ownership Limitation will not be effective until the 61st day after such notice is delivered to the Company. The provisions of this paragraph shall be construed and implemented in a manner otherwise than in strict conformity with the terms of this Section 2(e) to correct this paragraph (or any portion hereof) which may be defective or inconsistent with the intended Beneficial Ownership Limitation herein contained or to make changes or supplements necessary or desirable to properly give effect to such limitation. The limitations contained in this paragraph shall apply to a successor holder of this Warrant. If the Warrant is unexercisable as a result of the Holder's Beneficial Ownership Limitation, no alternate consideration is owing to the Holder.

Section 3. Certain Adjustments

a) Stock Dividends and Splits. If the Company, at any time while this Warrant is outstanding: (i) pays a stock dividend or otherwise makes a distribution or distributions on shares of its Common Stock or any other equity or equity equivalent securities payable in shares of Common Stock (which, for avoidance of doubt, shall not include any shares of Common Stock issued by the Company upon exercise of this Warrant or pursuant to any other Transaction Documents), (ii) subdivides outstanding shares of Common Stock into a larger number of shares, (iii) combines (including by way of reverse stock split) outstanding shares of Common Stock into a smaller number of shares, or (iv) issues by reclassification of shares of the Common Stock any shares of capital stock of the Company, then in each case the Exercise Price shall be multiplied by a fraction of which the numerator shall be the number of shares of Common Stock (excluding treasury shares, if any) outstanding immediately before such event and of which the denominator shall be the number of shares of Common Stock outstanding immediately after such event, and the number of shares issuable upon exercise of this Warrant shall be proportionately adjusted such that the aggregate Exercise Price of this Warrant shall remain unchanged. Any adjustment made pursuant to this Section 3(a) shall become effective immediately after the record date for the determination of stockholders entitled to receive such dividend or distribution and shall become effective immediately after the effective date in the case of a subdivision, combination or re-classification.

b) Subsequent Rights Offerings. In addition to any adjustments pursuant to Section 3(a) above, if at any time while this Warrant is outstanding the Company grants, issues or sells any Common Stock Equivalents or rights to purchase stock, warrants, securities or other property pro rata to all of the record holders of any class of shares of Common Stock (the "Purchase Rights"), then the Holder will be entitled to acquire, upon the terms applicable to such Purchase Rights, the aggregate Purchase Rights which the Holder could have acquired if the Holder had held the number of shares of Common Stock acquirable upon complete exercise of this Warrant (without regard to any limitations on exercise hereof, including without limitation, the Beneficial Ownership Limitation) immediately before the date on which a record is taken for the grant, issuance or sale of such Purchase Rights, or, if no such record is taken, the date as of which the record holders of shares of Common Stock are to be determined for the grant, issue or sale of such Purchase Rights (provided, however, that to the extent that the Holder's right to participate in any such Purchase Right would result in the Holder exceeding the Beneficial Ownership Limitation, then the Holder shall not be entitled to participate in such Purchase Right to such extent (or beneficial ownership of such shares of Common Stock as a result of such Purchase Right to such extent) and such Purchase Right to such extent shall be held in abeyance for the Holder until such time, if ever, as its right thereto would not result in the Holder exceeding the Beneficial Ownership Limitation).

c) Pro Rata Distributions. During such time as this Warrant is outstanding, if the Company shall declare or make any dividend or other distribution of its assets (or rights to acquire its assets) to all of the holders of shares of Common Stock, by way of return of capital or otherwise (including, without

limitation, any distribution of cash, stock or other securities, property or options by way of a dividend, spin off, reclassification, corporate rearrangement, scheme of arrangement or other similar transaction) (a "Distribution"), at any time after the issuance of this Warrant, then, in each such case, the Holder shall be entitled to participate in such Distribution to the same extent that the Holder would have participated therein if the Holder had held the number of shares of Common Stock acquirable upon complete exercise of this Warrant (without regard to any limitations on exercise hereof, including without limitation, the Beneficial Ownership Limitation) immediately before the date of which a record is taken for such Distribution, or, if no such record is taken, the date as of which the record holders of shares of Common Stock are to be determined for the participation in such Distribution (provided, however, that to the extent that the Holder's right to participate in any such Distribution would result in the Holder exceeding the Beneficial Ownership Limitation, then the Holder shall not be entitled to participate in such Distribution to such extent (or in the beneficial ownership of any shares of Common Stock as a result of such Distribution to such extent) and the portion of such Distribution shall be held in abeyance for the benefit of the Holder until such time, if ever, as its right thereto would not result in the Holder exceeding the Beneficial Ownership Limitation).

d) Fundamental Transaction. If, at any time while this Warrant is outstanding, (i) the Company, directly or indirectly, in one or more related transactions effects any merger or consolidation of the Company with or into another Person, (ii) the Company (or any Subsidiary), directly or indirectly, effects any sale, lease, license, assignment, transfer, conveyance or other disposition of all or substantially all of the Company's assets in one or a series of related transactions, (iii) any, direct or indirect, purchase offer, tender offer or exchange offer (whether by the Company or another Person) is completed pursuant to which holders of Common Stock are permitted to sell, tender or exchange their shares for other securities, cash or property and has been accepted by the holders of more than 50% of the aggregate voting power of the outstanding common and preferred stocks of the Company, (iv) the Company, directly or indirectly, in one or more related transactions effects any reclassification, reorganization or recapitalization of shares of Common Stock or any compulsory share exchange pursuant to which the shares of Common Stock are effectively converted into or exchanged for other securities, cash or property, or (v) the Company, directly or indirectly, in one or more related transactions consummates a stock or share purchase agreement or other business combination (including, without limitation, a reorganization, recapitalization, spin-off, merger or scheme of arrangement) with another Person or group of Persons whereby such other Person or group acquires more than 50% of the aggregate voting power of the outstanding common and preferred stocks of the Company (not including any shares of Common Stock held by the other Person or other Persons making or party to, or associated or affiliated with the other Persons making or party to, such stock or share purchase agreement or other business combination) (each a "Fundamental Transaction"), then, upon any subsequent exercise of this Warrant, the Holder shall have the right to receive, for each Warrant Share that would have been issuable upon such exercise immediately prior to the occurrence of such Fundamental Transaction, at the option of the Holder (without regard to any limitation in Section 2(e) on the exercise of this Warrant), the number of shares of Common Stock of the successor or acquiring corporation or of the Company, if it is the surviving corporation, and any additional consideration (the "Alternate Consideration") receivable as a result of such Fundamental Transaction by a holder of the number of shares of Common Stock for which this Warrant is exercisable immediately prior to such Fundamental Transaction (without regard to any limitation in Section 2(e) on the exercise of this Warrant). For purposes of any such exercise, the determination of the Exercise Price shall be appropriately adjusted to apply to such Alternate Consideration based on the amount of Alternate Consideration issuable in respect of one share of Common Stock in such Fundamental Transaction, and the Company shall apportion the Exercise Price among the Alternate Consideration in a reasonable manner reflecting the relative value of any different components of the Alternate Consideration. If holders of Common Stock are given any choice as to the securities, cash or property to be received in a Fundamental Transaction, then the Holder shall be given the same choice as to the Alternate Consideration it receives upon any exercise of this Warrant following such Fundamental Transaction. The Company shall cause any successor entity in a Fundamental Transaction in which the Company is not the survivor (the "Successor Entity") to assume in writing all of the obligations of the Company under this Warrant and the other Transaction Documents in accordance with the provisions of this Section 3(d) pursuant to written agreements in form and substance reasonably satisfactory to the Holder prior to such Fundamental Transaction and shall, at the option of the Holder, deliver to the Holder in exchange for this Warrant a security of the Successor Entity evidenced by a written instrument substantially similar in form and substance to this Warrant which is exercisable for a corresponding number of shares of capital stock of such Successor Entity (or its parent entity) equivalent to the shares of Common Stock acquirable and receivable upon exercise of this Warrant (without regard to any limitations on the exercise of this Warrant) prior to such Fundamental Transaction, and with an exercise price which applies the exercise price hereunder to such shares of capital stock (but taking into account the relative value of the shares of Common Stock pursuant to such Fundamental Transaction and the value of such shares of capital stock, such number of shares of capital stock and such exercise price being for the purpose of protecting the economic value of this Warrant immediately prior to the consummation of such Fundamental Transaction), and which is reasonably satisfactory in form and substance to the Holder. Upon the occurrence of any such Fundamental Transaction, the Successor Entity shall succeed to, and be substituted for (so that from and after the date of such Fundamental Transaction, the provisions of this Warrant and the other Transaction Documents referring to the "Company" shall refer instead to the Successor Entity), and may exercise every right and power of the Company and shall assume all of the obligations of the Company under this Warrant and the other Transaction Documents with the same effect as if such Successor Entity had been named as the Company herein.

e) Calculations. All calculations under this Section 3 shall be made to the nearest cent or the nearest 1/100th of a share, as the case may be. For purposes of this Section 3, the number of shares of Common Stock deemed to be issued and outstanding as of a given date shall be the sum of the number of shares of Common Stock (excluding treasury shares, if any) issued and outstanding.

f) Notice to Holder.

i. Adjustment to Exercise Price. Whenever the Exercise Price is adjusted pursuant to any provision of this Section 3, the Company shall promptly deliver to the Holder by facsimile or email a notice setting forth the Exercise Price after such adjustment and any resulting adjustment to the number of Warrant Shares and setting forth a brief statement of the facts requiring such adjustment; provided, however, that the Company may satisfy this notice requirement in this Section 3(f) by filing such notice with the Commission pursuant to a Current Report on Form 8-K, Quarterly Report on Form 10-Q or Annual Report on Form 10-K.

ii. Notice to Allow Exercise by Holder. If (A) the Company shall declare a dividend (or any other distribution in whatever form) on the Common Stock other than a stock split, (B) the Company shall declare a special nonrecurring cash dividend on or a redemption of the Common Stock, (C) the Company shall authorize the granting to all holders of the Common Stock rights or warrants to subscribe for or purchase any shares of capital stock of any class or of any rights, (D) the approval of any stockholders of the Company shall be required in connection with any reclassification of the Common Stock, any consolidation or merger to which the Company is a party, any sale or transfer of all or substantially all of the assets of the Company, or any compulsory share exchange whereby the Common Stock is converted into other securities, cash or property, or (E) the Company shall authorize the voluntary or involuntary dissolution, liquidation or winding up of the affairs of the Company, then, in each case, the Company shall cause to be delivered by facsimile or email to the Holder at its last facsimile number or email address as it shall appear upon the Warrant Register of the Company, at least 4 calendar days prior to the applicable record or effective date hereinafter specified, a notice stating (x) the date on which a record is to be taken for the purpose of such dividend, distribution, redemption, rights or warrants, or if a record is not to be taken, the date as of which the holders of the Common Stock of record to be entitled to such dividend, distributions, redemption, rights or warrants are to be determined or (y) the date on which such reclassification, consolidation, merger, sale, transfer or share exchange is expected to become effective or close, and the date as of which it is expected that holders of the Common Stock of record shall be entitled to exchange their shares of the Common Stock for securities, cash or other property deliverable upon such reclassification, consolidation, merger, sale, transfer or share exchange; provided that the failure to deliver such notice or any defect therein or in the delivery thereof shall not affect the validity of the corporate action required to be specified in such notice. To the extent that any notice provided in this Warrant constitutes, or contains, material, non-public information regarding the Company or any of the Company's subsidiaries, the Company shall simultaneously file such notice with the Commission pursuant to a Current Report on Form 8-K. The Holder shall remain entitled to exercise this Warrant during

the period commencing on the date of such notice to the effective date of the event triggering such notice except as may otherwise be expressly set forth herein.

g) **Voluntary Adjustment by Company.** Subject to the rules and regulations of the Trading Market, the Company may at any time during the term of this Warrant, subject to the prior written consent of the Holder, reduce the then current Exercise Price to any amount and for any period of time deemed appropriate by the board of directors of the Company.

Section 4. Transfer of Warrant

a) **Transferability.** Subject to compliance with any applicable securities laws and the conditions set forth in Section 4(d) hereof, this Warrant and all rights hereunder (including, without limitation, any registration rights) are transferable, in whole or in part, upon surrender of this Warrant at the principal office of the Company or its designated agent, together with a written assignment of this Warrant substantially in the form attached hereto duly executed by the Holder or its agent or attorney and funds sufficient to pay any transfer taxes payable upon the making of such transfer. Upon such surrender and, if required, such payment, the Company shall execute and deliver a new Warrant or Warrants in the name of the assignee or assignees, as applicable, and in the denomination or denominations specified in such instrument of assignment, and shall issue to the assignor a new Warrant evidencing the portion of this Warrant not so assigned, and this Warrant shall promptly be cancelled. Notwithstanding anything herein to the contrary, the Holder shall not be required to physically surrender this Warrant to the Company unless the Holder has assigned this Warrant in full, in which case, the Holder shall surrender this Warrant to the Company within three (3) Trading Days of the date on which the Holder delivers an assignment form to the Company assigning this Warrant in full. The Warrant, if properly assigned in accordance herewith, may be exercised by a new holder for the purchase of Warrant Shares without having a new Warrant issued.

b) **New Warrants.** This Warrant may be divided or combined with other Warrants upon presentation hereof at the aforesaid office of the Company, together with a written notice specifying the names and denominations in which new Warrants are to be issued, signed by the Holder or its agent or attorney. Subject to compliance with Section 4(a), as to any transfer which may be involved in such division or combination, the Company shall execute and deliver a new Warrant or Warrants in exchange for the Warrant or Warrants to be divided or combined in accordance with such notice. All Warrants issued on transfers or exchanges shall be dated the Issue Date of this Warrant and shall be identical with this Warrant except as to the number of Warrant Shares issuable pursuant thereto.

c) **Warrant Register.** The Company shall register this Warrant, upon records to be maintained by the Company for that purpose (the "Warrant Register"), in the name of the record Holder hereof from time to time. The Company may deem and treat the registered Holder of this Warrant as the absolute owner hereof for the purpose of any exercise hereof or any distribution to the Holder, and for all other purposes, absent actual notice to the contrary.

Section 5. Miscellaneous

a) **No Rights as Stockholder Until Exercise; No Settlement in Cash.** This Warrant does not entitle the Holder to any voting rights, dividends or other rights as a stockholder of the Company prior to the exercise hereof as set forth in Section 2(d)(i), except as expressly set forth in Section 3. Without limiting the rights of a Holder to receive Warrant Shares on a "cashless exercise" as permitted in Section 2(c), and to receive the cash payments contemplated pursuant to Section 2(d)(i) and Section 2(d)(iv), in no event will the Company be required to net cash settle an exercise of this Warrant.

b) **Loss, Theft, Destruction or Mutilation of Warrant.** The Company covenants that upon receipt by the Company of evidence reasonably satisfactory to it of the loss, theft, destruction or mutilation of this Warrant or any stock certificate relating to the Warrant Shares, and in case of loss, theft or destruction, of indemnity or security reasonably satisfactory to it (which, in the case of the Warrant, shall not include the posting of any bond), and upon surrender and cancellation of such Warrant or stock certificate, if mutilated, the Company will make and deliver a new Warrant or stock certificate of like tenor and dated as of such cancellation, in lieu of such Warrant or stock certificate.

c) **Saturdays, Sundays, Holidays, etc.** If the last or appointed day for the taking of any action or the expiration of any right required or granted herein shall not be a Trading Day, then, such action may be taken or such right may be exercised on the next succeeding Trading Day.

d) **Authorized Shares.** The Company covenants that, at all times during the period the Warrant is outstanding, it will reserve from its authorized and unissued Common Stock a sufficient number of shares to provide for the issuance of the Warrant Shares upon the exercise of any purchase rights under this Warrant. The Company further covenants that its issuance of this Warrant shall constitute full authority to its officers who are charged with the duty of issuing the necessary Warrant Shares upon the exercise of the purchase rights under this Warrant. The Company will take all such reasonable action as may be necessary to assure that such Warrant Shares may be issued as provided herein without violation of any applicable law or regulation, or of any requirements of the Trading Market upon which the Common Stock may be listed. The Company covenants that all Warrant Shares which may be issued upon the exercise of the purchase rights represented by this Warrant will, upon exercise of the purchase rights represented by this Warrant and payment for such Warrant Shares in accordance herewith, be duly authorized, validly issued, fully paid and nonassessable and free from all taxes, liens and charges created by the Company in respect of the issue thereof (other than taxes in respect of any transfer occurring contemporaneously with such issue).

Except and to the extent as waived or consented to by the Holder, the Company shall not by any action, including, without limitation, amending its certificate of incorporation or through any reorganization, transfer of assets, consolidation, merger, dissolution, issue or sale of securities or any other voluntary action, avoid or seek to avoid the observance or performance of any of the terms of this Warrant, but will at all times in good faith assist in the carrying out of all such terms and in the taking of all such actions as may be necessary or appropriate to protect the rights of Holder as set forth in this Warrant against impairment (it being understood that this Warrant shall not in any case prevent the Company from effecting any such amendment, reorganization, transfer, consolidation, merger, dissolution, issuance or sale). Without limiting the generality of the foregoing, the Company will (i) not increase the par value of any Warrant Shares above the amount payable therefor upon such exercise immediately prior to such increase in par value, (ii) take all such action as may be necessary or appropriate in order that the Company may validly and legally issue fully paid and nonassessable Warrant Shares upon the exercise of this Warrant and (iii) use commercially reasonable efforts to obtain all such authorizations, exemptions or consents from any public regulatory body having jurisdiction thereof, as may be, necessary to enable the Company to perform its obligations under this Warrant.

Before taking any action, which would result in an adjustment in the number of Warrant Shares for which this Warrant is exercisable or in the Exercise Price, the Company shall obtain all such authorizations or exemptions thereof, or consents thereto, as may be necessary from any public regulatory body or bodies having jurisdiction thereof.

e) **Jurisdiction.** All questions concerning the construction, validity, enforcement and interpretation of this Warrant shall be determined in accordance with the provisions of the Purchase Agreement.

f) **Restrictions.** The Holder acknowledges that the Warrant Shares acquired upon the exercise of this Warrant, if not registered, and the Holder does not utilize cashless exercise, will have restrictions upon resale imposed by state and federal securities laws.

g) **Nonwaiver and Expenses.** No course of dealing or any delay or failure to exercise any right hereunder on the part of Holder shall operate as a waiver of such right or otherwise prejudice the Holder's rights, powers or remedies, notwithstanding the fact that the right to exercise this Warrant terminates on the Termination Date. Without limiting any other provision of this Warrant, if the Company willfully and knowingly fails to comply with any provision of this Warrant, which results in any material damages to the Holder, the Company shall pay to the Holder such amounts as shall be sufficient to cover any costs and expenses including, but not limited to, reasonable attorneys' fees, including those of appellate proceedings, incurred by the Holder in collecting any amounts due pursuant hereto or in otherwise enforcing any of its rights, powers or remedies hereunder.

h) **Notices.** Any notice, request or other document required or permitted to be given or delivered to the Holder by the Company shall be delivered in accordance with the notice provisions of the Purchase Agreement.

i) **Limitation of Liability.** No provision hereof, in the absence of any affirmative action by the Holder to exercise this Warrant to purchase Warrant Shares, and no enumeration herein of the rights or privileges of the Holder, shall give rise to any liability of the Holder for the purchase price of any Common Stock or as a stockholder of the Company, whether such liability is asserted by the Company or by creditors of the Company.

j) **Remedies.** The Holder, in addition to being entitled to exercise all rights granted by law, including recovery of damages, will be entitled to specific performance of its rights under this Warrant. The Company agrees that monetary damages would not be adequate compensation for any loss incurred by reason of a breach by it of the provisions of this Warrant and hereby agrees to waive and not to assert the defense in any action for specific performance that a remedy at law would be adequate.

k) **Successors and Assigns.** Subject to applicable securities laws, this Warrant and the rights and obligations evidenced hereby shall inure to the benefit of and be binding upon the successors and permitted assigns of the Company and the successors and permitted assigns of Holder. The provisions of this Warrant are intended to be for the benefit of any Holder from time to time of this Warrant and shall be enforceable by the Holder or holder of Warrant Shares.

l) **Amendment.** This Warrant may be modified or amended or the provisions hereof waived with the written consent of the Company, on the one hand, and the Holder of this Warrant, on the other hand.

m) **Severability.** Wherever possible, each provision of this Warrant shall be interpreted in such manner as to be effective and valid under applicable law, but if any provision of this Warrant shall be prohibited by or invalid under applicable law, such provision shall be ineffective to the extent of such prohibition or invalidity, without invalidating the remainder of such provisions or the remaining provisions of this Warrant.

n) **Headings.** The headings used in this Warrant are for the convenience of reference only and shall not, for any purpose, be deemed a part of this Warrant.

(Signature Page Follows)

IN WITNESS WHEREOF, the Company has caused this Warrant to be executed by its officer thereunto duly authorized as of the date first above indicated.

THERIVA BIOLOGICS, INC.

By: _____
Name: _____
Title: _____

[SIGNATURE PAGE TO PRE-FUNDED COMMON STOCK PURCHASE WARRANT OF
THERIVA BIOLOGICS, INC.]

EXHIBIT A

NOTICE OF EXERCISE

TO: **THERIVA BIOLOGICS, INC.**

(1) The undersigned hereby elects to purchase _____ Warrant Shares of the Company pursuant to the terms of the attached Warrant (only if exercised in full), and tenders herewith payment of the exercise price in full, together with all applicable transfer taxes, if any.

(2) Payment shall take the form of (check applicable box):

“ in lawful money of the United States; or

“ if permitted the cancellation of such number of Warrant Shares as is necessary, in accordance with the formula set forth in subsection 2(c), to exercise this Warrant with respect to the maximum number of Warrant Shares purchasable pursuant to the cashless exercise procedure set forth in subsection 2(c).

(3) Please issue said Warrant Shares in the name of the undersigned or in such other name as is specified below:

The Warrant Shares shall be delivered to the following DWAC Account Number:

[SIGNATURE OF HOLDER]

Name of Investing Entity: _____

Signature of Authorized Signatory of Investing Entity : _____

Name of Authorized Signatory: _____

Title of Authorized Signatory: _____

Date: _____

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EXHIBIT B

ASSIGNMENT FORM

(To assign the foregoing Warrant, execute this form and supply required information. Do not use this form to exercise the Warrant to purchase shares.)

FOR VALUE RECEIVED, the foregoing Warrant and all rights evidenced thereby are hereby assigned to

Name: _____
(Please Print)

Address: _____
(Please Print)

Phone Number: _____

Email Address: _____

Dated: _____, _____

Holder's Signature: _____
Holder's Address: _____

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December 10, 2024

The Board of Directors
Theriva Biologics, Inc.
9605 Medical Center, Suite 270
Rockville, MD 20850

Re: Registration Statement on Form S-1

Gentlemen:

We have acted as special Nevada counsel to Theriva Biologics, Inc., a Nevada corporation (the "Company"), in connection with the preparation and filing with the Securities and Exchange Commission (the "Commission") pursuant to the Securities Act of 1933, as amended (the "Securities Act"), of a Registration Statement on Form S-1 (the "Registration Statement") relating to the registration by the Company of up to \$20,000,000 of the Company's Securities (as defined below), resulting in gross proceeds of \$10,000,000, consisting of shares (the "Shares") of the Company's common stock, par value \$0.001 per share (the "Common Stock"), or in lieu thereof, pre-funded warrants to purchase shares of Common Stock (the "Pre-Funded Warrants") and the shares of Common Stock issuable from time to time upon exercise of the Pre-Funded Warrants (the "Pre-Funded Warrant Shares"), with each Share or Pre-Funded Warrant accompanied by a warrant to purchase shares of Common Stock (the "Common Warrants") and the shares of Common Stock issuable from time to time upon exercise of the Common Warrants (the "Common Warrant Shares"). The Shares, the Pre-Funded Warrants, the Pre-Funded Warrant Shares, the Common Warrants and the Common Warrant Shares are collectively referred to as the "Securities." The Securities are to be sold by the Company pursuant to a securities purchase agreement (the "Purchase Agreement") to be entered into by and among the Company and certain investor signatories thereto, the form of which has been, or will be, filed as Exhibit 10.36 to the Registration Statement.

As such counsel, we have examined such matters of fact and questions of law as we have considered appropriate for purposes of this letter. With your consent, we have relied upon certificates and other assurances of officers of the Company and others as to factual matters without having independently verified such factual matters ("Reliance Documents"). We are opining herein as to the Nevada Revised Statutes (the "NRS"), and we express no opinion with respect to the applicability thereto, or the effect thereon, of the federal securities laws, the laws of any other jurisdiction or, in the case of Nevada, any other laws, or as to any matters of municipal law or the laws of any local agencies within any state. In connection with this opinion letter, we have examined and relied upon the representations and warranties as to factual matters contained in and made pursuant to the Reliance Documents, Registration Statement, and upon such other documents as in our judgment are necessary or appropriate to enable us to render the opinions expressed herein.

Our knowledge of the Company and its legal and other affairs is limited by the scope of our engagement, which scope includes the delivery of this opinion letter. We do not represent the Company with respect to all legal matters or issues. The Company may employ other independent counsel and, to our knowledge, handles certain matters and issues without the assistance of independent counsel.

In our examination of the foregoing, we have assumed, without independent investigation or verification: (i) the genuineness of all signatures on all agreements, instruments and other documents submitted to us; (ii) the legal capacity and authority of all persons or entities executing all agreements, instruments and other documents submitted to us; (iii) the authenticity and completeness of all agreements, instruments, corporate records, certificates and other documents submitted to us as originals; (iv) that all agreements, instruments, corporate records, certificate and other documents submitted to us as certified, electronic, facsimile, conformed, photostatic or other copies conform to authentic originals thereof, and that such originals are authentic and complete; (v) the due authorization, execution and delivery of all instruments, agreements, and other documents by the parties thereto (other than the Company); (vi) that the statements contained in the certificates and comparable documents of public officials, officers and representatives of the Company and other persons on which we have relied for the purposes of this letter are true and correct; and (vii) that the officers and directors of the Company have properly exercised their fiduciary duties. We have assumed that the issuance and sale of the Securities by the Company will not, in each case, violate or constitute a default or breach under (a) any agreement or instrument to which the Company is subject, (b) any law, rule or regulation to which the Company is subject, (c) any judicial or regulatory order or decree of any governmental authority, or (d) any consent, approval, license, authorization or validation of, or filing, recording or registration with any governmental authority.

We have further assumed that: (i) the Registration Statement and any amendments thereto will have become effective under the Securities Act and comply with all applicable laws at the time the Securities are offered or issued as contemplated by the Registration Statement; (ii) an appropriate prospectus supplement, free writing prospectus or term sheet relating to the Securities offered thereby will be prepared and filed with the Commission in compliance with the Securities Act and will comply with all applicable laws at the time the Securities are offered or issued as contemplated by the Registration Statement; (iii) all Securities will be issued and sold in compliance with the applicable provisions of the Securities Act and the Securities or Blue Sky Laws of various states and in the manner stated in the Registration Statement and the applicable prospectus supplement; (iv) any purchase, placement agency, warrant, deposit, unit or similar agreement (collectively the "Securities Agreements") relating to the Securities being offered will be duly authorized, executed and delivered by other parties thereto; (v) the terms of any Common Warrants and Pre-Funded Warrants included in any Securities offered and issued as executed and delivered are as described in the Registration Statement; and (vi) the number of shares of Common Stock offered pursuant to the Registration Statement does not exceed, at the time of issuance, the authorized but unissued shares of Common Stock.

Opinions

Based upon and subject to the foregoing, we are of the opinion that: (i) the Shares have been duly authorized for issuance and, when issued, delivered and paid for in accordance with the terms of the Purchase Agreement and in the manner described in the Registration Statement, the Shares will be validly issued, fully paid and non-assessable; (ii) the Pre-Funded Warrant Shares have been duly authorized for issuance and, when issued and sold by the Company and delivered by the Company and upon valid exercise of the Pre-Funded Warrants and against receipt of the exercise price therefor, in accordance with and in the manner described in the Registration Statement, the Purchase Agreement and the Pre-Funded Warrants, the Pre-Funded Warrant Shares will be validly issued, fully paid and non-assessable; and (iii) the Common Warrant Shares have been duly authorized for issuance and, when issued and sold by the Company and delivered by the Company and upon valid exercise of the Common Warrants and against receipt of the exercise price therefor, in accordance with and in the manner described in the Registration Statement, the Purchase Agreement and the Common Warrants, the Common Warrant Shares will be validly issued, fully paid and non-assessable.

This opinion is given as of the date hereof. We assume no obligation to advise you of changes in law or facts that may hereafter be brought to our

attention.

This opinion letter is for your benefit in connection with the Registration Statement and may be relied upon by you and by persons entitled to rely upon it pursuant to the applicable provisions of the Securities Act. We consent to the inclusion of this opinion letter as an exhibit to the Registration Statement and further consent to all references to our firm under the caption "Legal Matters" in the Registration Statement. We further consent to the incorporation by reference of this letter and consent into any registration statement or post-effective amendment to the Registration Statement filed pursuant to Rule 462(b) under the Securities Act with respect to the Securities covered by this opinion letter.

In giving such consent, we do not thereby admit that we are in the category of persons whose consent is required under Section 7 of the Securities Act or the rules and regulations of the Commission thereunder.

Very truly yours,

[/s/ PARSONS BEHLE & LATIMER]

BLANKROME

1271 Avenue of the Americas | New York, NY 10020
blankrome.com

December 10, 2024

The Board of Directors
Theriva Biologics, Inc.
9605 Medical Center, Suite 270
Rockville, MD 20850

Re: Registration Statement on Form S-1

Ladies and Gentlemen:

We have acted as counsel to Theriva Biologics, Inc., a Nevada corporation (the "Company"), in connection with the preparation and filing with the Securities and Exchange Commission pursuant to the Securities Act of 1933, as amended (the "Securities Act"), of a Registration Statement on Form S-1 (the "Registration Statement") relating to the offering by the Company of shares (the "Shares") of the Company's common stock, par value \$0.001 per share (the "Common Stock") or, in lieu thereof, pre-funded warrants (the "Pre-Funded Warrants") to purchase shares of Common Stock (the "Pre-Funded Warrant Shares") in lieu of the Shares, with each Share or Pre-Funded Warrant accompanied by a warrant (the "Common Warrants" and, together with the Pre-Funded Warrants, the "Warrants") to purchase shares of Common Stock (the "Common Warrant Shares"). The Shares, Pre-Funded Warrants, Pre-Funded Warrant Shares, Common Warrants and Common Warrant Shares are collectively referred to as the "Securities." The proposed maximum aggregate offering price of the Securities is \$20,000,000, resulting in gross proceeds of \$10,000,000. This opinion is being delivered at the request of the Company and in accordance with the requirements of Item 601(b)(5) of Regulation S-K promulgated by the Commission.

In rendering the opinions set forth herein, we have examined originals or copies, certified or otherwise identified to our satisfaction, of (i) the Registration Statement, (ii) resolutions adopted by the Board of Directors of the Company, (iii) the articles of incorporation of the Company, as amended, (iv) the second amended and restated bylaws of the Company (v) the form of the Pre-Funded Warrant, (vi) the form of the Common Warrant and (vii) such other corporate records, agreements, certificates, including, but not limited to, certificates or comparable documents of public officials and of officers and representatives of the Company, statutes and other instruments and documents as we considered relevant and necessary as a basis for the opinions hereinafter expressed.

In rendering this opinion, we have assumed, without inquiry, (i) the authenticity of all documents submitted to us as originals; (ii) the conformity to the original documents of all documents submitted to us as facsimile, electronic, certified or photostatic copies, and the authenticity of the originals of such copies; (iii) the legal capacity of all natural persons and the genuineness of all signatures on the Registration Statement and all documents submitted to us; and (iv) that the books and records of the Company are maintained in accordance with proper corporate procedures. As to various questions of fact material to such opinions, we have relied upon statements or certificates of officials and representatives of the Company and others.

Based on the foregoing, and subject to the qualifications, exceptions and assumptions stated herein, we are of the opinion that:

1. When the Pre-Funded Warrants are issued, delivered and paid for, as contemplated in the Registration Statement and prospectus, the Pre-Funded Warrants will constitute valid and binding obligations of the Company.
2. When the Common Warrants are issued, delivered and paid for, as contemplated in the Registration Statement and prospectus, the Common Warrants will constitute valid and binding obligations of the Company.

This opinion is limited the applicable laws of the State of New York in effect on the date hereof that, in our experience, are normally applicable to transactions of the type contemplated by the Warrants. We express no opinion with respect to the laws of any other jurisdiction.

With regard to our opinions concerning the Warrants constituting valid and binding obligations of the Company:

1. Our opinions are subject to, and may be limited by, (a) applicable bankruptcy, reorganization, insolvency, conservatorship, moratorium, fraudulent conveyance, fraudulent transfer, and similar laws and court decisions affecting the rights and remedies of creditors and secured parties generally, and (b) general principles of equity (including, without limitation, concepts of materiality, reasonableness, impossibility of performance, good faith and fair dealing) regardless of whether considered in a proceeding in equity or at law.
2. Our opinions are subject to the qualification that the availability of specific performance, an injunction or other equitable remedies is subject to the discretion of the court before which the request is brought.
3. We express no opinion as to any provision of the Warrants that: (a) provides for liquidated damages, buy-in damages, monetary penalties, prepayment or make-whole payments or other economic remedies to the extent such provisions may constitute unlawful penalties, (b) relates to advance waivers of claims, defenses, rights granted by law, or notice, opportunity for hearing, evidentiary requirements, statutes of limitations, trial by jury, or procedural rights, (c) restricts non-written modifications and waivers, (d) provides for the payment of legal and other professional fees where such payment is contrary to law or public policy, (e) relates to exclusivity, election or accumulation of rights or remedies, (f) authorizes or validates conclusive or discretionary determinations, or (g) provides that provisions of the Warrants are severable to the extent an essential part of the agreed exchange is determined to be invalid and unenforceable.
4. We express no opinion as to whether a state court outside of the State of New York or a federal court of the United States would give effect to the choice of New York law or jurisdiction provided for in the Warrants.

We hereby consent to the filing of this opinion as an Exhibit to the Registration Statement. We also hereby consent to the use of our name as your

counsel under "Legal Matters" in the prospectus constituting part of the Registration Statement. In giving this consent, we do not thereby concede that we come within the categories of persons whose consent is required by the Securities Act or the General Rules and Regulations promulgated thereunder. This opinion is strictly limited to the matters stated herein and no other or more extensive opinion is intended, implied or to be inferred beyond the matters expressly stated herein. This opinion letter is not a guaranty nor may one be inferred or implied.

Very truly yours,

/s/ Blank Rome LLP

BLANK ROME LLP

SECURITIES PURCHASE AGREEMENT

This SECURITIES PURCHASE AGREEMENT (this "Agreement") is dated as of December [●], 2024, between Theriva Biologics, Inc., a Nevada corporation (the "Company"), and each purchaser identified on the signature pages hereto (each, including its successors and assigns, a "Purchaser" and collectively the "Purchasers").

WHEREAS, subject to the terms and conditions set forth in this Agreement and pursuant to an effective registration statement under the Securities Act (as defined below), the Company desires to issue and sell to each Purchaser, and each Purchaser, severally and not jointly, desires to purchase from the Company, securities of the Company as more fully described in this Agreement.

NOW, THEREFORE, IN CONSIDERATION of the mutual covenants contained in this Agreement, and for other good and valuable consideration the receipt and adequacy of which are hereby acknowledged, the Company and each Purchaser agree as follows:

Section 1. DEFINITIONS

1.1 Definitions. In addition to the terms defined elsewhere in this Agreement, for all purposes of this Agreement, the following terms have the meanings set forth in this Section 1.1:

"Acquiring Person" shall have the meaning ascribed to such term in Section 4.5.

"Action" shall have the meaning ascribed to such term in Section 3.1(j).

"Affiliate" means any Person that, directly or indirectly through one or more intermediaries, controls or is controlled by or is under common control with a Person as such terms are used in and construed under Rule 405 under the Securities Act.

"Board of Directors" means the board of directors of the Company.

"Business Day" means any day other than Saturday, Sunday, or other day on which banking institutions in the State of New York are authorized or required by law to remain closed.

"Closing" means the closing of the purchase and sale of the Securities pursuant to Section 2.1.

"Closing Date" means the Trading Day on which all of the Transaction Documents have been executed and delivered by the applicable parties thereto, and all conditions precedent to (i) the Purchasers' obligations to pay the Subscription Amount at the Closing and (ii) the Company's obligations to deliver the Securities, in each case, at the Closing have been satisfied or waived, but in no event later than the second (2nd) Trading Day following the date hereof.

"Commission" means the United States Securities and Exchange Commission.

"Common Stock" means the common stock of the Company, par value \$0.001 per share.

"Common Stock Equivalents" means any securities of the Company or the Subsidiaries which would entitle the holder thereof to acquire at any time Common Stock, including, without limitation, any debt, preferred stock, right, option, warrant or other instrument that is at any time convertible into or exercisable or exchangeable for, or otherwise entitles the holder thereof to receive, Common Stock.

"Common Warrants" means the common warrants delivered to the Purchasers at Closing in accordance with Section 2.2(a) hereof, which common warrants shall be exercisable immediately upon issuance and may be exercised during a period of five years commencing from their issuance, in the form of Exhibit A attached hereto.

"Company Counsel" means Blank Rome LLP, with offices located at 1271 Avenue of The Americas, New York, NY 10020.

"Company Nevada Counsel" means Parsons Behle & Latimer, with offices located at 50 West Liberty Street, Suite 750, Reno, Nevada 89501.

"Disclosure Schedules" means the Disclosure Schedules of the Company delivered concurrently herewith.

"Disclosure Time" means, (i) if this Agreement is signed on a day that is not a Trading Day or after 9:00 a.m. (New York City time) and before midnight (New York City time) on any Trading Day, 9:01 a.m. (New York City time) on the Trading Day immediately following the date hereof, unless otherwise instructed as to an earlier time by the Placement Agent, and (ii) if this Agreement is signed between midnight (New York City time) and 9:00 a.m. (New York City time) on any Trading Day, no later than 9:01 a.m. (New York City time) on the date hereof, unless otherwise instructed as to an earlier time by the Placement Agent.

"DVP" shall have the meaning ascribed to such term in Section 2.1(v).

"Evaluation Date" shall have the meaning ascribed to such term in Section 3.1(r).

"Exchange Act" means the Securities Exchange Act of 1934, as amended, and the rules and regulations promulgated thereunder.

"Exempt Issuance" means the issuance of (a) shares of Common Stock, restricted stock units or options, including the shares of Common Stock underlying the restricted stock units or options, to consultants, employees, officers, directors or consultants of the Company or its subsidiary pursuant to any stock or option plan or arrangement duly adopted for such purpose by a majority of the non-employee members of the Board of Directors or a majority of the members of a committee of non-employee directors established for such purpose for services rendered to the Company provided that such securities issued to consultants are issued as "restricted securities" (as defined in Rule 144) and carry no registration rights that require or permit the filing of any registration statement in connection therewith during the prohibition period in Section 4.11(a) herein, (b) securities upon the exercise or exchange of or conversion of any Securities issued hereunder and/or other securities exercisable or exchangeable for or convertible into shares of Common Stock issued and outstanding on the date of this Agreement, *provided* that such securities have not been amended since the date of this Agreement to increase the number of such securities or to decrease the exercise price, exchange price or conversion price of such securities (other than in connection with stock splits or combinations or anti-dilution provisions contained therein as disclosed in the SEC Reports and the Prospectus) or to

extend the term of such securities, (c) securities pursuant to merger, acquisition or strategic transactions approved by a majority of the disinterested directors of the Company, *provided* that such securities are issued as "restricted securities" (as defined in Rule 144) and carry no registration rights that require or permit the filing of any registration statement in connection therewith during the prohibition period in Section 4.11(a) herein, and *provided further* that any such issuance shall only be to a Person that is, itself or through its subsidiaries, an operating company in a business synergistic with the business of the Company and in which the Company receives benefits in addition to any investment of funds, but shall not include a transaction in which the Company is issuing securities primarily for the purpose of raising capital or to an entity whose primary business is investing in securities, and (d) securities for settlement of outstanding payables or liabilities *provided* that such securities are issued as "restricted securities" (as defined in Rule 144) and carry no registration rights that require or permit the filing of any registration statement in connection therewith during the prohibition period in Section 4.11(a) herein.

"FCPA" means the Foreign Corrupt Practices Act of 1977, as amended.

"GAAP" means generally accepted accounting principles in the United States.

"General Disclosure Package" means the Preliminary Prospectus, the Prospectus, and the Registration Statement.

"Indebtedness" shall have the meaning ascribed to such term in Section 3.1(z).

"Intellectual Property Rights" shall have the meaning ascribed to such term in Section 3.1(p).

"Liens" means a lien, charge, pledge, security interest, encumbrance, right of first refusal, preemptive right or other restriction.

"Lock-Up Agreement" means the Lock-Up Agreement, dated as of the date hereof, by and among the Company and the directors, officers and 5% stockholders of the Company, in the form of Exhibit C attached hereto.

"Material Adverse Effect" shall have the meaning assigned to such term in Section 3.1(b).

"Material Permits" shall have the meaning ascribed to such term in Section 3.1(m).

"Per Share Purchase Price" equals \$[•], subject to adjustment for reverse and forward share splits, share dividends, share combinations and other similar transactions of shares of Common Stock that occur between the date hereof and the Closing Date.

"Per Pre-Funded Warrant Purchase Price" equals \$0.0001, subject to adjustment for reverse and forward share splits, share dividends, share combinations and other similar transactions relating to shares of Common Stock that occur after the date of this Agreement.

"Person" means an individual or corporation, partnership, trust, incorporated or unincorporated association, joint venture, limited liability company, joint stock company, government (or an agency or subdivision thereof) or other entity of any kind.

"Placement Agent" means A.G.P./Alliance Global Partners.

"Placement Agent Counsel" means Thompson Hine LLP with offices located at 300 Madison Ave, 27th Floor, New York, New York 10017.

"Pre-Funded Warrants" means, collectively, the warrants delivered to the Purchasers at Closing in accordance with Section 2.2(a) hereof, which Pre-Funded Warrants shall be exercisable immediately upon issuance and shall expire when exercised in full, in the form of Exhibit B attached hereto.

"Pre-Notice" shall have the meaning ascribed to such term in Section 4.16(b).

"Preliminary Prospectus" means the preliminary prospectus included in the Registration Statement at the time the Registration Statement is declared effective.

"Proceeding" means an action, claim, suit, investigation or proceeding (including, without limitation, an informal investigation or partial proceeding, such as a deposition), whether commenced or threatened.

"Prospectus" means the final prospectus filed pursuant to the Registration Statement.

"Purchaser Party" shall have the meaning ascribed to such term in Section 4.8.

"Registration Statement" means the effective registration statement with the Commission on Form S-1 (File No. 333-[•]), as amended, which registers the sale of the Securities and includes any Rule 462(b) Registration Statement.

"Required Approvals" shall have the meaning ascribed to such term in Section 3.1(e).

"Rule 144" means Rule 144 promulgated by the Commission pursuant to the Securities Act, as such Rule may be amended or interpreted from time to time, or any similar rule or regulation hereafter adopted by the Commission having substantially the same purpose and effect as such Rule.

"Rule 424" means Rule 424 promulgated by the Commission pursuant to the Securities Act, as such Rule may be amended or interpreted from time to time, or any similar rule or regulation hereafter adopted by the Commission having substantially the same purpose and effect as such Rule.

"Rule 462(b) Registration Statement" means any registration statement prepared by the Company registering additional Securities, which was filed with the Commission on or prior to the date hereof and became automatically effective pursuant to Rule 462(b) promulgated by the Commission pursuant to the Securities Act.

"SEC Reports" shall have the meaning ascribed to such term in Section 3.1(h).

"Securities" means the Shares, the Warrants, and the Warrant Shares.

“Securities Act” means the Securities Act of 1933, as amended, and the rules and regulations promulgated thereunder.

“Shares” means the shares of Common Stock issued and issuable to each Purchaser pursuant to this Agreement.

“Short Sales” means all “short sales” as defined in Rule 200 of Regulation SHO under the Exchange Act (but shall not be deemed to include locating and/or borrowing shares of Common Stock).

“Subscription Amount” means, as to each Purchaser, the aggregate amount to be paid for shares of Common Stock, and Pre-Funded Warrants, purchased hereunder as specified below such Purchaser’s name on the signature page of this Agreement and next to the heading “Subscription Amount,” in United States dollars and in immediately available funds.

“Subsidiary” means any significant subsidiary of the Company as set forth in the Exhibit 21.1 to the Company’s Annual Report on Form 10-K for the year ended December 31, 2023 and shall, where applicable, also include any direct or indirect subsidiary of the Company formed or acquired after the date hereof.

“Trading Day” means a day on which the principal Trading Market is open for trading.

“Trading Market” means any of the following markets or exchanges on which the shares of Common Stock are listed or quoted for trading on the date in question: the NYSE American, The Nasdaq Capital Market, The Nasdaq Global Market, The Nasdaq Global Select Market, or the New York Stock Exchange (or any successors to any of the foregoing).

“Transaction Documents” means this Agreement, the Warrants, the Lock-Up Agreements and all exhibits and schedules thereto and hereto and any other documents or agreements executed in connection with the transactions contemplated hereunder.

“Variable Rate Transaction” shall have the meaning ascribed to such term in Section 4.10(b).

“Warrants” means, collectively, the Common Warrants and the Pre-Funded Warrants.

“Warrant Shares” means, collectively, the shares of Common Stock issuable upon exercise of the Warrants.

Section 2.
PURCHASE AND SALE

2.1 Closing. On the Closing Date, upon the terms and subject to the conditions set forth herein, the Company agrees to sell, and the Purchasers, severally and not jointly, agree to purchase, (i) the number of shares of Common Stock set forth under the heading “Subscription Amount” on the Purchaser’s signature page hereto, at the Per Share Purchase Price, and (ii) Common Warrants exercisable for shares of Common Stock as calculated pursuant to Section 2.2(a); *provided, however,* that, to the extent that a Purchaser determines, in its sole discretion, that such Purchaser (together with such Purchaser’s Affiliates, and any Person acting as a group together with such Purchaser or any of such Purchaser’s Affiliates) would beneficially own in excess of the Beneficial Ownership Limitation, or as such Purchaser may otherwise choose, in lieu of purchasing shares of Common Stock, such Purchaser may elect to purchase Pre-Funded Warrants in such manner to result in the full Subscription Amount being paid by such Purchaser to the Company. The “Beneficial Ownership Limitation” shall be 4.99% (or, at the election of the Purchaser, 9.99%) of the number of shares of Common Stock, in each case, outstanding immediately after giving effect to the issuance of the Securities on the Closing Date.

Each Purchaser’s Subscription Amount as set forth on the signature page hereto executed by such Purchaser shall be made available for Delivery Versus Payment (“DVP”) settlement with the Company or its designees. The Company shall deliver to each Purchaser its respective Shares and Warrants as determined pursuant to Section 2.2(a), and the Company and each Purchaser shall deliver the other items set forth in Section 2.2 at the Closing. Upon satisfaction of the covenants and conditions set forth in Sections 2.2 and 2.3, the Closing shall occur remotely via the exchange of documents and signatures or such other location as the parties shall mutually agree. Unless otherwise directed by the Placement Agent, settlement of the Shares shall occur via DVP (i.e., on the Closing Date, the Company shall issue the Shares registered in the Purchasers’ names and addresses and released by the Depository directly to the account(s) at the Placement Agent identified by each Purchaser; upon receipt of such Shares, the Placement Agent shall promptly electronically deliver such Shares to the applicable Purchaser, and payment therefor shall be made by the Placement Agent (or its clearing firm) by wire transfer to the Company). Notwithstanding anything herein to the contrary, if at any time on or after the time of execution of this Agreement by the Company and an applicable Purchaser through, and including the time immediately prior to the Closing (the “Pre-Settlement Period”), such Purchaser sells to any Person all, or any portion, of any Securities to be issued hereunder to such Purchaser at the Closing (collectively, the “Pre-Settlement Shares”), such Person shall, automatically hereunder (without any additional required actions by such Purchaser or the Company), be deemed to be a Purchaser under this Agreement unconditionally bound to purchase, and the Company shall be deemed unconditionally bound to sell, such Pre-Settlement Shares to such Person at the Closing; provided, that the Company shall not be required to deliver any Pre-Settlement Shares to such Purchaser prior to the Company’s receipt of the Subscription Amount for such Pre-Settlement Shares hereunder; and provided, further, that the Company hereby acknowledges and agrees that the forgoing shall not constitute a representation or covenant by such Purchaser as to whether or not such Purchaser will elect to sell any Pre-Settlement Shares during the Pre-Settlement Period. The decision to sell any shares of Common Stock by such Purchaser shall solely be made at the time such Purchaser elects to effect any such sale, if any. Notwithstanding the foregoing, with respect to any Notice(s) of Exercise (as defined in the Prefunded Warrants) delivered on or prior to 9:00 a.m. (New York City time) on the Closing Date, which may be delivered at any time after the time of execution of the this Agreement, the Company agrees to deliver the Warrant Shares subject to such notice(s) by 4:00 p.m. (New York City time) on the Closing Date and the Closing Date shall be the Warrant Share Delivery Date (as defined in the Prefunded Warrants) for purposes hereunder.

2.2 Deliveries.

(a) On or prior to the Closing Date, the Company shall deliver or cause to be delivered to each Purchaser the following:

- (i) this Agreement duly executed by the Company;
- (ii) the Company’s wire instructions, on Company letterhead and executed by the Company’s Chief Executive Officer or Chief Financial Officer;
- (iii) subject to the provision of Section 2.1 that settlement of the Shares shall occur via DVP, a copy of the irrevocable instructions to the Transfer Agent instructing the Transfer Agent to deliver on an expedited basis via The Depository Trust Company Deposit or Withdrawal at Custodian system shares of Common Stock equal to the portion of such Purchaser’s Subscription Amount divided by the Per Share Purchase Price, registered in the name of such Purchaser;

- (iv) for each Purchaser of Pre-Funded Warrants pursuant to Section 2.1, a Pre-Funded Warrant registered in the name of such Purchaser to purchase up to a number of shares of Common Stock equal to the portion of such Purchaser's Subscription Amount applicable to Pre-Funded Warrants divided by the sum of the Per Pre-Funded Warrant Purchase Price, subject to adjustment therein;
- (v) the Preliminary Prospectus and the Prospectus (which may be delivered in accordance with Rule 172 under the Securities Act);
- (vi) a Common Warrant with an exercise price equal to \$[●], registered in the name of such Purchaser, to purchase up to a number of shares of Common Stock equal to 100% of such Purchaser's shares of Common Stock, or a Pre-Funded Warrants, as applicable, with an exercise price equal to \$0.0001 per share, subject to adjustment therein;
- (vii) the duly executed Lock-Up Agreements;
- (viii) a legal opinion of Company Counsel, in form reasonably acceptable to the Placement Agent and the Purchasers; and
- (ix) a legal opinion of Company Nevada Counsel, in form reasonably acceptable to the Placement Agent and the Purchasers.

(b) On or prior to the Closing Date, each Purchaser shall deliver or cause to be delivered to the Company, the following:

- (i) this Agreement duly executed by such Purchaser; and
- (ii) such Purchaser's Subscription Amount with respect to the Securities purchased by such Purchaser, which shall be made available for DVP settlement with the Company or its designees.

2.3 Closing Conditions.

- (a) The obligations of the Company hereunder in connection with the Closing are subject to the following conditions being met:
 - (i) the accuracy in all material respects (or, to the extent representations or warranties are qualified by materiality or Material Adverse Effect, in all respects) when made and on the Closing Date of the representations and warranties of the Purchasers contained herein (unless as of a specific date therein in which case they shall be accurate as of such date in all material respects or to the extent qualified by materiality or Material Adverse Effect);
 - (ii) all obligations, covenants and agreements of each Purchaser required to be performed at or prior to the Closing Date shall have been performed; and
 - (iii) the delivery by each Purchaser of the items set forth in Section 2.2(b) of this Agreement.
- (b) The respective obligations of the Purchasers hereunder in connection with the Closing are subject to the following conditions being met:
 - (i) the accuracy in all material respects (or, to the extent representations or warranties are qualified by materiality or Material Adverse Effect, in all respects) when made and on the Closing Date of the representations and warranties of the Company contained herein (unless as of a specific date therein in which case they shall be accurate as of such date);
 - (ii) all obligations, covenants and agreements of the Company required to be performed at or prior to the Closing Date shall have been performed;
 - (iii) the delivery by the Company of the items set forth in Section 2.2(a) of this Agreement;
 - (iv) there shall have been no Material Adverse Effect with respect to the Company since the date hereof; and
 - (v) from the date hereof to the Closing Date, trading in the Common Stock shall not have been suspended by the Commission or any Trading Market, and, at any time prior to the Closing Date, trading in securities generally as reported by Bloomberg L.P. shall not have been suspended or limited, nor shall a banking moratorium have been declared either by the United States or New York State authorities nor shall there have occurred after the date of this Agreement any material outbreak or escalation of hostilities or other national or international calamity of such magnitude in its effect on, or any material adverse change in, any financial market which, in each case, in the reasonable judgment of such Purchaser, makes it impracticable or inadvisable to purchase the Securities at the Closing.

Section 3. **REPRESENTATIONS AND WARRANTIES**

3.1 Representations and Warranties of the Company. Except as set forth in the Disclosure Schedules, which Disclosure Schedules shall be deemed a part hereof and shall qualify any representation or otherwise made herein to the extent of the disclosure contained in the corresponding section of the Disclosure Schedules, the Company hereby makes the following representations and warranties to each Purchaser:

- (a) **Subsidiaries.** Except as disclosed in the SEC Reports, the Company owns, directly or indirectly, all of the capital shares or other equity interests of each Subsidiary, free and clear of any Liens, and all of the issued and outstanding shares of capital stock of each Subsidiary are validly issued and are fully paid, non-assessable and free of preemptive and similar rights to subscribe for or purchase securities.

(b) **Organization and Qualification.** The Company and each of the Subsidiaries is an entity duly incorporated or otherwise organized, validly existing, and, if applicable under the laws of the jurisdiction in which they are formed, in good standing under the laws of the jurisdiction of its incorporation or organization, with the requisite power and authority to own and use its properties and assets and to carry on its business as currently conducted. Neither the Company nor any Subsidiary is in violation nor default of any of the provisions of its respective memorandum of association, articles of association, certificate or articles of incorporation, bylaws, operating agreement, or other organizational or charter documents that would constitute a Material Adverse Effect (defined below). Each of the Company and the Subsidiaries is duly qualified to conduct business and is in good standing (where applicable) as a foreign corporation or other entity in each jurisdiction in which the nature of the business conducted or property owned by it makes such qualification necessary, except where the failure to be so qualified or in good standing, as the case may be, could not have or reasonably be expected to result in: (i) a material adverse effect on the legality, validity or enforceability of any Transaction Document, (ii) material adverse effect on the results of operations, assets, business, prospects or condition (financial or otherwise) of the Company and the Subsidiaries, taken as a whole, or (iii) a material adverse effect on the Company's ability to perform in any material respect on a timely basis its obligations under any Transaction Document (any of (i), (ii) or (iii), a "Material Adverse Effect") and no Proceeding has been instituted in any such jurisdiction revoking, limiting or curtailing or seeking to revoke, limit or curtail such power and authority or qualification.

(c) **Authorization; Enforcement.** The Company has the requisite corporate power and authority to enter into and to consummate the transactions contemplated by this Agreement and each of the other Transaction Documents and otherwise to carry out its obligations hereunder and thereunder. The execution and delivery of this Agreement and each of the other Transaction Documents by the Company and the consummation by it of the transactions contemplated hereby and thereby have been duly authorized by all necessary action on the part of the Company and no further action is required by the Company, the Board of Directors, a committee of the Board of Directors or the Company's stockholders in connection herewith or therewith other than in connection with the Required Approvals. This Agreement and each other Transaction Document to which it is a party has been (or upon delivery will have been) duly executed by the Company and, when delivered in accordance with the terms hereof and thereof, will constitute the valid and binding obligation of the Company enforceable against the Company in accordance with its terms, except (i) as limited by general equitable principles and applicable bankruptcy, insolvency, reorganization, moratorium and other laws of general application affecting enforcement of creditors' rights generally, (ii) as limited by laws relating to the availability of specific performance, injunctive relief or other equitable remedies and (iii) insofar as indemnification and contribution provisions may be limited by applicable law.

(d) **No Conflicts.** The execution, delivery and performance by the Company of this Agreement and the other Transaction Documents to which it is a party, the issuance and sale of the Securities and the consummation by it of the transactions contemplated hereby and thereby do not and will not (i) conflict with or violate any provision of the Company's or any Subsidiary's memorandum of association, articles of association, certificate or articles of incorporation, bylaws, operating agreement, or other organizational or charter documents, or (ii) conflict with, or constitute a default (or an event that with notice or lapse of time or both would become a default) under, result in the creation of any Lien upon any of the properties or assets of the Company or any Subsidiary, or give to others any rights of termination, amendment, anti-dilution or similar adjustments acceleration or cancellation (with or without notice, lapse of time or both) of, any agreement, credit facility, debt or other instrument (evidencing a Company or Subsidiary debt or otherwise) or other understanding to which the Company or any Subsidiary is a party or by which any property or asset of the Company or any Subsidiary is bound or affected, or (iii) subject to the Required Approvals, conflict with or result in a violation of any law, rule, regulation, order, judgment, injunction, decree or other restriction of any court or governmental authority to which the Company or a Subsidiary is subject (including federal and state securities laws and regulations), or by which any property or asset of the Company or a Subsidiary is bound or affected; except in the case of each of clauses (ii) and (iii), such as could not have or reasonably be expected to result in a Material Adverse Effect.

(e) **Filings, Consents and Approvals.** The Company is not required to obtain any consent, waiver, authorization or order of, give any notice to, or make any filing or registration with, any court or other federal, state, local or other governmental authority or other Person in connection with the execution, delivery and performance by the Company of the Transaction Documents, other than: (i) the filings required pursuant to Section 4.4 of this Agreement, (ii) the filing with the Commission of the Prospectus, (iii) notices and/or application(s) to and approvals by each applicable Trading Market for the listing of the applicable Securities for trading thereon in the time and manner required thereby, and (iv) filings required by the Financial Industry Regulatory Authority ("FINRA") (collectively, the "Required Approvals").

(f) **Issuance of the Securities; Registration.** The Shares and Warrant Shares are duly authorized and, when issued and paid for in accordance with the applicable Transaction Documents, will be duly and validly issued, fully paid and non-assessable, free and clear of all Liens imposed by the Company. The Warrants are duly authorized and binding obligations of the Company under the law of the jurisdiction governing the Warrants, and, when issued in accordance with this Agreement, will be duly and validly issued, and free and clear of all Liens imposed by the Company. The Company has reserved from its duly authorized share capital the maximum number of shares of Common Stock issuable pursuant to this Agreement and the Warrants. The Company has prepared and filed the Registration Statement in conformity with the requirements of the Securities Act, which became effective on [●], 2024, including the Prospectus, and such amendments and supplements thereto as may have been required to the date of this Agreement. The Registration Statement is effective under the Securities Act and no stop order preventing or suspending the effectiveness of the Registration Statement or suspending or preventing the use of the Preliminary Prospectus or the Prospectus has been issued by the Commission and no proceedings for that purpose have been instituted or, to the knowledge of the Company, are threatened by the Commission. The Company, if required by the rules and regulations of the Commission, shall file the Preliminary Prospectus or the Prospectus with the Commission pursuant to Rule 424(b). At the time the Registration Statement and any amendments thereto became effective as determined under the Securities Act, at the date of this Agreement and at the Closing Date, the Registration Statement and any amendments thereto conformed and will conform in all material respects to the requirements of the Securities Act and 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 to make the statements therein not misleading; and the Prospectus and any amendments or supplements thereto, at the time the Preliminary Prospectus, the Prospectus or any amendment or supplement thereto was issued and at the Closing Date, conformed and will conform in all material respects to the requirements of the Securities Act and did not and will not contain an 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.

(g) **Capitalization.** The capitalization of the Company as of the date hereof is as set forth in the General Disclosure Package, and includes the number of shares of Common Stock owned beneficially, and of record, by Affiliates of the Company as of the date hereof. The Company has not issued any capital stock since its most recently filed report under the Exchange Act, other than pursuant to the exercise of employee stock options under the Company's stock option plans, the issuance of shares of Common Stock to employees pursuant to the Company's employee stock purchase plans and pursuant to the conversion and/or exercise of Common Stock Equivalents outstanding as of the date of the most recently filed report under the Exchange Act. No Person has any right of first refusal, preemptive right, right of participation, or any similar right to participate in the transactions contemplated by the Transaction Documents. As a result of the purchase and sale of the Securities, there are no outstanding options, warrants, scrip rights to subscribe to, calls or commitments of any character whatsoever relating to, or securities, rights or obligations convertible into or exercisable or exchangeable for, or giving any Person any right to subscribe for or acquire, any shares of Common Stock, or contracts, commitments, understandings or arrangements by which the Company or any Subsidiary is or may become bound to issue additional shares of Common Stock or Common Stock Equivalents. The issuance and sale of the Securities will not result in a right of any holder of Company securities to adjust the exercise, conversion, exchange or reset price under any of such securities. There are no outstanding securities or instruments of the Company or any Subsidiary with any provision that adjusts the exercise, conversion, exchange or reset price of such security or instrument upon an issuance of securities by the Company or any Subsidiary. There are no outstanding securities or instruments of the Company or any Subsidiary that contain any redemption or similar provisions, and there are no contracts, commitments, understandings or arrangements by which the Company or any Subsidiary is or may become bound to redeem a security of the Company or such Subsidiary. The Company does not have any share appreciation rights or "phantom share" plans or agreements or any similar plan or agreement. All of the outstanding shares of the Company are duly authorized, validly issued, fully paid and non-assessable, have been issued in compliance with all federal and state securities laws where applicable, and none of such outstanding shares was issued in violation of any preemptive rights or similar rights to subscribe for or purchase securities. Except for the Required Approvals, no further approval or authorization of any stockholder, the Board of Directors, or others is required for the issuance and sale of the Securities. There are no stockholders agreements, voting agreements or other similar agreements with respect to the Company's share capital to which the Company is a party or, to the knowledge of the Company, between or among any of the Company's stockholders.

(h) **SEC Reports: Financial Statements.** The Company has filed all reports, schedules, forms, statements and other documents required to be filed by the Company under the Securities Act and the Exchange Act, including pursuant to Section 13(a) or 15(d) thereof, for the one year preceding the date hereof (or such shorter period as the Company was required by law or regulation to file such materials) (the foregoing materials, including the exhibits thereto and documents incorporated by reference therein, together with the Preliminary Prospectus and the Prospectus, being collectively referred to herein as the "SEC Reports") As of their respective dates, the SEC Reports complied in all material respects with the requirements of the Securities Act and the Exchange Act, as applicable, and none of the SEC Reports, when filed, contained any untrue statement of a material fact or omitted to state a material fact required to be stated therein or necessary in order to make the statements therein, in the light of the circumstances under which they were made, not misleading. The financial statements of the Company included in the SEC Reports comply in all material respects with applicable accounting requirements and the rules and regulations of the Commission with respect thereto as in effect at the time of filing. Such financial statements have been prepared in accordance with GAAP, except as may be otherwise specified in such financial statements or the notes thereto and except that unaudited financial statements may not contain all footnotes required by GAAP, and fairly present in all material respects the financial position of the Company and its consolidated Subsidiaries as of and for the dates thereof and the results of operations and cash flows for the periods then ended, subject, in the case of unaudited statements, to normal, immaterial, year-end audit adjustments.

(i) **Material Changes: Undisclosed Events, Liabilities or Developments.** Since the date of the latest financial statements filed by the Company with the SEC and other than the reverse stock split effected August 26, 2024, (i) there has been no event, occurrence or development that has had or that could reasonably be expected to result in a Material Adverse Effect, (ii) the Company has not incurred any liabilities (contingent or otherwise) other than (A) trade payables and accrued expenses incurred in the ordinary course of business consistent with past practice and strategic acquisitions and (B) liabilities not required to be reflected in the Company's financial statements pursuant to GAAP or disclosed in filings made with the Commission, (iii) the Company has not altered its method of accounting, (iv) the Company has not declared or made any dividend or distribution of cash or other property to its stockholders or purchased, redeemed or made any agreements to purchase or redeem any of its shares and (v) the Company has not issued any equity securities to any officer, director or Affiliate, except pursuant to existing Company equity incentive plans. The Company does not have pending before the Commission any request for confidential treatment of information. Except for the issuance of the Securities contemplated by this Agreement, no event, liability, fact, circumstance, occurrence or development has occurred or exists or is reasonably expected to occur or exist with respect to the Company or its Subsidiaries or their respective businesses, prospects, properties, operations, assets or financial condition that would be required to be disclosed by the Company under applicable securities laws at the time this representation is made or deemed made that has not been publicly disclosed at least one (1) Trading Day prior to the date that this representation is made.

(j) **Litigation.** There is no action, suit, inquiry, notice of violation, proceeding or investigation pending or, to the knowledge of the Company, threatened against or affecting the Company, any Subsidiary or any of their respective properties before or by any court, arbitrator, governmental or administrative agency or regulatory authority (federal, state, county, local or foreign) (collectively, an "Action") except as disclosed in the General Disclosure Package. None of the Actions disclosed in the General Disclosure Package (i) adversely affects or challenges the legality, validity or enforceability of any of the Transaction Documents, the Shares or the Warrant Shares, or (ii) could, if there were an unfavorable decision, have or reasonably be expected to result in a Material Adverse Effect. Neither the Company nor any Subsidiary, nor any director or officer thereof, is or has been the subject of any Action involving a claim of violation of or liability under federal or state securities laws or a claim of breach of fiduciary duty, which could result in a Material Adverse Effect. There has not been, and to the knowledge of the Company, there is not pending or contemplated, any investigation by the Commission involving the Company or any current or former director or officer of the Company. The Commission has not issued any stop order or other order suspending the effectiveness of any registration statement filed by the Company or any Subsidiary under the Exchange Act or the Securities Act.

(k) **Labor Relations.** No labor dispute exists or, to the knowledge of the Company, is imminent with respect to any of the employees of the Company, which could reasonably be expected to result in a Material Adverse Effect. None of the Company's or its Subsidiaries' employees is a member of a union that relates to such employee's relationship with the Company or such Subsidiary, and neither the Company nor any of its Subsidiaries is a party to a collective bargaining agreement, and the Company and its Subsidiaries believe that their relationships with their employees are good. To the knowledge of the Company, no executive officer of the Company or any Subsidiary, is, or is now expected to be, in violation of any material term of any employment contract, confidentiality, disclosure or proprietary information agreement or non-competition agreement, or any other contract or agreement or any restrictive covenant in favor of any third party, and the continued employment of each such executive officer does not subject the Company or any of its Subsidiaries to any liability with respect to any of the foregoing matters. The Company and its Subsidiaries are in compliance with all applicable U.S. federal, state, local and foreign laws and regulations relating to employment and employment practices, terms and conditions of employment and wages and hours, except where the failure to be in compliance could not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect.

- (l) **Compliance.** Neither the Company nor any Subsidiary: (i) is in default under or in violation of (and no event has occurred that has not been waived that, with notice or lapse of time or both, would result in a default by the Company or any Subsidiary under), nor has the Company or any Subsidiary received notice of a claim that it is in default under or that it is in violation of, any indenture, loan or credit agreement or any other agreement or instrument to which it is a party or by which it or any of its properties is bound (whether or not such default or violation has been waived), (ii) is in violation of any judgment, decree or order of any court, arbitrator or other governmental authority or (iii) is or has been in violation of any statute, rule, ordinance or regulation of any governmental authority, including without limitation all foreign, federal, state and local laws relating to taxes, environmental protection, occupational health and safety, product quality and safety and employment and labor matters, except in each case of (i), (ii) and (iii) as could not have or reasonably be expected to result in a Material Adverse Effect.
- (m) **Environmental Laws.** The Company and its Subsidiaries (i) are in compliance with all federal, state, local and foreign laws relating to pollution or protection of human health or the environment (including ambient air, surface water, groundwater, land surface or subsurface strata), including laws relating to emissions, discharges, releases or threatened releases of chemicals, pollutants, contaminants, or toxic or hazardous substances or wastes (collectively, "Hazardous Materials") into the environment, or otherwise relating to the manufacture, processing, distribution, use, treatment, storage, disposal, transport or handling of Hazardous Materials, as well as all authorizations, codes, decrees, demands, or demand letters, injunctions, judgments, licenses, notices or notice letters, orders, permits, plans or regulations, issued, entered, promulgated or approved thereunder ("Environmental Laws"); (ii) have received all permits licenses or other approvals required of them under applicable Environmental Laws to conduct their respective businesses; and (iii) are in compliance with all terms and conditions of any such permit, license or approval where in each clause (i), (ii) and (iii), the failure to so comply could be reasonably expected to have, individually or in the aggregate, a Material Adverse Effect.
- (n) **Regulatory Permits.** The Company and the Subsidiaries possess all certificates, authorizations and permits issued by the appropriate federal, state, local or foreign regulatory authorities necessary to conduct their respective businesses as described in the General Disclosure Package, except where the failure to possess such certificates, authorizations or permits could not reasonably be expected to result in a Material Adverse Effect ("Material Permits"), and neither the Company nor any Subsidiary has received any notice of proceedings relating to the revocation or modification of any Material Permit.
- (o) **Title to Assets.** Except as disclosed in the General Disclosure Package, the Company and the Subsidiaries have good and marketable title in fee simple to all real property owned by them and good and marketable title in all personal property owned by them that is material to the business of the Company and the Subsidiaries, in each case free and clear of all Liens, except for (i) Liens as do not materially affect the value of such property and do not materially interfere with the use made and proposed to be made of such property by the Company and the Subsidiaries and (ii) Liens for the payment of federal, state or other taxes, for which appropriate reserves have been made therefor in accordance with GAAP and, the payment of which is neither delinquent nor subject to penalties. Any real property and facilities held under lease by the Company and the Subsidiaries are held by them under valid, subsisting and enforceable leases with which the Company and the Subsidiaries are in compliance in all material respects.
- (p) **Intellectual Property.** The Company and the Subsidiaries have, or have rights to use, all patents, patent applications, trademarks, trademark applications, service marks, trade names, trade secrets, inventions, copyrights, licenses and other intellectual property rights and similar rights necessary or required for use in connection with their respective businesses as described in the General Disclosure Package, and which the failure to so have could have a Material Adverse Effect (collectively, the "Intellectual Property Rights"). None of, and neither the Company nor any Subsidiary has received a notice (written or otherwise) that any of, the Intellectual Property Rights has expired, terminated or been abandoned, or is expected to expire or terminate or be abandoned, within two (2) years from the date of this Agreement except as would not reasonably be expected to have a Material Adverse Effect. Neither the Company nor any Subsidiary has received, since the date of the latest audited financial statements included within the General Disclosure Package, a written notice of a claim or otherwise has any knowledge that the Intellectual Property Rights violate or infringe upon the rights of any Person, except as could not have or reasonably be expected to not have a Material Adverse Effect. To the actual knowledge of the Company, all such Intellectual Property Rights are enforceable and there is no existing infringement by another Person of any of the Intellectual Property Rights. The Company and its Subsidiaries have taken reasonable security measures to protect the secrecy, confidentiality and value of all of their intellectual properties, except where failure to do so could not, individually or in the aggregate, reasonably be expected to have a Material Adverse Effect.

- (q) **Insurance.** The Company and the Subsidiaries are insured by insurers of recognized financial responsibility against such losses and risks and in such amounts as are prudent and customary in the businesses in which the Company and the Subsidiaries are engaged, including, but not limited to, directors and officers insurance coverage in an amount deemed commercially reasonable. Neither the Company nor any Subsidiary has any 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 without a significant increase in cost.
- (r) **Transactions with Affiliates and Employees.** Except as set forth in the General Disclosure Package, none of the officers or directors of the Company or any Subsidiary and, to the knowledge of the Company, none of the employees of the Company or any Subsidiary is presently a party to any transaction with the Company or any Subsidiary (other than for services as employees, officers and directors), including any contract, agreement or other arrangement providing for the furnishing of services to or by, providing for rental of real or personal property to or from, providing for the borrowing of money from or lending of money to or otherwise requiring payments to or from any officer, director or such employee or, to the knowledge of the Company, any entity in which any officer, director, or any such employee has a substantial interest or is an officer, director, trustee, shareholder, member or partner, in each case in excess of \$120,000 other than for (i) payment of salary or consulting fees for services rendered, (ii) reimbursement for expenses incurred on behalf of the Company or a Subsidiary and (iii) other employee benefits, including share option agreements under any share option plan of the Company.

(s) Sarbanes-Oxley; Internal Accounting Controls. Except as set forth in the SEC Reports, the Company and the Subsidiaries are in material compliance with any and all applicable requirements of the Sarbanes-Oxley Act of 2002 that are effective as of the date hereof, and any and all applicable rules and regulations promulgated by the Commission thereunder that are effective as of the date hereof and as of the Closing Date. Except as set forth in the SEC Reports, the Company and the Subsidiaries maintain a system of internal accounting controls sufficient 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 GAAP and to maintain asset accountability, (iii) access to assets is permitted only in accordance with management's general or specific authorization, and (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. The Company and the Subsidiaries have established disclosure controls and procedures (as defined in Exchange Act Rules 13a-15(e) and 15d-15(e)) for the Company and the Subsidiaries and designed such disclosure controls and procedures to ensure that information required to be disclosed by the Company in the reports it files or submits under the Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the Commission's rules and forms. The Company's certifying officers have evaluated the effectiveness of the disclosure controls and procedures of the Company and the Subsidiaries as of the end of the period covered by the most recently filed Form 10-Q under the Exchange Act (such date, the "Evaluation Date"). The Company presented in its most recently filed Form 10-Q under the Exchange Act the conclusions of the certifying officers about the effectiveness of the disclosure controls and procedures based on their evaluations as of the Evaluation Date. Since the Evaluation Date, there have been no changes in the internal control over financial reporting (as such term is defined in the Exchange Act) that have materially affected, or is reasonably likely to materially affect, the internal control over financial reporting of the Company and its Subsidiaries.

(t) Certain Fees. Except for fees payable to the Placement Agent, no brokerage or finder's fees or commissions are or will be payable by the Company or any Subsidiary to any broker, financial advisor or consultant, finder, placement agent, investment banker, bank or other Person with respect to the transactions contemplated by the Transaction Documents (for the avoidance of doubt, the foregoing shall not include any fees and/or commissions owed to the Depositary). Other than for Persons engaged by any Purchaser, if any, the Purchasers shall have no obligation with respect to any fees or with respect to any claims made by or on behalf of other Persons for fees of a type contemplated in this Section that may be due in connection with the transactions contemplated by the Transaction Documents.

(u) Investment Company. The Company is not, and is not an Affiliate of, and immediately after receipt of payment for the Securities, will not be or be an Affiliate of, an "investment company" within the meaning of the Investment Company Act of 1940, as amended. The Company shall conduct its business in a manner so that it will not become an "investment company" subject to registration under the Investment Company Act of 1940, as amended.

(v) Registration Rights. No Person has any right to cause the Company to effect the registration under the Securities Act of any securities of the Company or any Subsidiary.

(w) Listing and Maintenance Requirements. The shares of Common Stock are registered pursuant to Section 12(b) or 12(g) of the Exchange Act, and the Company has taken no action designed to, or which to its knowledge is likely to have the effect of, terminating the registration of the Common Stock under the Exchange Act nor has the Company received any notification that the Commission is contemplating terminating such registration. Except as disclosed in the General Disclosure Package, the Company has not, in the 12 months preceding the date hereof, received notice from any Trading Market on which the Common Stock are or have been listed or quoted to the effect that the Company is not in compliance with the listing or maintenance requirements of such Trading Market. The shares of Common Stock are currently eligible for electronic transfer through The Depository Trust Company or another established clearing corporation and the Company is current in payment of the fees to The Depository Trust Company (or such other established clearing corporation) in connection with such electronic transfer.

(x) Application of Takeover Protections. The Company and the Board of Directors have taken all necessary action, if any, in order to render inapplicable any control share acquisition, business combination, poison pill (including any distribution under a rights agreement) or other similar anti-takeover provision under the Company's articles of incorporation or the laws of its state of incorporation that is or could become applicable to the Purchasers as a result of the Purchasers and the Company fulfilling their obligations or exercising their rights under the Transaction Documents, including without limitation as a result of the Company's issuance of the Securities and the Purchasers' ownership of the Securities.

(y) Disclosure. Except with respect to the material terms and conditions of the transactions contemplated by the Transaction Documents, the Company confirms that it has not provided any of the Purchasers or their agents or counsel with any information that it believes constitutes or might constitute material, non-public information which is not otherwise disclosed in the Prospectus. The Company understands and confirms that the Purchasers will rely on the foregoing representation in effecting transactions in securities of the Company. All of the disclosure furnished by or on behalf of the Company to the Purchasers regarding the Company and its Subsidiaries, their respective businesses and the transactions contemplated hereby, including the Disclosure Schedules to this Agreement, is true and correct in all material respects and does not contain any untrue statement of a material fact or omit to state any material fact necessary in order to make the statements made therein, in the light of the circumstances under which they were made, not misleading. The press releases disseminated by the Company during the twelve months preceding the date of this Agreement taken as a whole do not contain any untrue statement of a material fact or omit to state a material fact required to be stated therein or necessary in order to make the statements therein, in the light of the circumstances under which they were made and when made, not misleading. The Company acknowledges and believes, to its best knowledge, that no Purchaser makes or has made any representations or warranties with respect to the transactions contemplated hereby other than those specifically set forth in Section 3.2 hereof.

(z) No Integrated Offering. Assuming the accuracy of the Purchasers' representations and warranties set forth in Section 3.2, neither the Company, nor any of its Affiliates, nor any Person acting on its or their behalf has, directly or indirectly, made any offers or sales of any security or solicited any offers to buy any security, under circumstances that would cause this offering of the Securities to be integrated with prior offerings by the Company for purposes of any applicable stockholder approval provisions of any Trading Market on which any of the securities of the Company are listed or designated.

(aa) **Solvency.** Except as disclosed in the General Disclosure Package, based on the consolidated financial condition of the Company as of the Closing Date, after giving effect to the receipt by the Company of the proceeds from the sale of the Securities hereunder, (i) the fair saleable value of the Company's assets exceeds the amount that will be required to be paid on or in respect of the Company's existing debts and other liabilities (including known contingent liabilities) as they mature, (ii) the Company's assets do not constitute unreasonably small capital to carry on its business as now conducted and as proposed to be conducted including its capital needs taking into account the particular capital requirements of the business conducted by the Company, consolidated and projected capital requirements and capital availability thereof, and (iii) the current cash flow of the Company, together with the proceeds the Company would receive, were it to liquidate all of its assets, after taking into account all anticipated uses of the cash, would be sufficient to pay all amounts on or in respect of its liabilities when such amounts are required to be paid. The Company does not intend to incur debts beyond its ability to pay such debts as they mature (taking into account the timing and amounts of cash to be payable on or in respect of its debt). The Company has no knowledge of any facts or circumstances which lead it to believe that it will file for reorganization or liquidation under the bankruptcy or reorganization laws of any jurisdiction within one year from the Closing Date. Schedule 3.1(aa) sets forth as of the date hereof all outstanding secured and unsecured Indebtedness of the Company or any Subsidiary, or for which the Company or any Subsidiary has commitments. For the purposes of this Agreement, "Indebtedness" means (x) any liabilities for borrowed money or amounts owed in excess of \$50,000 (other than trade accounts payable incurred in the ordinary course of business), (y) all guarantees, endorsements and other contingent obligations in respect of indebtedness of others, whether or not the same are or should be reflected in the Company's consolidated balance sheet (or the notes thereto), except guarantees by endorsement of negotiable instruments for deposit or collection or similar transactions in the ordinary course of business; and (z) the present value of any lease payments in excess of \$50,000 due under leases required to be capitalized in accordance with GAAP. Neither the Company nor any Subsidiary is in default with respect to any Indebtedness.

(bb) **Tax Compliance.** Except for matters that would not, individually or in the aggregate, have or reasonably be expected to result in a Material Adverse Effect, the Company and its Subsidiaries each (i) has made or filed all federal, state and local income and all foreign tax returns, reports and declarations required by any jurisdiction to which it is subject, (ii) has paid all taxes and other governmental assessments and charges, fines or penalties that are material in amount, shown or determined to be due on such returns, reports and declarations and (iii) has set aside on its financial statements provision reasonably adequate for the payment of all material tax liability of which has not been finally determined and all material taxes for periods subsequent to the periods to which such returns, reports or declarations apply. There are no unpaid taxes in any material amount claimed to be due by the taxing authority of any jurisdiction, and the officers of the Company or of any Subsidiary know of no basis for any such claim.

(cc) **Foreign Corrupt Practices.** Neither the Company nor any Subsidiary, nor to the knowledge of the Company or any Subsidiary, any agent or other person acting on behalf of the Company or any Subsidiary, has (i) directly or indirectly, used any funds for unlawful contributions, gifts, entertainment or other unlawful expenses related to foreign or domestic political activity, (ii) made any unlawful payment to foreign or domestic government officials or employees or to any foreign or domestic political parties or campaigns from corporate funds, (iii) failed to disclose fully any contribution made by the Company or any Subsidiary (or made by any person acting on its behalf of which the Company is aware) which is in violation of law, or (iv) violated in any material respect any provision of FCPA.

(dd) **Accountants.** The Company's independent registered public accounting firm is as set forth in the Prospectus. To the knowledge and belief of the Company, such accounting firm (i) is a registered public accounting firm as required by the Exchange Act and (ii) shall express its opinion with respect to the financial statements to be included in the Company's Annual Report for the fiscal year ending December 31, 2023.

(ee) **Acknowledgment Regarding Purchasers' Purchase of Securities.** The Company acknowledges and agrees that each of the Purchasers is acting solely in the capacity of an arm's length purchaser with respect to the Transaction Documents and the transactions contemplated thereby. The Company further acknowledges that no Purchaser is acting as a financial advisor or fiduciary of the Company (or in any similar capacity) with respect to the Transaction Documents and the transactions contemplated thereby and any advice given by any Purchaser or any of their respective representatives or agents in connection with the Transaction Documents and the transactions contemplated thereby is merely incidental to the Purchasers' purchase of the Securities. The Company further represents to each Purchaser that the Company's decision to enter into this Agreement and the other Transaction Documents has been based solely on the independent evaluation of the transactions contemplated hereby by the Company and its representatives.

(ff) **Acknowledgment Regarding Purchaser's Trading Activity.** Anything in this Agreement or elsewhere herein to the contrary notwithstanding (except for 4.12 hereof), it is understood and acknowledged by the Company that: (i) none of the Purchasers has been asked by the Company to agree, nor has any Purchaser agreed, to desist from purchasing or selling, long and/or short, securities of the Company, or "derivative" securities based on securities issued by the Company or to hold the Securities for any specified term; (ii) past or future open market or other transactions by any Purchaser, specifically including, without limitation, Short Sales or "derivative" transactions, before or after the closing of this or future private placement transactions, may negatively impact the market price of the Company's publicly-traded securities; (iii) any Purchaser, and counter-parties in "derivative" transactions to which any such Purchaser is a party, directly or indirectly, presently may have a "short" position in the shares of Common Stock, and (iv) each Purchaser shall not be deemed to have any affiliation with or control over any arm's length counter-party in any "derivative" transaction. The Company further understands and acknowledges that (y) one or more Purchasers may engage in hedging activities at various times during the period that the Securities are outstanding, and (z) such hedging activities (if any) could reduce the value of the existing stockholders' equity interests in the Company at and after the time that the hedging activities are being conducted. The Company acknowledges that such aforementioned hedging activities do not constitute a breach of any of the Transaction Documents.

(gg) **Regulation M Compliance.** The Company has not, and to its knowledge no one acting on its behalf has, (i) taken, directly or indirectly, any action designed to cause or to result in the stabilization or manipulation of the price of any security of the Company to facilitate the sale or resale of any of the shares of Common Stock, (ii) sold, bid for, purchased, or, paid any compensation for soliciting purchases of, any of the shares of Common Stock, or (iii) paid or agreed to pay to any Person any compensation for soliciting another to purchase any other securities of the Company, other than, in the case of clauses (ii) and (iii), compensation paid to the Placement Agent in connection with the placement of the shares of Common Stock.

(hh) **Stock Option Plans.** Each stock option granted by the Company under the Company's stock incentive plans was granted (i) in accordance with the terms of such plan and (ii) with an exercise price at least equal to the fair market value of the Common Stock on the date such stock option would be considered granted under GAAP and applicable law. No stock option granted under the Company's stock option plan has been backdated.

- (ii) Cybersecurity. Except as would not, individually or in the aggregate, have a Material Adverse Effect, (i) the Company and the Subsidiaries are 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 the Company's or any Subsidiary's information technology and computer systems, networks, hardware, software, data (including the data of its 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 to the protection of such IT Systems and Data from unauthorized use, access, misappropriation or modification; (ii) the Company and the Subsidiaries have implemented and maintained commercially reasonable safeguards to maintain and protect its material confidential information and the integrity, continuous operation, redundancy and security of all IT Systems and Data; and (iii) the Company and the Subsidiaries have implemented backup and disaster recovery technology consistent with commercially reasonable industry standards and practices.

- (jj) FDA. As to each product subject to the jurisdiction of the U.S. Food and Drug Administration ("FDA") under the Federal Food, Drug and Cosmetic Act, as amended, and the regulations thereunder ("FDCA") that is manufactured, packaged, labeled, tested, distributed, sold, and/or marketed by the Company or any of its Subsidiaries (each such product, a "Pharmaceutical Product"), such Pharmaceutical Product is being manufactured, packaged, labeled, tested, distributed, sold and/or marketed by the Company in compliance with all applicable requirements under FDCA and similar laws, rules and regulations relating to registration, investigational use, premarket clearance, licensure, or application approval, good manufacturing practices, good laboratory practices, good clinical practices, product listing, quotas, labeling, advertising, record keeping and filing of reports, except where the failure to be in compliance would not have a Material Adverse Effect. There is no pending, completed or, to the Company's knowledge, threatened, action (including any lawsuit, arbitration, or legal or administrative or regulatory proceeding, charge, complaint, or investigation) against the Company or any of its Subsidiaries, and none of the Company or any of its Subsidiaries has received any notice, warning letter or other communication from the FDA or any other governmental entity, which (i) contests the premarket clearance, licensure, registration, or approval of, the uses of, the distribution of, the manufacturing or packaging of, the testing of, the sale of, or the labeling and promotion of any Pharmaceutical Product, (ii) withdraws its approval of, requests the recall, suspension, or seizure of, or withdraws or orders the withdrawal of advertising or sales promotional materials relating to, any Pharmaceutical Product, (iii) imposes a clinical hold on any clinical investigation by the Company or any of its Subsidiaries, (iv) enjoins production at any facility of the Company or any of its Subsidiaries, (v) enters or proposes to enter into a consent decree of permanent injunction with the Company or any of its Subsidiaries, or (vi) otherwise alleges any violation of any laws, rules or regulations by the Company or any of its Subsidiaries, and which, either individually or in the aggregate, would have a Material Adverse Effect. The properties, business and operations of the Company have been and are being conducted in all material respects in accordance with all applicable laws, rules and regulations of the FDA. The Company has not been informed by the FDA that the FDA will prohibit the marketing, sale, license or use in the United States of any product proposed to be developed, produced or marketed by the Company nor has the FDA expressed any concern as to approving or clearing for marketing any product being developed or proposed to be developed by the Company.
- (kk) Office of Foreign Assets Control. Neither the Company nor any Subsidiary nor, to the Company's knowledge, any director, officer, agent, employee or affiliate of the Company or any Subsidiary is currently subject to any U.S. sanctions administered by the Office of Foreign Assets Control of the U.S. Treasury Department ("OFAC").
- (ll) Money Laundering. The operations of the Company and its Subsidiaries are and have been conducted at all times in compliance with applicable financial record-keeping and reporting requirements of the Currency and Foreign Transactions Reporting Act of 1970, as amended, applicable money laundering statutes and applicable rules and regulations thereunder (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 Company or any Subsidiary with respect to the Money Laundering Laws is pending or, to the knowledge of the Company or any Subsidiary, threatened.

3.2 Representations and Warranties of the Purchasers. Each Purchaser, for itself and for no other Purchaser, hereby represents and warrants as of the date hereof and as of the Closing Date to the Company as follows (unless as of a specific date therein, in which case they shall be accurate as of such date):

- (a) Organization; Authority. Such Purchaser is either an individual or an entity duly incorporated or formed, validly existing and in good standing under the laws of the jurisdiction of its incorporation or formation with full right, corporate, partnership limited liability company or similar power and authority to enter into and to consummate the transactions contemplated by the Transaction Documents and otherwise to carry out its obligations hereunder and thereunder. The execution and delivery of the Transaction Documents and performance by such Purchaser of the transactions contemplated by the Transaction Documents have been duly authorized by all necessary corporate, partnership, limited liability company or similar action, as applicable, on the part of such Purchaser. Each Transaction Document to which it is a party has been duly executed by such Purchaser, and when delivered by such Purchaser in accordance with the terms hereof, will constitute the valid and legally binding obligation of such Purchaser, enforceable against it in accordance with its terms, except: (i) as limited by general equitable principles and applicable bankruptcy, insolvency, reorganization, moratorium and other laws of general application affecting enforcement of creditors' rights generally, (ii) as limited by laws relating to the availability of specific performance, injunctive relief or other equitable remedies and (iii) insofar as indemnification and contribution provisions may be limited by applicable law.
- (b) Understandings or Arrangements. Such Purchaser is acquiring the Securities as principal for its own account and has no direct or indirect arrangement or understandings with any other persons to distribute or regarding the distribution of such Securities (this representation and warranty not limiting such Purchaser's right to sell the Securities pursuant to the Registration Statement or otherwise in compliance with applicable federal and state securities laws).
- (c) Experience of Such Purchaser. Such Purchaser, either alone or together with its representatives, has such knowledge, sophistication and experience in business and financial matters so as to be capable of evaluating the merits and risks of the prospective investment in the Securities, and has so evaluated the merits and risks of such investment. Such Purchaser is able to bear the economic risk of an investment in the Securities and, at the present time, is able to afford a complete loss of such investment.

(d) **Certain Transactions and Confidentiality.** Other than consummating the transactions contemplated hereunder, such Purchaser has not, nor has any Person acting on behalf of or pursuant to any understanding with such Purchaser, directly or indirectly executed any purchases or sales, including Short Sales, of the securities of the Company during the period commencing as of the time that such Purchaser first received a term sheet (written or oral) from the Company or any other Person representing the Company setting forth the material terms, which terms include definitive pricing terms, of the transactions contemplated hereunder and ending immediately prior to the execution hereof. Notwithstanding the foregoing, in the case of a Purchaser that is a multi-managed investment vehicle whereby separate portfolio managers manage separate portions of such Purchaser's assets and the portfolio managers have no direct knowledge of the investment decisions made by the portfolio managers managing other portions of such Purchaser's assets, the representation set forth above shall only apply with respect to the portion of assets managed by the portfolio manager that made the investment decision to purchase the Securities covered by this Agreement. Other than to other Persons party to this Agreement or to such Purchaser's representatives, including, without limitation, its officers, directors, partners, legal and other advisors, employees, agents and Affiliates, such Purchaser has maintained the confidentiality of all disclosures made to it in connection with this transaction (including the existence and terms of this transaction). Notwithstanding the foregoing, for the avoidance of doubt, nothing contained herein shall constitute a representation or warranty, or preclude any actions, with respect to locating or borrowing shares order to effect Short Sales or similar transactions in the future.

(e) **Independent Advice.** Each Purchaser understands that nothing in this Agreement or any other materials presented by or on behalf of the Company to the Purchaser in connection with the purchase of the Securities constitutes legal, tax or investment advice.

The Company acknowledges and agrees that the representations contained in this Section 3.2 shall not modify, amend or affect such Purchaser's right to rely on the Company's representations and warranties contained in this Agreement or any representations and warranties contained in any other Transaction Document or any other document or instrument executed and/or delivered in connection with this Agreement or the consummation of the transactions contemplated hereby. Notwithstanding the foregoing, for the avoidance of doubt, nothing contained herein shall constitute a representation or warranty, or preclude any actions, except as set forth in this Agreement, with respect to locating or borrowing shares in order to effect Short Sales or similar transactions in the future.

Section 4.
OTHER AGREEMENTS OF THE PARTIES

4.1 Legends. The shares of Common Stock and the Warrant Shares shall be issued free of legends. If at any time following the date hereof the Registration Statement is not effective or is not otherwise available for the sale of the shares of Common Stock, the Warrants or the Warrant Shares, the Company shall immediately notify the holders of the Warrants in writing that such registration statement is not then effective and thereafter shall promptly notify such holders when the registration statement is effective again and available for the sale of the Shares, the Warrants or the Warrant Shares (it being understood and agreed that the foregoing shall not limit the ability of the Company to issue, or any Purchaser to sell, any of the Shares, the Warrants or the Warrant Shares in compliance with applicable federal and state securities laws). The Company shall use commercially reasonable best efforts to keep a registration statement (including the Registration Statement) registering the issuance of the Warrant Shares effective during the term of the Warrants.

4.2 Furnishing of Information; Public Information. Until the earliest of the time that (i) no Purchaser owns Securities, or (ii) the Common Warrants have expired, the Company covenants to maintain the registration of the Common Stock under Section 12(b) or 12(g) of the Exchange Act and to timely file (or obtain extensions in respect thereof and file within the applicable grace period) all reports required to be filed by the Company after the date hereof pursuant to the Exchange Act, even if the Company is not then subject to the reporting requirements of the Exchange Act, (in each case on or after the date as of which the Purchasers may sell all of their Securities without restriction or limitation pursuant to Rule 144) except in the event that the Company consummates: (a) any transaction or series of related transactions as a result of which any Person (together with its Affiliates) acquires then outstanding securities of the Company representing more than fifty percent (50%) of the voting control of the Company; (b) a merger or reorganization of the Company with one or more other entities in which the Company is not the surviving entity; or (c) a sale of all or substantially all of the assets of the Company, where the consummation of such transaction results in the Company no longer being subject to the reporting requirements of the Exchange Act.

4.3 Integration. The Company shall not sell, offer for sale or solicit offers to buy or otherwise negotiate in respect of any security (as defined in Section 2 of the Securities Act) that would be integrated with the offer or sale of the Securities for purposes of the rules and regulations of any Trading Market such that it would require shareholder approval prior to the closing of such other transaction unless shareholder approval is obtained before the closing of such subsequent transaction.

4.4 Securities Laws Disclosure; Publicity. The Company shall (a) by the Disclosure Time, issue a press release disclosing the material terms of the transactions contemplated hereby, and (b) file a Current Report on Form 8-K, including the Transaction Documents as exhibits thereto, with the Commission within the time required by the Exchange Act. From and after the issuance of such press release, the Company represents to the Purchasers that it shall have publicly disclosed all material, non-public information delivered to any of the Purchasers by the Company or any of its Subsidiaries, or any of their respective officers, directors, employees or agents in connection with the transactions contemplated by the Transaction Documents. In addition, effective upon the issuance of such press release, the Company acknowledges and agrees that any and all confidentiality or similar obligations under any agreement, whether written or oral, between the Company, any of its Subsidiaries or any of their respective officers, directors, agents, employees or Affiliates on the one hand, and any of the Purchasers or any of their Affiliates on the other hand, shall terminate. The Company and each Purchaser shall consult with each other in issuing any other press releases with respect to the transactions contemplated hereby, and neither the Company nor any Purchaser shall issue any such press release nor otherwise make any such public statement without the prior consent of the Company, with respect to any press release of any Purchaser, or without the prior consent of each Purchaser, with respect to any press release of the Company, which consent shall not unreasonably be withheld or delayed, except if such disclosure is required by law, in which case the disclosing party shall promptly provide the other party with prior notice of such public statement or communication. Notwithstanding the foregoing, the Company shall not publicly disclose the name of any Purchaser, or include the name of any Purchaser in any filing with the Commission or any regulatory agency or Trading Market, without the prior written consent of such Purchaser, except (a) as required by federal securities law in connection with the filing of final Transaction Documents with the Commission, and (b) to the extent such disclosure is required by law or Trading Market regulations, in which case the Company shall provide the Purchasers with prior notice of such disclosure permitted under this clause (b).

4.5 Stockholder Rights Plan. No claim will be made or enforced by the Company or, with the consent of the Company, any other Person, that any Purchaser is an "Acquiring Person" under any control share acquisition, business combination, poison pill (including any distribution under a rights agreement) or similar anti-takeover plan or arrangement in effect or hereafter adopted by the Company, or that any Purchaser could be deemed to trigger the provisions of any such plan or arrangement, by virtue of receiving Securities under the Transaction Documents or under any other agreement

between the Company and the Purchasers.

4.6 Non-Public Information. Except with respect to the material terms and conditions of the transactions contemplated by the Transaction Documents, which shall be disclosed pursuant to Section 4.4, the Company covenants and agrees that neither it, nor any other Person acting on its behalf will provide any Purchaser or its agents or counsel with any information that the Company reasonably believes constitutes material non-public information, unless prior thereto such Purchaser shall have entered into a written agreement with the Company regarding the confidentiality and use of such information. The Company understands and confirms that each Purchaser shall be relying on the foregoing covenant in effecting transactions in securities of the Company. To the extent that the Company delivers any material, non-public information to a Purchaser without such Purchaser's consent, the Company hereby covenants and agrees that such Purchaser shall not have any duty of confidentiality to the Company, any of its Subsidiaries, or any of their respective officers, directors, agents, employees or Affiliates, or a duty to the Company, and of its Subsidiaries or any of their respective officers, directors, agents, employees or Affiliates not to trade on the basis of, such material, non-public information, provided that the Purchaser shall remain subject to applicable law. To the extent that any notice provided pursuant to any Transaction Document constitutes, or contains, material, non-public information regarding the Company or any Subsidiaries, the Company shall simultaneously file such notice with the Commission pursuant to a Current Report on Form 8-K. The Company understands and confirms that each Purchaser shall be relying on the foregoing covenant in effecting transactions in securities of the Company.

4.7 Use of Proceeds. Although the Company intends to use the net proceeds from the sale of the Securities hereunder for general working capital purposes and potential acquisitions], the Company has discretion in the application of the net proceeds of the Offering.

4.8 Indemnification of Purchasers. Subject to the provisions of this Section 4.8, the Company will indemnify and hold each Purchaser and its directors, officers, shareholders, members, partners, employees and agents (and any other Persons with a functionally equivalent role of a Person holding such titles notwithstanding a lack of such title or any other title), each Person who controls such Purchaser (within the meaning of Section 15 of the Securities Act and Section 20 of the Exchange Act), and the directors, officers, shareholders, agents, members, partners or employees (and any other Persons with a functionally equivalent role of a Person holding such titles notwithstanding a lack of such title or any other title) of such controlling persons (each, a "Purchaser Party") harmless from any and all losses, liabilities, obligations, claims, contingencies, damages, costs and expenses, including all judgments, amounts paid in settlements, court costs and reasonable attorneys' fees and costs of investigation that any such Purchaser Party may suffer or incur as a result of or relating to (a) any breach of any of the representations, warranties, covenants or agreements made by the Company in this Agreement or in the other Transaction Documents or (b) any action instituted against the Purchaser Parties in any capacity (including a Purchaser Party's status as an investor), or any of them or their respective Affiliates, any stockholder of the Company who is not an Affiliate of such Purchaser Party, arising out of or relating to any of the transactions contemplated by the Transaction Documents (unless such action is based upon a material breach of such Purchaser Party's representations, warranties, covenants or agreements made by such Purchaser Party in any Transaction Document or any conduct by a Purchaser Party which is finally judicially determined to constitute fraud, gross negligence or willful misconduct). If any action shall be brought against any Purchaser Party in respect of which indemnity may be sought pursuant to this Agreement, such Purchaser Party shall promptly notify the Company in writing, and the Company shall have the right to assume the defense thereof with counsel of its own choosing reasonably acceptable to the Purchaser Party. Any Purchaser Party shall have the right to employ separate counsel in any such action and participate in the defense thereof, but the fees and expenses of such counsel shall be at the expense of such Purchaser Party except to the extent that (i) the employment thereof has been specifically authorized by the Company in writing, (ii) the Company has failed after a reasonable period of time to assume such defense and to employ counsel or (iii) in such action there is, in the reasonable opinion of counsel to the applicable Purchaser Party (which may be internal counsel), a material conflict on any material issue between the position of the Company and the position of such Purchaser Party, in which case the Company shall be responsible for the reasonable fees and expenses of no more than one such separate counsel. The Company will not be liable to any Purchaser Party under this Agreement for any settlement by a Purchaser Party effected without the Company's prior written consent, which shall not be unreasonably withheld or delayed, or the extent that a loss, claim, damage, or liability is attributable to any Purchaser Party's breach of any of the representations, warranties, covenants or agreements made by such Purchaser Party in this Agreement or in the other Transaction Documents. The indemnification and other payment obligations required by this Section 4.8 shall be made by periodic payments of the amount thereof during the course of the investigation, defense, collection, enforcement or action, as and when bills are received or are incurred; provided, that if any Purchaser Party is finally judicially determined not to be entitled to indemnification or payment under this Section 4.8, such Purchaser Party shall promptly reimburse the Company for any payments that are advanced under this sentence. The indemnity agreements contained herein shall be in addition to any cause of action or similar right of any Purchaser Party against the Company or others and any liabilities the Company may be subject to pursuant to law.

4.9 Listing of Shares. The Company hereby agrees to use commercially reasonable best efforts to maintain the listing or quotation of the shares of Common Stock on each Trading Market on which each is currently listed, and concurrently with the Closing, the Company shall apply to list or quote all of the shares of Common Stock on such Trading Markets and promptly secure the listing of all of the shares of Common Stock on such Trading Markets. The Company further agrees, if the Company applies to have the Common Stock traded on any other Trading Market, it will then include in such application all of the shares of Common Stock and Warrant Shares, and will take such other action as is necessary to cause all of the shares of Common Stock and Warrant Shares to be listed or quoted on such other Trading Market as promptly as possible. The Company will then take all action reasonably necessary to continue the listing and trading of the Common Stock on a Trading Market and will comply in all material respects with the Company's reporting, filing and other obligations under the bylaws or rules of the Trading Market. The Company agrees to use commercially reasonable efforts to maintain the eligibility of the for electronic transfer through the Depository Trust Company or another established clearing corporation, including, without limitation, by timely payment of fees to the Depository Trust Company or such other established clearing corporation in connection with such electronic transfer. Notwithstanding anything to the contrary contained in this Agreement, none of the foregoing shall apply in the event that the Company consummates (a) any transaction or series of related transactions as a result of which any Person (together with its Affiliates) acquires then outstanding securities of the Company representing more than fifty percent (50%) of the voting control of the Company; (b) a merger or reorganization of the Company with one or more other entities in which the Company is not the surviving entity; or (c) a sale of all or substantially all of the assets of the Company, where the consummation of such transaction results in the Company no longer being subject to the reporting requirements of the Exchange Act

4.10 Subsequent Equity Sales.

- (a) From the date hereof until sixty (60) days after the Closing Date, neither the Company nor any Subsidiary shall (i) issue, enter into any agreement to issue or announce the issuance or proposed issuance of any shares of Common Stock or Common Stock Equivalents or (ii) file any registration statement or amendment or supplement thereto, other than the Prospectus Supplement or filing a registration statement on Form S-8 in connection with any employee benefit plan.

(b) From the date hereof until the six (6) month anniversary of the Closing Date, the Company shall be prohibited from effecting or entering into an agreement to effect any issuance by the Company or any of its Subsidiaries of shares of Common Stock or Common Stock Equivalents (or a combination of units thereof) involving a Variable Rate Transaction. “Variable Rate Transaction” means a transaction in which the Company (i) issues or sells any debt or equity securities that are convertible into, exchangeable or exercisable for, or include the right to receive additional shares of Common Stock either (A) at a conversion price, exercise price or exchange rate or other price that is based upon and/or varies with the trading prices of or quotations for the Common Stock at any time after the initial issuance of such debt or equity securities, or (B) with a conversion, exercise or exchange price that is subject to being reset at some future date after the initial issuance of such debt or equity security or upon the occurrence of specified or contingent events directly or indirectly related to the business of the Company or the market for shares of Common Stock or (ii) enters into, or effects a transaction under, any agreement, including, but not limited to, an equity line of credit or an “at-the-market offering”, whereby the Company may issue securities at a future determined price regardless of whether shares pursuant to such agreement have actually been issued and regardless of whether such agreement is subsequently canceled. Any Purchaser shall be entitled to obtain injunctive relief against the Company to preclude any such issuance, which remedy shall be in addition to any right to collect damages.

(c) Notwithstanding the foregoing, this Section 4.10 shall not apply (1) in respect of an Exempt Issuance, except that no Variable Rate Transaction shall be an Exempt Issuance and (2) following the forty-five (45) day anniversary of the Closing Date, to the at-the-market offering in which the Placement Agent is a sales agent, pursuant to the Amended and Restated Sales Agreement dated February 9, 2021, as amended.

4.11 Equal Treatment of Purchasers. No consideration (including any modification of the Transaction Documents) shall be offered or paid to any Person to amend or consent to a waiver or modification of any provision of the Transaction Documents unless the same consideration is also offered to all of the parties to the Transaction Documents. For clarification purposes, this provision constitutes a separate right granted to each Purchaser by the Company and negotiated separately by each Purchaser, and is intended for the Company to treat the Purchasers as a class and shall not in any way be construed as the Purchasers acting in concert or as a group with respect to the purchase, disposition or voting of the shares of Common Stock or otherwise.

4.12 Certain Transactions and Confidentiality. Each Purchaser, severally and not jointly with the other Purchasers, covenants that neither it nor any Affiliate acting on its behalf or pursuant to any understanding with it will execute any purchases or sales, including Short Sales of any of the Company's securities during the period commencing with the execution of this Agreement and ending at such time that the transactions contemplated by this Agreement are first publicly announced pursuant to the initial press release as described in Section 4.4. Each Purchaser, severally and not jointly with the other Purchasers, covenants that until such time as the transactions contemplated by this Agreement are publicly disclosed by the Company pursuant to the initial press release as described in Section 4.4, such Purchaser will maintain the confidentiality of the existence and terms of this transaction. Notwithstanding the foregoing, and notwithstanding anything contained in this Agreement to the contrary, the Company expressly acknowledges and agrees that (i) no Purchaser makes any representation, warranty or covenant hereby that it will not engage in effecting transactions in any securities of the Company after the time that the transactions contemplated by this Agreement are first publicly announced pursuant to the initial press release as described in Section 4.4, (ii) no Purchaser shall be restricted or prohibited from effecting any transactions in any securities of the Company in accordance with applicable securities laws from and after the time that the transactions contemplated by this Agreement are first publicly announced pursuant to the initial press release as described in Section 4.4 and (iii) no Purchaser shall have any duty of confidentiality or duty not to trade in the securities of the Company to the Company or its Subsidiaries after the issuance of the initial press release as described in Section 4.4. Notwithstanding the foregoing, in the case of a Purchaser that is a multi-managed investment vehicle whereby separate portfolio managers manage separate portions of such Purchaser's assets and the portfolio managers have no direct knowledge of the investment decisions made by the portfolio managers managing other portions of such Purchaser's assets, the covenant set forth above shall only apply with respect to the portion of assets managed by the portfolio manager that made the investment decision to purchase the Securities covered by this Agreement.

4.13 Exercise Procedures. The form of Notice of Exercise included in the Warrants set forth the totality of the procedures required of the Purchasers in order to exercise the Warrants. No additional legal opinion, other information or instructions shall be required of the Purchasers to exercise their Warrants. Without limiting the preceding sentences, no ink-original Notice of Exercise shall be required, nor shall any medallion guarantee (or other type of guarantee or notarization) of any Notice of Exercise form be required in order to exercise the Warrants. The Company shall honor exercises of the Warrants and shall deliver shares of Common Stock and/or Warrant Shares in accordance with the terms, conditions and time periods set forth in the Transaction Documents.

4.14 Reservations of Shares. As of the date hereof, the Company has reserved and the Company shall continue to reserve and keep available at all times, free of preemptive rights, a sufficient number of shares of Common Stock for the purpose of enabling the Company to issue shares of Common Stock pursuant to this Agreement and Warrant Shares pursuant to any exercise of the Warrants.

4.15 Lock-Up Agreements. The Company shall not amend, modify, waive or terminate any provision of any of the Lock-Up Agreements without the prior written consent of the Placement Agent, except to extend the term of the lock-up period, and shall enforce the provisions of each Lock-Up Agreement in accordance with its terms. If any party to a Lock-Up Agreement breaches any provision of a Lock-Up Agreement, the Company shall promptly use its best efforts to seek specific performance of the terms of such Lock-Up Agreement.

Section 5. **MISCELLANEOUS**

5.1 Termination. This Agreement may be terminated by any Purchaser, as to such Purchaser's obligations hereunder only and without any effect whatsoever on the obligations between the Company and the other Purchasers, by written notice to the other parties, if the Closing has not been consummated on or before the fifth (5th) Trading Day following the date hereof; provided, however, that no such termination will affect the right of any party to sue for any breach by any other party (or parties).

5.2 Fees and Expenses. Except as expressly set forth in the Transaction Documents to the contrary, each party shall pay the fees and expenses of its advisers, counsel, accountants and other experts, if any, and all other expenses incurred by such party incident to the negotiation, preparation, execution, delivery and performance of this Agreement. The Company shall pay all Depositary Fees (including, without limitation, any fees required for same-day processing of any instruction letter delivered by the Company and any exercise notice delivered by a Purchaser), stamp taxes and other taxes and duties levied in connection with the delivery of any Securities to the Purchasers.

5.3 Entire Agreement. The Transaction Documents, together with the exhibits and schedules thereto, the Preliminary Prospectus and the Prospectus, contain the entire understanding of the parties with respect to the subject matter hereof and thereof and supersede all prior agreements and

understandings, oral or written, with respect to such matters, which the parties acknowledge have been merged into such documents, exhibits and schedules.

5.4 Notices. Any and all notices or other communications or deliveries required or permitted to be provided hereunder shall be in writing and shall be deemed given and effective on the earliest of: (a) the time of transmission, if such notice or communication is delivered via facsimile at the facsimile number or email attachment at the email address as set forth on the signature pages attached hereto at or prior to 5:30 p.m. (New York City time) on a Trading Day, (b) the next Trading Day after the time of transmission, if such notice or communication is delivered via facsimile at the facsimile number or email attachment at the email address as set forth on the signature pages attached hereto on a day that is not a Trading Day or later than 5:30 p.m. (New York City time) on any Trading Day, (c) the second (2nd) Trading Day following the date of mailing, if sent by U.S. nationally recognized overnight courier service or (d) upon actual receipt by the party to whom such notice is required to be given. The address for such notices and communications shall be as set forth on the signature pages attached hereto. To the extent that any notice provided pursuant to any Transaction Document constitutes, or contains, material, non-public information regarding the Company or any Subsidiaries, the Company shall simultaneously file such notice with the Commission pursuant to a Current Report on Form 8-K.

5.5 Amendments; Waivers. No provision of this Agreement may be waived, modified, supplemented or amended except in a written instrument signed, in the case of an amendment, by the Company and the Purchasers who execute this Agreement and who purchased at least 50.1% in interest of the sum of (i) the Shares and (ii) the Pre-Funded Warrant Shares initially issuable upon exercise of the Pre-Funded Warrants based on the initial Subscription Amounts hereunder, or, in the case of a waiver, by the party against whom enforcement of any such waived provision is sought; provided, that if any amendment, modification or waiver disproportionately and adversely impacts a Purchaser (or group of Purchasers), the consent of at least 50.1% in interest of such disproportionately impacted Purchaser execute this Agreement and who (or group of Purchasers) shall also be required. No waiver of any default with respect to any provision, condition or requirement of this Agreement shall be deemed to be a continuing waiver in the future or a waiver of any subsequent default or a waiver of any other provision, condition or requirement hereof, nor shall any delay or omission of any party to exercise any right hereunder in any manner impair the exercise of any such right. Any proposed amendment or waiver that disproportionately, materially and adversely affects the rights and obligations of any Purchaser relative to the comparable rights and obligations of the other Purchasers shall require the prior written consent of such adversely affected Purchaser. Any amendment effected in accordance with this Section 5.5 shall be binding upon each Purchaser and holder of Securities and the Company.

5.6 Headings. The headings herein are for convenience only, do not constitute a part of this Agreement and shall not be deemed to limit or affect any of the provisions hereof.

5.7 Successors and Assigns. This Agreement shall be binding upon and inure to the benefit of the parties and their successors and permitted assigns. The Company may not assign this Agreement or any rights or obligations hereunder without the prior written consent of each Purchaser (other than by merger). Any Purchaser may assign any or all of its rights under this Agreement to any Person to whom such Purchaser assigns or transfers any Securities, provided that such transferee agrees in writing to be bound, with respect to the transferred Securities, by the provisions of the Transaction Documents that apply to the "Purchasers."

5.8 No Third-Party Beneficiaries. The Placement Agent shall be the third-party beneficiary of the representations and warranties of the Company in Section 3.1 and the representations and warranties of the Purchasers in Section 3.2. This Agreement is intended for the benefit of the parties hereto and their respective successors and permitted assigns and is not for the benefit of, nor may any provision hereof be enforced by, any other Person, except as otherwise set forth in Section 4.8 and this Section 5.8.

5.9 Governing Law. All questions concerning the construction, validity, enforcement and interpretation of the Transaction Documents shall be governed by and construed and enforced in accordance with the internal laws of the State of New York, without regard to the principles of conflicts of law thereof. Each party agrees that all legal proceedings concerning the interpretations, enforcement and defense of the transactions contemplated by this Agreement and any other Transaction Documents (whether brought against a party hereto or its respective affiliates, directors, officers, shareholders, partners, members, employees or agents) shall be commenced exclusively in the state and federal courts sitting in the state of New York. Each party hereby irrevocably submits to the exclusive jurisdiction of the state and federal courts sitting in the state of New York for the adjudication of any dispute hereunder or in connection herewith or with any transaction contemplated hereby or discussed herein (including with respect to the enforcement of any of the Transaction Documents), and hereby irrevocably waives, and agrees not to assert in any suit, action or proceeding, any claim that it is not personally subject to the jurisdiction of any such court, that such suit, action or proceeding is improper or is an inconvenient venue for such proceeding. Each party hereby irrevocably waives personal service of process and consents to process being served in any such suit, action or proceeding by mailing a copy thereof via registered or certified mail or overnight delivery (with evidence of delivery) to such party at the address in effect for notices to it under this Agreement and agrees that such service shall constitute good and sufficient service of process and notice thereof. Nothing contained herein shall be deemed to limit in any way any right to serve process in any other manner permitted by law. If either party shall commence an action, suit or proceeding to enforce any provisions of the Transaction Documents, then, in addition to the obligations of the Company under Section 4.8, the prevailing party in such action, suit or proceeding shall be reimbursed by the other party for its reasonable attorneys' fees and other costs and expenses incurred with the investigation, preparation and prosecution of such action or proceeding.

5.10 Survival. The representations and warranties contained herein shall survive the Closing and the delivery of the Securities for the applicable statute of limitations.

5.11 Execution. This Agreement may be executed in two or more counterparts, all of which when taken together shall be considered one and the same agreement and shall become effective when counterparts have been signed by each party and delivered to each other party, it being understood that the parties need not sign the same counterpart. In the event that any signature is delivered by facsimile transmission or by e-mail delivery of a ".pdf" format data file, such signature shall create a valid and binding obligation of the party executing (or on whose behalf such signature is executed) with the same force and effect as if such facsimile or ".pdf" signature page was an original thereof.

5.12 Severability. If any term, provision, covenant or restriction of this Agreement is held by a court of competent jurisdiction to be invalid, illegal, void or unenforceable, the remainder of the terms, provisions, covenants and restrictions set forth herein shall remain in full force and effect and shall in no way be affected, impaired or invalidated, and the parties hereto shall use their commercially reasonable efforts to find and employ an alternative means to achieve the same or substantially the same result as that contemplated by such term, provision, covenant or restriction. It is hereby stipulated and declared to be the intention of the parties that they would have executed the remaining terms, provisions, covenants and restrictions without including any of such that may be hereafter declared invalid, illegal, void or unenforceable.

5.13 Rescission and Withdrawal Right. Notwithstanding anything to the contrary contained in (and without limiting any similar provisions of) any of the

other Transaction Documents, whenever any Purchaser exercises a right, election, demand or option under a Transaction Document and the Company does not timely perform its related obligations within the periods therein provided, then such Purchaser may rescind or withdraw, in its sole discretion from time to time upon written notice to the Company, any relevant notice, demand or election in whole or in part without prejudice to its future actions and rights; provided, however, that, in the case of a rescission of an exercise of a Warrant, the applicable Purchaser shall be required to return any shares of Common Stock subject to any such rescinded exercise notice concurrently with the return to such Purchaser of the aggregate exercise price paid to the Company for such shares and the restoration of such Purchaser's right to acquire such shares pursuant to such Purchaser's Warrant (including, issuance of a replacement warrant certificate evidencing such restored right).

5.14 Replacement of Securities. If any certificate or instrument evidencing any Securities is mutilated, lost, stolen or destroyed, the Company shall issue or cause to be issued in exchange and substitution for and upon cancellation thereof (in the case of mutilation), or in lieu of and substitution therefor, a new certificate or instrument, but only upon receipt of evidence reasonably satisfactory to the Company of such loss, theft or destruction. The applicant for a new certificate or instrument under such circumstances shall also pay any reasonable third-party costs (including customary indemnity) associated with the issuance of such replacement Securities.

5.15 Remedies. In addition to being entitled to exercise all rights provided herein or granted by law, including recovery of damages, each of the Purchasers and the Company will be entitled to specific performance under the Transaction Documents. The parties agree that monetary damages may not be adequate compensation for any loss incurred by reason of any breach of obligations contained in the Transaction Documents and hereby agree to waive and not to assert in any action for specific performance of any such obligation the defense that a remedy at law would be adequate.

5.16 Payment Set Aside. To the extent that the Company makes a payment or payments to any Purchaser pursuant to any Transaction Document or a Purchaser enforces or exercises its rights thereunder, and such payment or payments or the proceeds of such enforcement or exercise or any part thereof are subsequently invalidated, declared to be fraudulent or preferential, set aside, recovered from, disgorged by or are required to be refunded, repaid or otherwise restored to the Company, a trustee, receiver or any other Person under any law (including, without limitation, any bankruptcy law, state or federal law, common law or equitable cause of action), then to the extent of any such restoration the obligation or part thereof originally intended to be satisfied shall be revived and continued in full force and effect as if such payment had not been made or such enforcement or setoff had not occurred.

5.17 Independent Nature of Purchasers' Obligations and Rights. The obligations of each Purchaser under any Transaction Document are several and not joint with the obligations of any other Purchaser, and no Purchaser shall be responsible in any way for the performance or non-performance of the obligations of any other Purchaser under any Transaction Document. Nothing contained herein or in any other Transaction Document, and no action taken by any Purchaser pursuant hereto or thereto, shall be deemed to constitute the Purchasers as a partnership, an association, a joint venture or any other kind of entity, or create a presumption that the Purchasers are in any way acting in concert or as a group with respect to such obligations or the transactions contemplated by the Transaction Documents. Each Purchaser shall be entitled to independently protect and enforce its rights including, without limitation, the rights arising out of this Agreement or out of the other Transaction Documents, and it shall not be necessary for any other Purchaser to be joined as an additional party in any proceeding for such purpose. Each Purchaser has been represented by its own separate legal counsel in its review and negotiation of the Transaction Documents. For reasons of administrative convenience only, each Purchaser and its respective counsel have chosen to communicate with the Company through the Placement Agent Counsel, the legal counsel of the Placement Agent. Placement Agent Counsel does not represent any of the Purchasers and only represents the Placement Agent. The Company has elected to provide all Purchasers with the same terms and Transaction Documents for the convenience of the Company and not because it was required or requested to do so by any of the Purchasers. It is expressly understood and agreed that each provision contained in this Agreement and in each other Transaction Document is between the Company and a Purchaser, solely, and not between the Company and the Purchasers collectively and not between and among the Purchasers.

5.18 Saturdays, Sundays, Holidays, etc. If the last or appointed day for the taking of any action or the expiration of any right required or granted herein shall not be a Business Day, then such action may be taken or such right may be exercised on the next succeeding Business Day.

5.19 Liquidated Damages. The Company's obligations to pay any partial liquidated damages or other amounts owing under the Transaction Documents is a continuing obligation of the Company and shall not terminate until all unpaid partial liquidated damages and other amounts have been paid notwithstanding the fact that the instrument or security pursuant to which such partial liquidated damages or other amounts are due and payable shall have been canceled.

5.20 Construction. The parties agree that each of them and/or their respective counsel have reviewed and had an opportunity to revise the Transaction Documents and, therefore, the normal rule of construction to the effect that any ambiguities are to be resolved against the drafting party shall not be employed in the interpretation of the Transaction Documents or any amendments thereto. In addition, each and every reference to share prices and shares of Common Stock in any Transaction Document shall be subject to adjustment for reverse and forward stock splits, stock dividends, stock combinations and other similar transactions relating to shares of Common Stock that occur after the date of this Agreement.

5.21 WAIVER OF JURY TRIAL. IN ANY ACTION, SUIT, OR PROCEEDING IN ANY JURISDICTION BROUGHT BY ANY PARTY AGAINST ANY OTHER PARTY, THE PARTIES EACH KNOWINGLY AND INTENTIONALLY, TO THE GREATEST EXTENT PERMITTED BY APPLICABLE LAW, HEREBY ABSOLUTELY, UNCONDITIONALLY, IRREVOCABLY AND EXPRESSLY WAIVES FOREVER TRIAL BY JURY.

[Signature Pages Follow]

IN WITNESS WHEREOF, the parties hereto have caused this Securities Purchase Agreement to be duly executed by their respective authorized signatories as of the date first indicated above.

THERIVA BIOLOGICS, INC.

Address for Notice:

By: _____

Email: _____

Name: _____

Fax: _____

Title: _____

With a copy to (which shall not constitute notice):

[]
Attn:
Email:

[REMAINDER OF PAGE INTENTIONALLY LEFT BLANK.
SIGNATURE PAGES FOR PURCHASERS FOLLOW.]

[PURCHASER SIGNATURE PAGES TO SECURITIES PURCHASE AGREEMENT]

IN WITNESS WHEREOF, the undersigned have caused this Securities Purchase Agreement to be duly executed by their respective authorized signatories as of the date first indicated above.

Name of Purchaser:

Signature of Authorized Signatory of Purchaser :

Name of Authorized Signatory:

Title of Authorized Signatory:

Email Address of Authorized Signatory:

Facsimile Number of Authorized Signatory:

Address for Notice to Purchaser:

Address for Delivery of Warrant Shares to the Purchaser (if not same address for notice):

DWAC for Common Stock:

Subscription Amount: \$ _____

Shares of Common Stock: _____

Shares of Common Stock underlying the Pre-Funded Warrants: _____

Warrant Shares underlying the Common Warrants: _____

EIN Number: _____

Notwithstanding anything contained in this Agreement to the contrary, by checking this box (i) the obligations of the above-signed to purchase the securities set forth in this Agreement to be purchased from the Company by the above-signed, and the obligations of the Company to sell such securities to the above-signed, shall be unconditional and all conditions to Closing shall be disregarded, (ii) the Closing shall occur on the second (2nd) Trading Day following the date of this Agreement and (iii) any condition to Closing contemplated by this Agreement (but prior to being disregarded by clause (i) above) that required delivery by the Company or the above-signed of any agreement, instrument, certificate or the like or purchase price (as applicable) shall no longer be a condition and shall instead be an unconditional obligation of the Company or the above-signed (as applicable) to deliver such agreement, instrument, certificate or the like or purchase price (as applicable) to such other party on the Closing Date.

[SIGNATURE PAGES CONTINUE]

Exhibit A
Form of Common Warrant
(See Attached)

Exhibit B
Form of Pre-Funded Warrant
(See Attached)

Exhibit C
Form of Lock-Up Agreement
(See Attached)

Consent of Independent Registered Public Accounting Firm

We hereby consent to the incorporation by reference in the Prospectus constituting a part of this Registration Statement of our report dated March 25, 2024, relating to the consolidated financial statements of Theriva Biologics, Inc. (the Company) appearing in the Company's Annual Report on Form 10-K for the year ended December 31, 2023. Our report contains an explanatory paragraph regarding the Company's ability to continue as a going concern.

We also consent to the reference to us under the caption "Experts" in the Prospectus.

/s/ BDO USA, P.C.

Raleigh, North Carolina
December 10, 2024

Calculation of Filing Fee Table

S-1
(Form Type)

Theriva Biologics, Inc.
(Exact Name of Registrant as Specified in its Charter)

Security Type	Security Class Title	Fee Calculation Rule	Amount to be Registered	Proposed Maximum Offering Price Per Unit	Proposed Maximum Aggregate Offering Price ⁽¹⁾⁽²⁾	Fee Rate	Amount of Registration Fee ⁽³⁾
Equity	Common Stock, par value \$0.001 per share	Rule 457(o)			\$10,000,000 ⁽³⁾	\$0.00015310	\$1,531.00
Equity	Warrants to purchase Common Stock	Rule 457(g)			\$10,000,000 ⁽⁴⁾	\$0.00015310	\$1,531.00
Equity	Common stock issuable upon exercise of the Warrant	Rule 457(g)			(4)		
Equity	Pre-Funded Warrants to purchase Common Stock	Rule 457(o)					
Equity	Common Stock issuable upon exercise of the Pre-Funded Warrants ⁽³⁾	Rule 457(o)			(3)		
Total Offering Amounts					\$20,000,000		\$3,062.00
Total Fees Previously Paid							
Total Fee Offsets							
Net Fee Due							\$3,062.00

(1) Estimated solely for the purpose of calculating the registration fee pursuant to Rule 457(o) under the Securities Act of 1933, as amended (the "Securities Act").

(2) Pursuant to Rule 416(a) under the Securities Act, there are also being registered an indeterminable number of additional securities as may be issued to prevent dilution resulting from stock splits, stock dividends or similar transactions.

(3) The proposed maximum aggregate offering price of the Common Stock proposed to be sold in the offering will be reduced on a dollar-for-dollar basis based on the offering price of any pre-funded warrants sold in the offering, and, as such, the proposed maximum aggregate offering price of the Common Stock and pre-funded warrants (including the Common Stock issuable upon exercise of the pre-funded warrants), if any, is \$10,000,000.

(4) Pursuant to Rule 457(g) of the Securities Act, no separate registration fee is required for the warrants because the warrants are being registered in the same registration statement as the Common Stock issuable upon exercise of the warrants.