

As filed with the Securities and Exchange Commission on December 15, 2023

Registration No. 333-

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

FORM S-3

REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

ASTRIA THERAPEUTICS, INC.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of
incorporation or organization)

26-3687168
(I.R.S. Employer
Identification Number)

75 State Street
Suite 1400
Boston, Massachusetts 02109
(617) 349-1971

(Address, including zip code, and telephone number, including area code, of registrant's principal executive offices)

Jill C. Milne
President and Chief Executive Officer
Astria Therapeutics, Inc.
75 State Street
Suite 1400
Boston, Massachusetts 02109
(617) 349-1971

(Name, address, including zip code, and telephone number, including area code, of agent for service)

Copy to:
Rosemary G. Reilly, Esq.
Wilmer Cutler Pickering Hale and Dorr LLP
60 State Street
Boston, Massachusetts 02109
Telephone: (617) 526-6000
Fax: (617) 526 5000

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

If the only securities being registered on this Form are being offered pursuant to dividend or interest reinvestment plans, please check the following box.

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, other than securities offered only in connection with dividend or interest reinvestment plans, 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 registration statement pursuant to General Instruction I.D. or a post-effective amendment thereto that shall become effective upon filing with the Commission pursuant to Rule 462(e) under the Securities Act, check the following box.

If this Form is a post-effective amendment to a registration statement filed pursuant to General Instruction I.D. filed to register additional securities or additional classes of securities pursuant to Rule 413(b) under the Securities Act, check the following box.

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

Large accelerated filer Accelerated filer Non-accelerated filer Smaller reporting company
Emerging growth company

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

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 or until the Registration Statement shall become effective on such date as the Commission acting pursuant to said Section 8(a), may determine.

EXPLANATORY NOTE

This registration statement contains two prospectuses:

- a base prospectus which covers the offering, issuance and sale by us of up to \$500,000,000 of our common stock, preferred stock, depositary shares, units and warrants; and
- a warrant share prospectus covering the offering, issuance and sale by us of up to
 - (i) 7,368,738 shares of our common stock that may be issued and sold upon the exercise of certain outstanding common stock warrants for an aggregate exercise price of up to \$59,134,123 and
 - (ii) 1,571,093 shares of our common stock that may be issued upon the cashless exercise of certain outstanding pre-funded warrants.

The base prospectus immediately follows this explanatory note. The specific terms of any securities to be offered pursuant to the base prospectus will be specified in a prospectus supplement to the base prospectus.

The warrant share prospectus immediately follows the base prospectus. The common stock that may be offered, issued and sold by us under the warrant share prospectus is separate from the \$500,000,000 of securities that may be offered, issued and sold by us under the base prospectus.

Subject to completion, dated December 15, 2023

PROSPECTUS

\$500,000,000

ASTRIA THERAPEUTICS, INC.

**Common Stock
Preferred Stock
Depository Shares
Units
Warrants**

We may offer and sell securities from time to time in one or more offerings of up to \$500,000,000 in aggregate offering price. This prospectus describes the general terms of these securities and the general manner in which these securities will be offered. We will provide the specific terms of these securities in supplements to this prospectus. The prospectus supplements will also describe the specific manner in which these securities will be offered and may also supplement, update or amend information contained in this document. You should read this prospectus and any applicable prospectus supplement before you invest.

We may offer these securities in amounts, at prices and on terms determined at the time of offering. The securities may be sold directly to you, through agents, or through underwriters and dealers. If agents, underwriters or dealers are used to sell the securities, we will name them and describe their compensation in a prospectus supplement.

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

Investing in these securities involves certain risks. See "Risk Factors" on page 5 of this prospectus, any similar section included in any accompanying prospectus supplement and in the documents incorporated by reference in this prospectus for a discussion of the factors you should carefully consider before deciding to purchase these securities.

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

The date of this prospectus is _____, 2023

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

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ABOUT THIS PROSPECTUS

Unless the context otherwise indicates, references in this prospectus to “we,” “our” and “us” refer, collectively, to Astria Therapeutics, Inc., a Delaware corporation, and its consolidated subsidiaries. This prospectus is part of a registration statement that we filed with the Securities and Exchange Commission, which we refer to as the “SEC,” utilizing a “shelf” registration process. Under this shelf registration process, we may from time to time sell any combination of the securities described in this prospectus in one or more offerings for an aggregate initial offering price of up to \$500,000,000.

This prospectus provides you with a general description of the securities we may offer. Each time we sell securities, we will provide one or more prospectus supplements that will contain specific information about the terms of the offering. The prospectus supplement may also add, update or change information contained in this prospectus. You should read both this prospectus and the accompanying prospectus supplement together with the additional information described under the heading “Where You Can Find More Information” beginning on page [2](#) of this prospectus.

You should rely only on the information contained in or incorporated by reference in this prospectus, any accompanying prospectus supplement or in any related free writing prospectus filed by us with the SEC. We have not authorized anyone to provide you with different information. This prospectus and any accompanying prospectus supplement do not constitute an offer to sell or the solicitation of an offer to buy any securities other than the securities described in this prospectus or such accompanying prospectus supplement or an offer to sell or the solicitation of an offer to buy such securities in any circumstances in which such offer or solicitation is unlawful. You should assume that the information appearing in this prospectus, any prospectus supplement, the documents incorporated by reference and any related free writing prospectus is accurate only as of their respective dates. Our business, financial condition, results of operations and prospects may have changed materially since those dates.

WHERE YOU CAN FIND MORE INFORMATION

We file annual, quarterly and current reports, proxy statements and other information with the SEC. Our SEC filings are available to the public over the Internet at the SEC's website at <http://www.sec.gov>. Copies of certain information filed by us with the SEC are also available on our website at www.astriatx.com. Our website is not a part of this prospectus and is not incorporated by reference in this prospectus.

This prospectus is part of a registration statement we filed with the SEC. This prospectus omits some information contained in the registration statement in accordance with SEC rules and regulations. You should review the information and exhibits in the registration statement for further information about us and our consolidated subsidiaries and the securities we are offering. Statements in this prospectus concerning any document we filed as an exhibit to the registration statement or that we otherwise filed with the SEC are not intended to be comprehensive and are qualified by reference to these filings and the exhibits attached thereto. You should review the complete document to evaluate these statements.

INCORPORATION BY REFERENCE

The SEC allows us to incorporate by reference much of the information we file with the SEC, which means that we can disclose important information to you by referring you to those publicly available documents. The information that we incorporate by reference in this prospectus is considered to be part of this prospectus. Because we are incorporating by reference future filings with the SEC, this prospectus is continually updated and those future filings may modify or supersede some of the information included or incorporated in this prospectus. This means that you must look at all of the SEC filings that we incorporate by reference to determine if any of the statements in this prospectus or in any document previously incorporated by reference have been modified or superseded. This prospectus incorporates by reference the documents listed below (File No. 001-37467) and any future filings we make with the SEC under Sections 13(a), 13(c), 14 or 15(d) of the Securities Exchange Act of 1934, as amended, or the Exchange Act (in each case, other than those documents or the portions of those documents not deemed to be filed) between the date of the initial registration statement and the effectiveness of the registration statement and following the effectiveness of the registration statement until the offering of the securities under the registration statement is terminated or completed:

- [Annual Report on Form 10-K for the fiscal year ended December 31, 2022, filed with the SEC on March 22, 2023](#), including the information specifically incorporated by reference into the Annual Report on Form 10-K from our [Definitive Proxy Statement on Schedule 14A filed with the SEC on April 20, 2023](#);
- Quarterly Reports on Form 10-Q for the quarterly periods ended March 31, 2023, June 30, 2023 and September 30, 2023, filed with the SEC on [May 11, 2023](#), [August 7, 2023](#) and [November 11, 2023](#), respectively;
- Current Reports on Form 8-K filed with the SEC on [January 5, 2023](#) (other than Item 2.02, Item 7.01 and Item 9.01), [February 2, 2023](#), [March 31, 2023](#), [June 6, 2023](#), [October 11, 2023](#) (other than Item 7.01 and Exhibit 99.1), [October 12, 2023](#), and [October 12, 2023](#); and
- [The description of our common stock contained in our Registration Statement on Form 8-A filed with the SEC on June 23, 2015, including any amendments or reports filed for the purpose of updating such description.](#)

You may request a copy of these filings, at no cost, by writing or telephoning us at the following address or telephone number:

Astria Therapeutics, Inc.
75 State Street, Suite 1400
Boston, MA 02109
Attn: Investor Relations
(617) 349-1971

FORWARD-LOOKING STATEMENTS

This prospectus and the information incorporated by reference in 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 Exchange Act. All statements, other than statements of historical facts, contained or incorporated by reference in this prospectus, including statements regarding our strategy, future operations, future financial position, future revenue, projected costs, prospects, plans and objectives of management and expected market growth are forward-looking statements. The words “anticipate,” “believe,” “continue,” “could,” “estimate,” “expect,” “intend,” “may,” “plan,” “potential,” “predict,” “project,” “should,” “target,” “would” and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words.

These forward-looking statements include, among other things, statements about:

- our expectations regarding the timing of availability of final results from our Phase 1a clinical trial of STAR-0215;
- our expectations regarding the potential significance of the preliminary results from the Phase 1a STAR-0215 clinical trial and the anticipated nature and timing of receipt of additional data from such trial;
- our expectations regarding the timing, nature, goals and results of our Phase 1b/2 clinical trial of STAR-0215 and that favorable results from such trial could allow us to move directly into a Phase 3 pivotal trial of STAR-0215 as a potential treatment for hereditary angioedema, or HAE;
- our expectations about the design and anticipated timing of a Phase 3 pivotal clinical trial for STAR-0215 as a potential treatment for HAE, assuming positive data from the Phase 1b/2 trial;
- our expectations about the unmet medical need for HAE, the potential differentiating attributes of STAR-0215 as a potential treatment for HAE, along with the potential market impact of such differentiation, the potential of STAR-0215 to be a best-in-class monoclonal antibody inhibitor of plasma kallikrein able to provide long-acting, effective attack prevention for HAE, and our vision for STAR-0215 to become the first-choice preventative treatment for HAE with administration every three or six months with the goal of normalizing the lives of people living with HAE;
- the nature and anticipated growth of the global HAE market and HAE therapies;
- our plans to optimize the formulation of STAR-0215 and corresponding work to develop a drug-device combination for STAR-0215 for potential use in late-stage clinical trials and commercially, if approved;
- our expectations that we have scaled the manufacturing process for STAR-0215 in a manner to generate sufficient material for our planned STAR-0215 nonclinical and clinical studies;
- the potential therapeutic benefits and potential attributes of STAR-0310, a preclinical stage product candidate which we recently in-licensed, and our plans to develop STAR-0310 as a treatment for atopic dermatitis, or AD;
- our expectations regarding the timing of regulatory submissions for STAR-0310;
- our expectations about the design and anticipated timing of planned clinical trials of STAR-0310;
- our expectations regarding the timing and nature of anticipated data from planned clinical trials of STAR-0310;
- the potential commercial opportunity for STAR-0310 in AD and the likelihood that it can effectively compete in AD, assuming it is approved;
- the estimated size and anticipated growth of the AD market and the need for treatments for AD;
- the potential to pursue the development of STAR-0310 in additional indications;
- our goals and visions for the STAR-0310 program;
- our expectations regarding our ability to expand our pipeline;

- the potential benefits of any future acquisition, in-license, collaboration or preclinical development activities;
- our manufacturing plans, capabilities and strategy;
- our intellectual property position and strategy;
- our estimates regarding our cash runway, expenses, future revenue, capital requirements and needs for additional financing, including additional financing to fund our long-term operations;
- developments relating to our competitors and our industry; and
- the impact of government laws and regulations.

You are cautioned that these forward-looking statements are only predictions and are subject to risks, uncertainties and assumptions that are referenced in the section of any accompanying prospectus supplement entitled “Risk Factors.” You should also carefully review the risk factors and cautionary statements described in the other documents we file from time to time with the SEC, specifically our most recent Annual Report on Form 10-K, our Quarterly Reports on Form 10-Q and our Current Reports on Form 8-K. We undertake no obligation to revise or update any forward-looking statements, except to the extent required by law.

RISK FACTORS

Investing in our securities involves significant risk. Prior to making a decision about investing in our securities, you should carefully consider the specific factors discussed under the heading “Risk Factors” in the applicable prospectus supplement and in any free-writing prospectus that we authorize for use in connection with an offering, together with all of the other information contained or incorporated by reference in the prospectus supplement or appearing or incorporated by reference in this prospectus, including the risks, uncertainties and assumptions discussed under the heading “Risk Factors” included in our most recent Annual Report on Form 10-K, as revised or supplemented by our most recent Quarterly Report on Form 10-Q or our Current Reports on Form 8-K that we have filed with the SEC, which are incorporated herein by reference, and which may be amended, supplemented or superseded from time to time by other reports we file with the SEC in the future. The risks and uncertainties we have described are not the only ones we face. Additional risks and uncertainties not presently known to us or that we currently deem immaterial may also affect our operations. The occurrence of any of these risks might cause you to lose all or part of your investment in the offered securities.

ASTRIA THERAPEUTICS, INC.

This summary highlights selected information contained elsewhere in this prospectus and in the documents we incorporate by reference. This summary does not contain all of the information you should consider before making an investment decision. You should read this entire prospectus carefully, especially the risks discussed under “Risk Factors” beginning on page 5 of this prospectus, along with our consolidated financial statements and notes to those consolidated financial statements and the other information incorporated by reference in this prospectus.

We are a biopharmaceutical company focused on the discovery, development and commercialization of novel therapeutics for allergic and immunological diseases. Our focus is to develop first-choice therapies that improve the health and outcomes of patients with allergic and immunological diseases. Our lead product candidate is STAR-0215, a potential best-in-class monoclonal antibody inhibitor of plasma kallikrein in clinical development for the treatment of hereditary angioedema, or HAE, a rare, debilitating and potentially life-threatening disease. STAR-0215 has the potential to be the most patient-friendly chronic treatment option for HAE, based on the data generated to date and the existing HAE treatment landscape. Our second product candidate is STAR-0310, a monoclonal antibody OX40 antagonist that is in preclinical development for the treatment of atopic dermatitis, or AD, an immune disorder associated with loss of skin barrier function and itching. We believe that with both of these programs, we are advancing a pipeline of products with meaningfully differentiated profiles based on validated mechanisms

Our principal executive offices are located at 75 State Street, Suite 1400, Boston, Massachusetts 02109, and our telephone number is (617) 349-1971.

USE OF PROCEEDS

We intend to use the net proceeds from the sale of any securities offered under this prospectus for general corporate purposes unless otherwise indicated in the applicable prospectus supplement. General corporate purposes may include research and development expenditures, repayment and refinancing of debt, working capital and capital expenditures. We have not determined the amount of net proceeds to be used specifically for such purposes. As a result, management will retain broad discretion over the allocation of the net proceeds of any offering.

DESCRIPTION OF CAPITAL STOCK

The following description of our capital stock is intended as a summary only and therefore is not a complete description of our capital stock. This description is based upon, and is qualified by reference to, our certificate of incorporation, our by-laws and applicable provisions of Delaware corporate law. You should read our certificate of incorporation and by-laws, which are filed as exhibits to the registration statement of which this prospectus forms a part, for the provisions that are important to you.

Our authorized capital stock consists of 150,000,000 shares of common stock, \$0.001 par value per share, and 5,000,000 shares of preferred stock, \$0.001 par value per share. As of November 30, 2023, 36,296,191 shares of our common stock were outstanding and 31,107 shares of our Series X Preferred Stock were outstanding.

Common Stock

Voting Rights. Holders of our common stock are entitled to one vote for each share held on all matters submitted to a vote of stockholders, except that unless otherwise required by law, holders of our common stock are not entitled to vote on any amendment to the certificate of incorporation that relates solely to the terms of one or more outstanding series of preferred stock, if the holders of such affected series are entitled, either separately or together as a class with the holders of one or more such other series, to vote thereon pursuant to the certificate of incorporation. Holders of our common stock do not have cumulative voting rights.

An election of directors will be decided by a plurality of the votes cast by the stockholders entitled to vote on the election at a duly held stockholders' meeting at which a quorum is present. All other questions will be decided by a majority of the votes cast by stockholders entitled to vote thereon at a duly held meeting of stockholders at which a quorum is present, except when a different vote is required by law, our certificate of incorporation or by-laws.

Dividends. Holders of common stock are entitled to receive proportionately any dividends as may be declared by our board of directors, subject to any preferential dividend or other rights of any series of preferred stock that we may designate and issue in the future.

Liquidation and Dissolution. In the event of our liquidation or dissolution, the holders of common stock are entitled to receive proportionately our net assets available for distribution to stockholders after the payment of all debts and other liabilities and subject to the prior rights of any outstanding preferred stock.

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

Transfer Agent and Registrar. The transfer agent and registrar for our common stock is Equiniti Trust Company, LLC.

Listing on The Nasdaq Global Market. Our common stock is listed on The Nasdaq Global Market under the symbol "ATXS."

Preferred Stock

General Description

Under our restated certificate of incorporation, we are authorized to issue "blank check" preferred stock, which may be issued in one or more series upon authorization of our board of directors. Our board of directors is authorized to fix the designation of the series, the number of authorized shares of the series, dividend rights and terms, conversion rights, voting rights, redemption rights and terms, liquidation preferences and any other rights, powers, preferences and limitations applicable to each series of preferred stock. The authorized shares of our preferred stock are available for issuance without further action by our

stockholders, unless such action is required by applicable law or the rules of any stock exchange on which our securities may be listed. If the approval of our stockholders is not required for the issuance of shares of our preferred stock, our board may determine not to seek stockholder approval. The specific terms of any series of preferred stock offered pursuant to this prospectus will be described in the prospectus supplement relating to that series of preferred stock.

A series of our preferred stock could, depending on the terms of such series, impede the completion of a merger, tender offer or other takeover attempt. Our board of directors will make any determination to issue preferred shares based upon its judgment as to the best interests of our stockholders. Our directors, in so acting, could issue preferred stock having terms that could discourage an acquisition attempt through which an acquirer may be able to change the composition of our board of directors, including a tender offer or other transaction that some, or a majority, of our stockholders might believe to be in their best interests or in which stockholders might receive a premium for their stock over the then-current market price of the stock.

The preferred stock has the terms described below unless otherwise provided in the prospectus supplement relating to a particular series of preferred stock. You should read the prospectus supplement relating to the particular series of preferred stock being offered for specific terms, including:

- the designation and stated value per share of the preferred stock and the number of shares offered;
- the amount of liquidation preference per share;
- the price at which the preferred stock will be issued;
- the dividend rate, or method of calculation of dividends, the dates on which dividends will be payable, whether dividends will be cumulative or noncumulative and, if cumulative, the dates from which dividends will commence to accumulate;
- any redemption or sinking fund provisions;
- if other than the currency of the United States, the currency or currencies including composite currencies in which the preferred stock is denominated and/or in which payments will or may be payable;
- any conversion provisions;
- whether we have elected to offer depositary shares as described under “Description of Depositary Shares”; and
- any other rights, preferences, privileges, limitations and restrictions on the preferred stock.

The preferred stock will, when issued, be fully paid and non-assessable. Unless otherwise specified in the prospectus supplement, each series of preferred stock will rank equally as to dividends and liquidation rights in all respects with each other series of preferred stock. The rights of holders of shares of each series of preferred stock will be subordinate to those of our general creditors.

As described under “Description of Depositary Shares,” we may, at our option, with respect to any series of preferred stock, elect to offer fractional interests in shares of preferred stock, and provide for the issuance of depositary receipts representing depositary shares, each of which will represent a fractional interest in a share of the series of preferred stock. The fractional interest will be specified in the prospectus supplement relating to a particular series of preferred stock.

Rank. Unless otherwise specified in the prospectus supplement, the preferred stock will, with respect to dividend rights and rights upon our liquidation, dissolution or winding up of our affairs, rank:

- senior to our common stock and to all equity securities ranking junior to such preferred stock with respect to dividend rights or rights upon our liquidation, dissolution or winding up of our affairs;
- on a parity with all equity securities issued by us, the terms of which specifically provide that such equity securities rank on a parity with the preferred stock with respect to dividend rights or rights upon our liquidation, dissolution or winding up of our affairs; and

- junior to all equity securities issued by us, the terms of which specifically provide that such equity securities rank senior to the preferred stock with respect to dividend rights or rights upon our liquidation, dissolution or winding up of our affairs.

The term “equity securities” does not include convertible debt securities.

Dividends. Holders of the preferred stock of each series will be entitled to receive, when, as and if declared by our board of directors, cash dividends at such rates and on such dates described in the prospectus supplement. Different series of preferred stock may be entitled to dividends at different rates or based on different methods of calculation. The dividend rate may be fixed or variable or both. Dividends will be payable to the holders of record as they appear on our stock books on record dates fixed by our board of directors, as specified in the applicable prospectus supplement.

Dividends on any series of preferred stock may be cumulative or noncumulative, as described in the applicable prospectus supplement. If our board of directors does not declare a dividend payable on a dividend payment date on any series of noncumulative preferred stock, then the holders of that noncumulative preferred stock will have no right to receive a dividend for that dividend payment date, and we will have no obligation to pay the dividend accrued for that period, whether or not dividends on that series are declared payable on any future dividend payment dates. Dividends on any series of cumulative preferred stock will accrue from the date we initially issue shares of such series or such other date specified in the applicable prospectus supplement.

No dividends may be declared or paid or funds set apart for the payment of any dividends on any parity securities unless full dividends have been paid or set apart for payment on the preferred stock. If full dividends are not paid, the preferred stock will share dividends pro rata with the parity securities.

No dividends may be declared or paid or funds set apart for the payment of dividends on any junior securities unless full dividends for all dividend periods terminating on or prior to the date of the declaration or payment will have been paid or declared and a sum sufficient for the payment set apart for payment on the preferred stock.

Liquidation Preference. Upon any voluntary or involuntary liquidation, dissolution or winding up of our affairs, then, before we make any distribution or payment to the holders of any common stock or any other class or series of our capital stock ranking junior to the preferred stock in the distribution of assets upon any liquidation, dissolution or winding up of our affairs, the holders of each series of preferred stock shall be entitled to receive out of assets legally available for distribution to stockholders, liquidating distributions in the amount of the liquidation preference per share set forth in the prospectus supplement, plus any accrued and unpaid dividends thereon. Such dividends will not include any accumulation in respect of unpaid noncumulative dividends for prior dividend periods. Unless otherwise specified in the prospectus supplement, after payment of the full amount of their liquidating distributions, the holders of preferred stock will have no right or claim to any of our remaining assets. Upon any such voluntary or involuntary liquidation, dissolution or winding up, if our available assets are insufficient to pay the amount of the liquidating distributions on all outstanding preferred stock and the corresponding amounts payable on all other classes or series of our capital stock ranking on parity with the preferred stock and all other such classes or series of shares of capital stock ranking on parity with the preferred stock in the distribution of assets, then the holders of the preferred stock and all other such classes or series of capital stock ranking on parity with the preferred stock will share ratably in any such distribution of assets in proportion to the full liquidating distributions to which they would otherwise be entitled.

Upon any such liquidation, dissolution or winding up and if we have made liquidating distributions in full to all holders of preferred stock, we will distribute our remaining assets among the holders of any other classes or series of capital stock ranking junior to the preferred stock according to their respective rights and preferences and, in each case, according to their respective number of shares. For such purposes, our consolidation or merger with or into any other corporation, trust or entity, or the sale, lease or conveyance of all or substantially all of our property or assets will not be deemed to constitute a liquidation, dissolution or winding up of our affairs.

Redemption. If so provided in the applicable prospectus supplement, the preferred stock will be subject to mandatory redemption or redemption at our option, as a whole or in part, in each case upon the terms, at the times and at the redemption prices set forth in such prospectus supplement.

The prospectus supplement relating to a series of preferred stock that is subject to mandatory redemption will specify the number of shares of preferred stock that shall be redeemed by us in each year commencing after a date to be specified, at a redemption price per share to be specified, together with an amount equal to all accrued and unpaid dividends thereon to the date of redemption. Unless the shares have a cumulative dividend, such accrued dividends will not include any accumulation in respect of unpaid dividends for prior dividend periods. We may pay the redemption price in cash or other property, as specified in the applicable prospectus supplement. If the redemption price for preferred stock of any series is payable only from the net proceeds of the issuance of shares of our capital stock, the terms of such preferred stock may provide that, if no such shares of our capital stock shall have been issued or to the extent the net proceeds from any issuance are insufficient to pay in full the aggregate redemption price then due, such preferred stock shall automatically and mandatorily be converted into the applicable shares of our capital stock pursuant to conversion provisions specified in the applicable prospectus supplement. Notwithstanding the foregoing, we will not redeem any preferred stock of a series unless:

- if that series of preferred stock has a cumulative dividend, we have declared and paid or contemporaneously declare and pay or set aside funds to pay full cumulative dividends on the preferred stock for all past dividend periods and the then current dividend period; or
- if such series of preferred stock does not have a cumulative dividend, we have declared and paid or contemporaneously declare and pay or set aside funds to pay full dividends for the then current dividend period.

In addition, we will not acquire any preferred stock of a series unless:

- if that series of preferred stock has a cumulative dividend, we have declared and paid or contemporaneously declare and pay or set aside funds to pay full cumulative dividends on all outstanding shares of such series of preferred stock for all past dividend periods and the then current dividend period; or
- if that series of preferred stock does not have a cumulative dividend, we have declared and paid or contemporaneously declare and pay or set aside funds to pay full dividends on the preferred stock of such series for the then current dividend period.

However, at any time we may purchase or acquire preferred stock of that series (1) pursuant to a purchase or exchange offer made on the same terms to holders of all outstanding preferred stock of such series or (2) by conversion into or exchange for shares of our capital stock ranking junior to the preferred stock of such series as to dividends and upon liquidation.

If fewer than all of the outstanding shares of preferred stock of any series are to be redeemed, we will determine the number of shares that may be redeemed pro rata from the holders of record of such shares in proportion to the number of such shares held or for which redemption is requested by such holder or by any other equitable manner that we determine. Such determination will reflect adjustments to avoid redemption of fractional shares.

Unless otherwise specified in the prospectus supplement, we will mail notice of redemption at least 10 days but not more than 60 days before the redemption date to each holder of record of preferred stock to be redeemed at the address shown on our stock transfer books. Each notice shall state:

- the redemption date;
- the number of shares and series of preferred stock to be redeemed;
- the redemption price;
- the place or places where certificates for such preferred stock are to be surrendered for payment of the redemption price;
- that dividends on the shares to be redeemed will cease to accrue on such redemption date;
- the date on which the holder's conversion rights, if any, as to such shares shall terminate; and
- the specific number of shares to be redeemed from each such holder if fewer than all the shares of any series are to be redeemed.

If notice of redemption has been given and we have set aside the funds necessary for such redemption in trust for the benefit of the holders of any shares called for redemption, then from and after the redemption date, dividends will cease to accrue on such shares, and all rights of the holders of such shares will terminate, except the right to receive the redemption price.

Voting Rights. Holders of preferred stock will not have any voting rights, except as required by law or as indicated in the applicable prospectus supplement.

Unless otherwise provided for under the terms of any series of preferred stock, no consent or vote of the holders of shares of preferred stock or any series thereof shall be required for any amendment to our certificate of incorporation that would increase the number of authorized shares of preferred stock or the number of authorized shares of any series thereof or decrease the number of authorized shares of preferred stock or the number of authorized shares of any series thereof (but not below the number of authorized shares of preferred stock or such series, as the case may be, then outstanding).

Conversion Rights. The terms and conditions, if any, upon which any series of preferred stock is convertible into shares of our common stock will be set forth in the applicable prospectus supplement relating thereto. Such terms will include the number of shares of common stock into which the shares of preferred stock are convertible, the conversion price, rate or manner of calculation thereof, the conversion period, provisions as to whether conversion will be at our option or at the option of the holders of the preferred stock, the events requiring an adjustment of the conversion price and provisions affecting conversion in the event of the redemption.

Transfer Agent and Registrar. The transfer agent and registrar for the preferred stock will be set forth in the applicable prospectus supplement.

Series X Preferred Stock

Pursuant to our Certificate of Designation of Preferences, Rights and Limitations of Series X Convertible Preferred Stock, or the Certificate of Designation, we designated 91,380 shares of our authorized and unissued preferred stock as Series X convertible preferred stock, or Series X Preferred Stock, and established the rights, preferences and privileges of the Series X Preferred Stock, which are summarized below. As of November 30, 2023, we had 31,107 outstanding shares of Series X Preferred Stock.

Conversion. The Series X Preferred Stock is convertible at the option of the holder thereof into a number of registered shares of common stock determined by dividing the aggregate stated value of the Series X Preferred Stock being converted by the conversion price then in effect. Each share of Series X Preferred Stock is convertible into 166.67 shares of common stock. At November 30, 2023, the number of shares of common stock issuable upon conversion of the remaining outstanding shares of Series X Preferred Stock is 5,184,591. No holder may request a conversion of its Series X Preferred Stock to the extent such conversion would result in the holder and its affiliates beneficially owning more than a pre-set conversion blocker threshold, which was initially set at 9.99% of our common stock then outstanding (as of November 30, 2023, these percentages are set at 9.99% and can be adjusted by the holder to a number between 4.99% and 19.99%). The amount of beneficial ownership of a holder and its affiliates will be determined in accordance with Section 13(d) of the Exchange Act and the rules and regulations of that section.

Conversion Price Adjustment — Stock Dividends and Stock Splits. If we pay a stock dividend or otherwise make a distribution payable in common stock on our common stock or any common stock equivalents, subdivide or combine our outstanding common stock, or reclassify our common stock in such a way that we issue additional shares of our capital stock, the conversion price of the Series X Preferred Stock will be adjusted by multiplying the then-existing conversion price by a fraction, the numerator of which is the number of shares of common stock outstanding immediately before the distribution, dividend, adjustment or recapitalization and the denominator of which is the number of shares of common stock outstanding immediately after such action.

Fundamental Transaction. If we effect a “fundamental transaction” (as defined below), then upon any future conversion of the Series X Preferred Stock, a holder of our Series X Preferred Stock will have the right to receive, for each common share such holder would have received upon such conversion, the same kind

and amount of securities, cash or property as such holder would have been entitled to receive in the fundamental transaction had such holder been a holder of common stock immediately prior to the fundamental transaction.

The term “fundamental transaction” means any of the following:

- a merger or consolidation of us with or into another entity or any stock sale to, or other business combination in which we are not the surviving entity;
- the sale of all or substantially all of our assets in one transaction or a series of related transactions;
- any completed tender offer or exchange offer involving holders of common stock in which more than 50% of our common stock is converted or exchanged into other securities, cash or property, regardless of who makes such offer; or
- any reclassification of our common stock or any compulsory share exchange by which our common stock is effectively converted into or exchanged for other securities, cash or property (but not a reverse stock split).

If the holders of our common stock are given a choice as to the securities, cash or property to be received in a fundamental transaction, the holders of Series X Preferred Stock will be given the same choice on conversion of such holders’ shares.

Dividends. Holders of Series X Preferred Stock are entitled to receive dividends, subject to certain beneficial ownership limitations, on shares of Series X Preferred Stock equal, on an as-if-converted-to-common-stock basis, and in the same form as dividends actually paid on shares of the Company’s common stock.

Voting Rights. Except as otherwise required by law, the Series X Preferred Stock does not have voting rights. However, as long as any shares of Series X Preferred Stock are outstanding, the Company may not, without the affirmative vote of the holders of a majority of the then outstanding shares of the Series X Preferred Stock, (i) alter or change adversely the powers, preferences or rights given to the Series X Preferred Stock or alter or amend the Certificate of Designation that authorized the Series X Preferred Stock, amend or repeal any provision of, or add any provision to, the Company’s Certificate of Incorporation or bylaws, or file any articles of amendment, certificate of designations, preferences, limitations and relative rights of any series of preferred stock, if such action would adversely alter or change the preferences, rights, privileges or powers of, or restrictions provided for the benefit of the Series X Preferred Stock, (ii) issue further shares of Series X Preferred Stock or increase or decrease (other than by conversion) the number of authorized shares of Series X Preferred Stock, or (iii) enter into any agreement with respect to any of the foregoing.

Stock Options

As of November 30, 2023, options to purchase 3,403,269 shares of our common stock at a weighted-average exercise price of \$13.79 per share were outstanding, of which options to purchase 1,073,898 shares of our common stock were exercisable, at a weighted-average exercise price of \$18.83 per share.

Warrants

As of November 30, 2023, we had outstanding warrants to purchase shares of our common stock exercisable for an aggregate of 9,271,689 shares of our common stock at a weighted-average exercise price of \$7.72 per share.

Provisions of Our Certificate of Incorporation and By-laws and Delaware Law That May Have Anti-Takeover Effects

Delaware law, our certificate of incorporation and our by-laws contain provisions that could have the effect of delaying, deferring or discouraging another party from acquiring control of us. These provisions, which are summarized below, are expected to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with our board of directors.

Staggered Board; Removal of Directors. Our certificate of incorporation and by-laws divide our board of directors into three classes with staggered three-year terms. In addition, a director is only able to be removed for cause and only by the affirmative vote of the holders of at least 75% of the votes that all of our stockholders would be entitled to cast in an annual election of directors. Any vacancy on our board of directors, including a vacancy resulting from an enlargement of our board of directors, is only able to be filled by vote of a majority of our directors then in office. The classification of our board of directors and the limitations on the removal of directors and filling of vacancies could make it more difficult for a third party to acquire, or discourage a third party from seeking to acquire, control of our company.

Stockholder Action by Written Consent; Special Meetings. Our certificate of incorporation provides that any action required or permitted to be taken by our stockholders must be effected at a duly called annual or special meeting of our stockholders and may not be effected by any consent in writing by our stockholders. Our certificate of incorporation and by-laws also provide that, except as otherwise required by law, special meetings of our stockholders can only be called by our chairman of the board, our chief executive officer or our board of directors.

Advance Notice Requirements for Stockholder Proposals. Our by-laws establish an advance notice procedure for stockholder proposals to be brought before an annual meeting of stockholders, including proposed nominations of persons for election to our board of directors. Stockholders at an annual meeting are only able to consider proposals or nominations specified in the notice of meeting or brought before the meeting by or at the direction of our board of directors or by a stockholder of record on the record date for the meeting who is entitled to vote at the meeting and who has delivered timely written notice in proper form to our secretary of the stockholder's intention to bring such business before the meeting. These provisions could have the effect of delaying until the next stockholder meeting stockholder actions that are favored by the holders of a majority of our outstanding voting securities.

Delaware Business Combination Statute. We are subject to Section 203 of the General Corporation Law of the State of Delaware. Subject to certain exceptions, Section 203 prevents a publicly held Delaware corporation from engaging in a "business combination" with any "interested stockholder" for three years following the date that the person became an interested stockholder, unless the interested stockholder attained such status with the approval of our board of directors or unless the business combination is approved in a prescribed manner. A "business combination" includes, among other things, a merger or consolidation involving us and the "interested stockholder" and the sale of more than 10% of our assets. In general, an "interested stockholder" is any entity or person beneficially owning 15% or more of our outstanding voting stock and any entity or person affiliated with or controlling or controlled by such entity or person.

Amendment of Certificate of Incorporation and By-laws. The General Corporation Law of the State of Delaware provides generally that the affirmative vote of a majority of the shares entitled to vote on any matter is required to amend a corporation's certificate of incorporation or by-laws, unless a corporation's certificate of incorporation or by-laws, as the case may be, requires a greater percentage. Our by-laws may be amended or repealed by a majority vote of our board of directors or by the affirmative vote of the holders of at least 75% of the votes that all of our stockholders would be entitled to cast in any annual election of directors. In addition, the affirmative vote of the holders of at least 75% of the votes that all of our stockholders would be entitled to cast in any annual election of directors is required to amend or repeal or to adopt any provisions inconsistent with any of the provisions of our certificate of incorporation described above under "*— Staggered Board; Removal of Directors*" and "*— Stockholder Action by Written Consent; Special Meetings.*"

Exclusive Forum Selection. Our certificate of incorporation provides that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware (or if the Court of Chancery does not have jurisdiction, the federal district court for the District of Delaware) shall be the sole and exclusive forum for (1) any derivative action or proceeding brought on behalf of our company, (2) any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers or employees to our company or our stockholders, (3) any action asserting a claim against our company arising pursuant to any provision of the General Corporation Law of the State of Delaware or our certificate of incorporation or by-laws, or (4) any action asserting a claim against our company governed by the internal affairs doctrine. This exclusive forum provision would not apply to suits brought to enforce any

liability or duty created by the Securities Act or the Exchange Act or any other claim for which the federal courts have exclusive jurisdiction. To the extent that any such claims may be based upon federal law claims, Section 27 of the Exchange Act creates exclusive federal jurisdiction over all suits brought to enforce any duty or liability created by the Exchange Act or the rules and regulations thereunder. Furthermore, Section 22 of the Securities Act creates concurrent jurisdiction for federal and state courts over all suits brought to enforce any duty or liability created by the Securities Act or the rules and regulations thereunder. Although our restated certificate contains the choice of forum provision described above, it is possible that a court could rule that such a provision is inapplicable for a particular claim or action or that such provision is unenforceable. Although our certificate of incorporation contains the choice of forum provision described above, it is possible that a court could rule that such a provision is inapplicable for a particular claim or action or that such provision is unenforceable.

Authorized but Unissued Shares. Our authorized but unissued shares of common stock and preferred stock are available for future issuance without stockholder approval, subject to any limitations imposed by the listing requirements of The Nasdaq Global Market. These additional shares may be used for a variety of corporate finance transactions, acquisitions and employee benefit plans. The existence of authorized but unissued and unreserved common stock and preferred stock could make it more difficult or discourage an attempt to obtain control of us by means of a proxy contest, tender offer, merger or otherwise.

DESCRIPTION OF DEPOSITARY SHARES

General

We may, at our option, elect to offer fractional shares of preferred stock, which we call depositary shares, rather than full shares of preferred stock. If we do, we will issue to the public receipts, called depositary receipts, for depositary shares, each of which will represent a fraction, to be described in the applicable prospectus supplement, of a share of a particular series of preferred stock. Unless otherwise provided in the prospectus supplement, each owner of a depositary share will be entitled, in proportion to the applicable fractional interest in a share of preferred stock represented by the depositary share, to all the rights and preferences of the preferred stock represented by the depositary share. Those rights include dividend, voting, redemption, conversion and liquidation rights.

The shares of preferred stock underlying the depositary shares will be deposited with a bank or trust company selected by us to act as depositary under a deposit agreement between us, the depositary and the holders of the depositary receipts. The depositary will be the transfer agent, registrar and dividend disbursing agent for the depositary shares.

The depositary shares will be evidenced by depositary receipts issued pursuant to the deposit agreement. Holders of depositary receipts agree to be bound by the deposit agreement, which requires holders to take certain actions such as filing proof of residence with and paying certain charges to the depositary.

The summary of terms of the depositary shares contained in this prospectus is not a complete description of the terms of the depositary shares. You should refer to the form of the deposit agreement, our certificate of incorporation and the certificate of designation for the applicable series of preferred stock that are, or will be, filed with the SEC.

Dividends and Other Distributions

The depositary will distribute all cash dividends or other cash distributions, if any, received in respect of the preferred stock underlying the depositary shares to the record holders of depositary shares in proportion to the numbers of depositary shares owned by those holders on the relevant record date. The relevant record date for depositary shares will be the same date as the record date for the underlying preferred stock.

If there is a distribution other than in cash, the depositary will distribute property (including securities) received by it to the record holders of depositary shares, unless the depositary determines that it is not feasible to make the distribution. If this occurs, the depositary may, with our approval, adopt another method for the distribution, including selling the property and distributing the net proceeds from the sale to the holders.

Liquidation Preference

If a series of preferred stock underlying the depositary shares has a liquidation preference, in the event of the voluntary or involuntary liquidation, dissolution or winding up of us, holders of depositary shares will be entitled to receive the fraction of the liquidation preference accorded each share of the applicable series of preferred stock, as set forth in the applicable prospectus supplement.

Withdrawal of Stock

Unless the related depositary shares have been previously called for redemption, upon surrender of the depositary receipts at the office of the depositary, the holder of the depositary shares will be entitled to delivery, at the office of the depositary to or upon his or her order, of the number of whole shares of the preferred stock and any money or other property represented by the depositary shares. If the depositary receipts delivered by the holder evidence a number of depositary shares in excess of the number of depositary shares representing the number of whole shares of preferred stock to be withdrawn, the depositary will deliver to the holder at the same time a new depositary receipt evidencing the excess number of depositary shares. In no event will the depositary deliver fractional shares of preferred stock upon surrender of depositary receipts. Holders of preferred stock thus withdrawn may not thereafter deposit those shares under the deposit agreement or receive depositary receipts evidencing depositary shares therefor.

Redemption of Depositary Shares

Whenever we redeem shares of preferred stock held by the depositary, the depositary will redeem as of the same redemption date the number of depositary shares representing shares of the preferred stock so redeemed, so long as we have paid in full to the depositary the redemption price of the preferred stock to be redeemed plus an amount equal to any accumulated and unpaid dividends on the preferred stock to the date fixed for redemption. The redemption price per depositary share will be equal to the redemption price and any other amounts per share payable on the preferred stock multiplied by the fraction of a share of preferred stock represented by one depositary share. If less than all the depositary shares are to be redeemed, the depositary shares to be redeemed will be selected by lot or pro rata or by any other equitable method as may be determined by the depositary.

After the date fixed for redemption, depositary shares called for redemption will no longer be deemed to be outstanding and all rights of the holders of depositary shares will cease, except the right to receive the monies payable upon redemption and any money or other property to which the holders of the depositary shares were entitled upon redemption upon surrender to the depositary of the depositary receipts evidencing the depositary shares.

Voting the Preferred Stock

Upon receipt of notice of any meeting at which the holders of the preferred stock are entitled to vote, the depositary will mail the information contained in the notice of meeting to the record holders of the depositary receipts relating to that preferred stock. The record date for the depositary receipts relating to the preferred stock will be the same date as the record date for the preferred stock. Each record holder of the depositary shares on the record date will be entitled to instruct the depositary as to the exercise of the voting rights pertaining to the number of shares of preferred stock represented by that holder's depositary shares. The depositary will endeavor, insofar as practicable, to vote the number of shares of preferred stock represented by the depositary shares in accordance with those instructions, and we will agree to take all action that may be deemed necessary by the depositary in order to enable the depositary to do so. The depositary will not vote any shares of preferred stock except to the extent it receives specific instructions from the holders of depositary shares representing that number of shares of preferred stock.

Charges of Depositary

We will pay all transfer and other taxes and governmental charges arising solely from the existence of the depositary arrangements. We will pay the charges due to the depositary in connection with the initial deposit of the preferred stock and any redemption of the preferred stock. Holders of depositary receipts will pay transfer, income and other taxes and governmental charges and such other charges (including those in connection with the receipt and distribution of dividends, the sale or exercise of rights, the withdrawal of the preferred stock and the transferring, splitting or grouping of depositary receipts) as are expressly provided in the deposit agreement to be for their accounts. If these charges have not been paid by the holders of depositary receipts, the depositary may refuse to transfer depositary shares, withhold dividends and distributions and sell the depositary shares evidenced by the depositary receipt.

Amendment and Termination of the Deposit Agreement

The form of depositary receipt evidencing the depositary shares and any provision of the deposit agreement may be amended by agreement between us and the depositary. However, any amendment that materially and adversely alters the rights of the holders of depositary shares, other than fee changes, will not be effective unless the amendment has been approved by the holders of a majority of the outstanding depositary shares affected by the amendment. The deposit agreement may be terminated by the depositary or us only if:

- all outstanding depositary shares have been redeemed; or
- there has been a final distribution of the preferred stock in connection with our dissolution and such distribution has been made to all the holders of depositary shares.

Resignation and Removal of Depositary

The depositary may resign at any time by delivering to us notice of its election to do so, and we may remove the depositary at any time. Any resignation or removal of the depositary will take effect upon our appointment of a successor depositary and its acceptance of such appointment. The successor depositary must be appointed within 60 days after delivery of the notice of resignation or removal and must be a bank or trust company having its principal office in the United States and having the requisite combined capital and surplus as set forth in the applicable agreement.

Notices

The depositary will forward to holders of depositary receipts all notices, reports and other communications, including proxy solicitation materials received from us, that are delivered to the depositary and that we are required to furnish to the holders of the preferred stock. In addition, the depositary will make available for inspection by holders of depositary receipts at the principal office of the depositary, and at such other places as it may from time to time deem advisable, any reports and communications we deliver to the depositary as the holder of preferred stock.

Limitation of Liability

Neither we nor the depositary will be liable if either we or it is prevented or delayed by law or any circumstance beyond its control in performing its obligations. Our obligations and those of the depositary will be limited to performance in good faith of our and their duties thereunder. We and the depositary will not be obligated to prosecute or defend any legal proceeding in respect of any depositary shares or preferred stock unless satisfactory indemnity is furnished. We and the depositary may rely upon written advice of counsel or accountants, on information provided by persons presenting preferred stock for deposit, holders of depositary receipts or other persons believed to be competent to give such information and on documents believed to be genuine and to have been signed or presented by the proper party or parties.

DESCRIPTION OF UNITS

We may issue units comprised of one or more of the other securities that may be offered under this prospectus, in any combination. The following, together with the additional information we may include in the applicable prospectus supplement, summarizes the material terms and provisions of the units that we may offer under this prospectus. While the terms summarized below will apply generally to any units we may offer, we will describe the particular terms of any series of units in more detail in the applicable prospectus supplement.

Each unit will be issued so that the holder of the unit is also the holder of each security included in the unit. Thus, the holder of a unit will have the rights and obligations of a holder of each included security. The unit agreement under which a unit is issued may provide that the securities included in the unit may not be held or transferred separately at any time, or at any time before a specified date.

Any applicable prospectus supplement will describe:

- the material terms of the units and of the securities comprising the units, including whether and under what circumstances those securities may be held or transferred separately;
- any material provisions relating to the issuance, payment, settlement, transfer or exchange of the units or of the securities comprising the units; and
- any material provisions of the governing unit agreement that differ from those described above.

DESCRIPTION OF WARRANTS

General

We may issue warrants to purchase common stock, preferred stock or depositary shares. We may offer warrants separately or together with one or more additional warrants, common stock, preferred stock or depositary shares, or any combination of those securities in the form of units, as described in the applicable prospectus supplement. If we issue warrants as part of a unit, the accompanying prospectus supplement will specify whether those warrants may be separated from the other securities in the unit prior to the expiration date of the warrants. The applicable prospectus supplement will also describe the following terms of any warrants:

- the specific designation and aggregate number of, and the offering price at which we will issue, the warrants;
- the currency or currency units in which the offering price, if any, and the exercise price are payable;
- the date on which the right to exercise the warrants will begin and the date on which that right will expire or, if you may not continuously exercise the warrants throughout that period, the specific date or dates on which you may exercise the warrants;
- whether the warrants are to be sold separately or with other securities as parts of units;
- whether the warrants will be issued in definitive or global form or in any combination of these forms, although, in any case, the form of a warrant included in a unit will correspond to the form of the unit and of any security included in that unit;
- any applicable material U.S. federal income tax consequences;
- the identity of the warrant agent for the warrants and of any other depositaries, execution or paying agents, transfer agents, registrars or other agents;
- the proposed listing, if any, of the warrants or any securities purchasable upon exercise of the warrants on any securities exchange;
- the designation and terms of any equity securities purchasable upon exercise of the warrants;
- if applicable, the designation and terms of the preferred stock or depositary shares with which the warrants are issued and the number of warrants issued with each security;
- if applicable, the date from and after which any warrants issued as part of a unit and the related preferred stock, depositary shares or common stock will be separately transferable;
- the number of shares of common stock, preferred stock or depositary shares purchasable upon exercise of a warrant and the price at which those shares may be purchased;
- if applicable, the minimum or maximum amount of the warrants that may be exercised at any one time;
- information with respect to book-entry procedures, if any;
- the anti-dilution provisions of, and other provisions for changes to or adjustment in the exercise price of, the warrants, if any;
- any redemption or call provisions; and
- any additional terms of the warrants, including terms, procedures and limitations relating to the exchange or exercise of the warrants.

Pre-Funded Warrants

We may also issue pre-funded warrants to purchase common stock. A pre-funded warrant is a type of warrant that allows the holder to purchase a specified number of shares of common stock at a nominal exercise price. The pre-funded warrants may be issued as individual warrant agreements to the holders. In

addition to the terms described in the bullets above, the applicable prospectus supplement will describe the following terms of any pre-funded warrants:

- the date on which the right to exercise the pre-funded warrants will begin, generally on the date of issuance, and the date on which that right will expire, generally when the pre-funded warrant is exercised in full;
- whether the warrant may only be exercised pursuant to a cashless exercise procedure;
- certain beneficial ownership limitations, such that a holder will not be entitled to exercise any portion of any pre-funded warrant that, upon giving effect to (or immediately prior to) such exercise, would cause the holder's beneficial ownership to exceed a specified threshold, typically 4.99% or 9.99%, of the number of shares of our outstanding common stock or the combined voting power of all our outstanding securities, which threshold may be subject to increase or decrease at the option of the holder, subject to a maximum ownership threshold, typically 9.99% or 19.99%, and compliance with a notice period;
- in the event of a fundamental transaction (generally including any reorganization, recapitalization or reclassification of our common stock, the sale, transfer or other disposition of all or substantially all of our assets, our consolidation or merger with or into another person in which we are not the surviving entity, the acquisition of more than 50% of our outstanding common stock by any person or group, or any person or group becoming the beneficial owner of more than 50% of the voting power of our outstanding common stock), the right of the holder to receive, upon exercise of the pre-funded warrants, the same kind and amount of securities, cash or other property that such holder would have received had they exercised the pre-funded warrants immediately prior to such fundamental transaction, without regard to any limitations on exercise contained in the pre-funded warrants; and
- any additional terms of the warrants, including terms, procedures and limitations relating to the exchange or exercise of the warrants.

FORMS OF SECURITIES

Each depositary share, unit and warrant will be represented either by a certificate issued in definitive form to a particular investor or by one or more global securities representing the entire issuance of securities. Unless the applicable prospectus supplement provides otherwise, certificated securities in definitive form and global securities will be issued in registered form. Definitive securities name you or your nominee as the owner of the security, and in order to transfer or exchange these securities or to receive payments other than interest or other interim payments, you or your nominee must physically deliver the securities to the trustee, registrar, paying agent or other agent, as applicable. Global securities name a depositary or its nominee as the owner of the depositary shares, units or warrants represented by these global securities. The depositary maintains a computerized system that will reflect each investor's beneficial ownership of the securities through an account maintained by the investor with its broker/dealer, bank, trust company or other representative, as we explain more fully below.

Global Securities

We may issue the depositary shares, units and warrants in the form of one or more fully registered global securities that will be deposited with a depositary or its nominee identified in the applicable prospectus supplement and registered in the name of that depositary or nominee. In those cases, one or more global securities will be issued in a denomination or aggregate denominations equal to the portion of the aggregate principal or face amount of the securities to be represented by global securities. Unless and until it is exchanged in whole for securities in definitive registered form, a global security may not be transferred except as a whole by and among the depositary for the global security, the nominees of the depositary or any successors of the depositary or those nominees.

If not described below, any specific terms of the depositary arrangement with respect to any securities to be represented by a global security will be described in the prospectus supplement relating to those securities. We anticipate that the following provisions will apply to all depositary arrangements.

Ownership of beneficial interests in a global security will be limited to persons, called participants, that have accounts with the depositary or persons that may hold interests through participants. Upon the issuance of a global security, the depositary will credit, on its book-entry registration and transfer system, the participants' accounts with the respective principal or face amounts of the securities beneficially owned by the participants. Any dealers, underwriters or agents participating in the distribution of the securities will designate the accounts to be credited. Ownership of beneficial interests in a global security will be shown on, and the transfer of ownership interests will be effected only through, records maintained by the depositary, with respect to interests of participants, and on the records of participants, with respect to interests of persons holding through participants. The laws of some states may require that some purchasers of securities take physical delivery of these securities in definitive form. These laws may impair your ability to own, transfer or pledge beneficial interests in global securities.

So long as the depositary, or its nominee, is the registered owner of a global security, that depositary or its nominee, as the case may be, will be considered the sole owner or holder of the securities represented by the global security for all purposes under the applicable deposit agreement, unit agreement or warrant agreement. Except as described below, owners of beneficial interests in a global security will not be entitled to have the securities represented by the global security registered in their names, will not receive or be entitled to receive physical delivery of the securities in definitive form and will not be considered the owners or holders of the securities under the applicable deposit agreement, unit agreement or warrant agreement. Accordingly, each person owning a beneficial interest in a global security must rely on the procedures of the depositary for that global security and, if that person is not a participant, on the procedures of the participant through which the person owns its interest, to exercise any rights of a holder under the applicable deposit agreement, unit agreement or warrant agreement. We understand that under existing industry practices, if we request any action of holders or if an owner of a beneficial interest in a global security desires to give or take any action that a holder is entitled to give or take under the applicable deposit agreement, unit agreement or warrant agreement, the depositary for the global security would authorize the participants holding the relevant beneficial interests to give or take that action, and the participants would authorize beneficial owners owning through them to give or take that action or would otherwise act upon the instructions of beneficial owners holding through them.

Any payments to holders with respect to depositary shares, units or warrants represented by a global security registered in the name of a depositary or its nominee will be made to the depositary or its nominee, as the case may be, as the registered owner of the global security. None of us, or any warrant agent, unit agent or other agent of ours, or any agent of any warrant agent or unit agent will have any responsibility or liability for any aspect of the records relating to payments made on account of beneficial ownership interests in the global security or for maintaining, supervising or reviewing any records relating to those beneficial ownership interests.

We expect that the depositary for any of the securities represented by a global security, upon receipt of any payment to holders or other distribution of underlying securities or other property on that registered global security, will immediately credit participants' accounts in amounts proportionate to their respective beneficial interests in that global security as shown on the records of the depositary. We also expect that payments by participants to owners of beneficial interests in a global security held through participants will be governed by standing customer instructions and customary practices, as is now the case with the securities held for the accounts of customers or registered in "street name," and will be the responsibility of those participants.

If the depositary for any of the securities represented by a global security is at any time unwilling or unable to continue as depositary or ceases to be a clearing agency registered under the Exchange Act, and a successor depositary registered as a clearing agency under the Exchange Act is not appointed by us within 90 days, we will issue securities in definitive form in exchange for the global security that had been held by the depositary. Any securities issued in definitive form in exchange for a global security will be registered in the name or names that the depositary gives to the relevant warrant agent, unit agent or other relevant agent of ours or theirs. It is expected that the depositary's instructions will be based upon directions received by the depositary from participants with respect to ownership of beneficial interests in the global security that had been held by the depositary.

PLAN OF DISTRIBUTION

We may sell securities:

- through underwriters;
- through dealers;
- through agents;
- directly to purchasers; or
- through a combination of any of these methods of sale.

In addition, we may issue the securities as a dividend or distribution or in a subscription rights offering to our existing security holders. This prospectus may be used in connection with any offering of our securities through any of these methods or other methods described in the applicable prospectus supplement.

We may directly solicit offers to purchase securities, or agents may be designated to solicit such offers. We will, in the prospectus supplement relating to such offering, name any agent that could be viewed as an underwriter under the Securities Act, and describe any commissions that we must pay. Any such agent will be acting on a best efforts basis for the period of its appointment or, if indicated in the applicable prospectus supplement, on a firm commitment basis.

The distribution of the securities may be effected from time to time in one or more transactions:

- at a fixed price, or prices, which may be changed from time to time;
- at market prices prevailing at the time of sale;
- at prices related to such prevailing market prices; or
- at negotiated prices.

Each prospectus supplement will describe the method of distribution of the securities and any applicable restrictions.

The prospectus supplement with respect to the securities of a particular series will describe the terms of the offering of the securities, including the following:

- the name of the agent or any underwriters;
- the public offering or purchase price and the proceeds we will receive from the sale of the securities;
- any discounts and commissions to be allowed or re-allowed or paid to the agent or underwriters;
- all other items constituting underwriting compensation;
- any discounts and commissions to be allowed or re-allowed or paid to dealers; and
- any exchanges on which the securities will be listed.

If any underwriters or agents are utilized in the sale of the securities in respect of which this prospectus is delivered, we will enter into an underwriting agreement or other agreement with them at the time of sale to them, and we will set forth in the prospectus supplement relating to such offering the names of the underwriters or agents and the terms of the related agreement with them.

If a dealer is utilized in the sale of the securities in respect of which this prospectus is delivered, we will sell such securities to the dealer, as principal. The dealer may then resell such securities to the public at varying prices to be determined by such dealer at the time of resale.

If we offer securities in a subscription rights offering to our existing security holders, we may enter into a standby underwriting agreement with dealers, acting as standby underwriters. We may pay the standby underwriters a commitment fee for the securities they commit to purchase on a standby basis. If we do not enter into a standby underwriting arrangement, we may retain a dealer-manager to manage a subscription rights offering for us.

Remarketing firms, agents, underwriters, dealers and other persons may be entitled under agreements which they may enter into with us to indemnification by us against certain civil liabilities, including liabilities under the Securities Act, and may be customers of, engage in transactions with or perform services for us in the ordinary course of business.

If so indicated in the applicable prospectus supplement, we will authorize underwriters or other persons acting as our agents to solicit offers by certain institutions to purchase securities from us pursuant to delayed delivery contracts providing for payment and delivery on the date stated in the prospectus supplement. Each contract will be for an amount not less than, and the aggregate amount of securities sold pursuant to such contracts shall not be less nor more than, the respective amounts stated in the prospectus supplement. Institutions with whom the contracts, when authorized, may be made include commercial and savings banks, insurance companies, pension funds, investment companies, educational and charitable institutions and other institutions, but shall in all cases be subject to our approval. Delayed delivery contracts will not be subject to any conditions except that:

- the purchase by an institution of the securities covered under that contract shall not at the time of delivery be prohibited under the laws of the jurisdiction to which that institution is subject; and
- if the securities are also being sold to underwriters acting as principals for their own account, the underwriters shall have purchased such securities not sold for delayed delivery. The underwriters and other persons acting as our agents will not have any responsibility in respect of the validity or performance of delayed delivery contracts.

Certain agents, underwriters and dealers, and their associates and affiliates may be customers of, have borrowing relationships with, engage in other transactions with, and/or perform services, including investment banking services, for us or one or more of our respective affiliates in the ordinary course of business.

In order to facilitate the offering of the securities, any underwriters may engage in transactions that stabilize, maintain or otherwise affect the price of the securities or any other securities the prices of which may be used to determine payments on such securities. Specifically, any underwriters may overallocate in connection with the offering, creating a short position for their own accounts. In addition, to cover overallocations or to stabilize the price of the securities or of any such other securities, the underwriters may bid for, and purchase, the securities or any such other securities in the open market. Finally, in any offering of the securities through a syndicate of underwriters, the underwriting syndicate may reclaim selling concessions allowed to an underwriter or a dealer for distributing the securities in the offering if the syndicate repurchases previously distributed securities in transactions to cover syndicate short positions, in stabilization transactions or otherwise. Any of these activities may stabilize or maintain the market price of the securities above independent market levels. Any such underwriters are not required to engage in these activities and may end any of these activities at any time.

As of the date of this prospectus, under Rule 15c6-1 of the Exchange Act, trades in the secondary market generally are required to settle in two business days, unless the parties to any such trade expressly agree otherwise or the securities are sold by us to an underwriter in a firm commitment underwritten offering. The applicable prospectus supplement may provide that the original issue date for your securities may be more than two scheduled business days after the trade date for your securities. Accordingly, in such a case, if you wish to trade securities on any date prior to the second business day before the original issue date for your securities, you will be required, by virtue of the fact that your securities initially are expected to settle in more than two scheduled business days after the trade date for your securities, to make alternative settlement arrangements to prevent a failed settlement. In February 2023, Rule 15c6-1 of the Exchange Act was amended to require, effective May 28, 2024, trades in the secondary market to settle in one business day, unless the parties to any such trade expressly agree otherwise or the securities are sold by us to an underwriter in a firm commitment underwritten offering. Therefore, for any securities offered under this prospectus on or after May 28, 2024, the same process described in this paragraph will apply, except that purchasers who wish to trade such securities on any date prior to the first business day before the original issue date will be required, by virtue of the fact that their securities initially are expected to settle in more than one scheduled business day after the trade date for their securities, to make alternative settlement arrangements to prevent a failed settlement as described in this paragraph.

The securities may be new issues of securities and may have no established trading market. The securities may or may not be listed on a national securities exchange. We can make no assurance as to the liquidity of or the existence of trading markets for any of the securities.

LEGAL MATTERS

Unless the applicable prospectus supplement indicates otherwise, the validity of the securities in respect of which this prospectus is being delivered will be passed upon by Wilmer Cutler Pickering Hale and Dorr LLP. Additional legal matters may be passed upon for us or any underwriters, dealer or agents, by counsel that we will name in the applicable prospectus supplement.

EXPERTS

Ernst & Young, LLP, independent registered public accounting firm, has audited our consolidated financial statements included in our [Annual Report on Form 10-K for the year ended December 31, 2022](#), as set forth in their report, which is incorporated by reference in this prospectus and elsewhere in the registration statement. Our financial statements are incorporated by reference in reliance on Ernst & Young LLP's report, given on their authority as experts in accounting and auditing.

ASTRIA THERAPEUTICS, INC.

\$500,000,000

**Common Stock
Preferred Stock
Depositary Shares
Units
Warrants**

PROSPECTUS

, 2023

Subject to completion, dated December 15, 2023

PROSPECTUS

ASTRIA THERAPEUTICS, INC.

**1,571,093 Shares of Common Stock Underlying Previously
Issued Pre-Funded Warrants**

**7,368,738 Shares of Common Stock Underlying Previously
Issued Common Stock Warrants**

This prospectus relates to the offer and sale by us of (i) 1,571,093 shares of our common stock issuable upon the exercise of outstanding pre-funded warrants (the “Pre-Funded Warrants”) and (ii) 7,368,738 shares of our common stock issuable upon the exercise of outstanding common stock warrants (the “Common Stock Warrants”, and, together with the “Pre-Funded Warrants”, the “Warrants”) that we issued and sold in October 2023 in an underwritten offering.

Each Pre-Funded Warrant has an exercise price per share of \$0.001 per share of common stock, is exercisable only by means of a cashless exercise and is exercisable from the date of issuance until the date the Pre-Funded Warrant is exercised in full, subject to specified beneficial ownership limitations. Each Common Stock Warrant has an exercise price of \$8.025 per share of common stock, is exercisable from the date of issuance and will expire on the date that is five years after the date of issuance, subject to specified beneficial ownership limitations.

Our common stock is listed on The Nasdaq Global Market under the symbol “ATXS.” On December 14, 2023, the last reported sale price of our common stock on The Nasdaq Global Market was \$6.12 per share.

Investing in our securities involves risks. See “Risk Factors” beginning on page SA-5 of this prospectus and the risk factors incorporated by reference into this prospectus.

No underwriter or other person has been engaged by us to facilitate the sale in this offering of the shares of common stock issuable upon exercise of the Warrants. We will receive all of the proceeds from any cash exercise of the Common Stock Warrants. All costs associated with this registration were borne by us. See “Plan of Distribution” beginning on page SA-27 of this prospectus for more information on this offering.

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

The date of this prospectus is _____, 2023

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

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ABOUT THIS PROSPECTUS

We have not authorized anyone to provide you with information that is different from that contained in this prospectus or in any free writing prospectus we may authorize to be delivered or made available to you. When you make a decision about whether to invest in our securities, you should not rely upon any information other than the information contained in or incorporated by reference in this prospectus or in any free writing prospectus that we may authorize to be delivered or made available to you. Neither the delivery of this prospectus nor the sale of our securities means that the information contained in this prospectus or any free writing prospectus is correct after the date of this prospectus or such free writing prospectus. This prospectus is not an offer to sell or the solicitation of an offer to buy our securities in any circumstances under which the offer or solicitation is unlawful.

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

Unless otherwise indicated, information contained in this prospectus concerning our industry and the markets in which we operate, including our general expectations and market position, market opportunity and market share, is based on information from our own management estimates and research, as well as from industry and general publications and research, surveys and studies conducted by third parties. Management estimates are derived from publicly available information, our knowledge of our industry and assumptions based on such information and knowledge, which we believe to be reasonable. Our management estimates have not been verified by any independent source, and we have not independently verified any third-party information. In addition, assumptions and estimates of our and our industry's future performance are necessarily subject to a high degree of uncertainty and risk due to a variety of factors, including those described in "Risk Factors" beginning on page SA-5 of this prospectus and included in the sections entitled "Risk Factors" in our most recent Annual Report on Form 10-K, our Quarterly Reports on Form 10-Q and the other filings we make with the Securities and Exchange Commission, or SEC, from time to time that are incorporated by reference herein. These and other factors could cause our future performance to differ materially from our assumptions and estimates. See "Forward-Looking Statements."

We further note that the representations, warranties and covenants made by us in any agreement that is filed as an exhibit to the registration statement of which this prospectus is a part were made solely for the benefit of the parties to such agreement, including, in some cases, for the purpose of allocating risk among the parties to such agreements, and should not be deemed to be a representation, warranty or covenant to you. Moreover, such representations, warranties or covenants were accurate only as of the date when made. Accordingly, such representations, warranties and covenants should not be relied on as accurately representing the current state of our affairs.

Solely for our convenience, trademarks and trade names referred to in this prospectus may appear without the "®" or "™" symbols, but such references are not intended to indicate, in any way, that we will not assert, to the fullest extent possible under applicable law, our rights or the rights to these trademarks and trade names. We do not intend our use or display of other companies' trade names, trademarks or service marks to imply a relationship with, or endorsement or sponsorship of us by, any other companies. Each trademark, trade name, or service mark of any other company appearing in this prospectus is the property of its respective holder.

Unless the context otherwise indicates, references in this prospectus to "we," "our" and "us" refer, collectively, to Astria Therapeutics, Inc., a Delaware corporation, and its consolidated subsidiaries.

PROSPECTUS SUMMARY

This summary highlights selected information contained elsewhere in this prospectus and in the documents we incorporate by reference. This summary does not contain all of the information you should consider before making an investment decision. You should read this entire prospectus carefully, especially the risks discussed under “Risk Factors” beginning on page SA-5 of this prospectus, along with our consolidated financial statements and notes to those consolidated financial statements and the other information incorporated by reference in this prospectus.

Overview

We are a biopharmaceutical company focused on the discovery, development and commercialization of novel therapeutics for allergic and immunological diseases. Our focus is to develop first-choice therapies that improve the health and outcomes of patients with allergic and immunological diseases. Our lead product candidate is STAR-0215, a potential best-in-class monoclonal antibody inhibitor of plasma kallikrein in clinical development for the treatment of hereditary angioedema, or HAE, a rare, debilitating and potentially life-threatening disease. STAR-0215 has the potential to be the most patient-friendly chronic treatment option for HAE, based on the data generated to date and the existing HAE treatment landscape. Our second product candidate is STAR-0310, a monoclonal antibody OX40 antagonist that is in preclinical development for the treatment of atopic dermatitis, or AD, an immune disorder associated with loss of skin barrier function and itching. We believe that with both of these programs, we are advancing a pipeline of products with meaningfully differentiated profiles based on validated mechanisms.

In September 2021, we formally changed our name to Astria Therapeutics, Inc. from Catabasis Pharmaceuticals, Inc. The name “Astria” originates from the Greek word for star, demonstrating our commitment to patients who serve as our guiding stars.

THE OFFERING	
Securities offered	8,939,831 shares of common stock, consisting of (i) 1,571,093 shares issuable upon exercise of the Pre-Funded Warrants and (ii) 7,368,738 shares issuable upon exercise of the Common Stock Warrants.
Description of Pre-Funded Warrants	Each Pre-Funded Warrant has an exercise price of \$0.001 per share of common stock, is exercisable only by means of a cashless exercise and will expire on the date the warrant is exercised in full, subject to specified beneficial ownership limitations.
Description of Common Stock Warrants	Each Common Stock Warrant has an exercise price of \$8.025 per share of common stock and is exercisable until the date that is five years after the date of issuance, subject to specified beneficial ownership limitations.
Common stock to be outstanding immediately following this offering	45,235,765 shares of common stock assuming (i) the issuance of 1,570,836 shares of common stock upon the exercise in full of the Pre-Funded Warrants by means of cashless exercises, calculated based on the last reported sale price of our common stock on The Nasdaq Global Market on December 14, 2023, and (ii) the issuance of 7,368,738 shares of common stock upon the exercise in full of the Common Stock Warrants by means of cash exercises.
Use of proceeds	We plan to use any proceeds from this offering for preclinical studies, clinical trials and other research and development activities; continued growth of our manufacturing capabilities; initial investments in commercial and medical affairs infrastructure to support our transition to a commercial-stage company; and for working capital and other general corporate purposes.
Risk factors	See “Risk Factors” beginning on page SA-5 of this prospectus and the sections entitled “Risk Factors” in our most Annual Report on Form 10-K, our Quarterly Reports on Form 10-Q and the other filings we make with SEC from time to time that are incorporated by reference herein for a discussion of certain factors you should carefully consider before deciding to invest in our securities.
Nasdaq Global Market symbol	Our common stock is listed on The Nasdaq Global Market under the symbol “ATXS.” There is no established public trading market for the Warrants, and we do not expect a market to develop. We do not intend to list the Warrants on The Nasdaq Global Market or any other national securities exchange or nationally recognized trading system. Without an active trading market, the liquidity of the Warrants will be limited.
<p>The number of shares of our common stock to be outstanding after this offering is based on 36,296,191 shares of our common stock outstanding as of November 30, 2023.</p> <p>The number of shares of our common stock to be outstanding after this offering excludes:</p>	

- 3,403,269 shares of our common stock issuable upon the exercise of stock options outstanding as of November 30, 2023 at a weighted-average exercise price of \$13.79 per share;
- 4,420,901 shares of our common stock available for future issuance as of November 30, 2023 under our amended and restated 2015 stock incentive plan;
- 64,100 shares of our common stock available for future issuance as of November 30, 2023 under our 2022 inducement stock incentive plan;
- 9,271,689 shares of our common stock that had been reserved for issuance in connection with warrants outstanding as of November 30, 2023 (not including the Warrants) at a weighted-average exercise price of \$7.72 per share;
- 43,060 shares of our common stock available for future issuance as of November 30, 2023 under our 2015 employee stock purchase plan; and
- 5,184,591 shares of our common stock issuable upon the conversion of shares of Series X Preferred Stock outstanding as November 30, 2023.

Unless otherwise indicated, all information in this prospectus assumes no exercise or conversion of the outstanding preferred stock, options or warrants described in the bullets above.

RISK FACTORS

Investing in our securities involves a high degree of risk. Before you decide to invest in our securities, you should consider carefully the risks described below and the risks discussed in the sections entitled “Risk Factors” in our most recent Annual Report on Form 10-K, our Quarterly Reports on Form 10-Q and the other filings we make with the SEC from time to time that are incorporated by reference herein, together with the other information contained in this prospectus and the information incorporated by reference herein and in any free writing prospectus that we may authorize for use in connection with this offering. We believe the risks described below and incorporated by reference herein are the risks that are material to us as of the date of this prospectus. If any of these risks actually occur, our business, financial condition, results of operations and future growth prospects could be materially and adversely affected. In these circumstances, the market price of our common stock could decline, and you may lose all or part of your investment.

Risks Related to this Offering

If you purchase shares in this offering by exercising your Common Stock Warrants, you will suffer immediate dilution of your investment.

The exercise price of the Common Stock Warrants is substantially higher than the net tangible book value per share of our common stock. Therefore, if you purchase shares in this offering by exercising your Common Stock Warrants, you will pay an effective price per share of common stock you acquire that substantially exceeds net tangible book value per share. If you exercise a Common Stock Warrant to purchase a share of our common stock in this offering, and assuming no other Warrants are exercised in this offering, you will experience immediate dilution of approximately \$2.63 per share, representing the difference between our pro forma net tangible book value per share as of September 30, 2023 after giving effect to our October 2023 underwritten offering and the exercise price of the Common Stock Warrants. In addition, if previously issued options or warrants or other convertible securities are exercised for or converted into shares of our common stock at exercise or conversion prices that are lower the exercise price of the Common Stock Warrants, you will experience further dilution. For a further description of the dilution that you will experience if you exercise your Common Stock Warrants, see “Dilution.”

There is no public market for the Warrants.

There is no established public trading market for the Warrants, and we do not expect a market to develop. In addition, we do not intend to list the Warrants on The Nasdaq Global Market or any other national securities exchange or nationally recognized trading system. Without an active trading market, the liquidity of the Warrants will be limited.

You may experience future dilution as a result of future equity offerings.

In order to raise additional capital, we may in the future offer additional shares of our common stock or other securities convertible into or exchangeable for our common stock at prices that may not be the same as the exercise price of the Common Stock Warrants. We may sell shares or other securities in any other offering at prices that are less than the exercise price of the Common Stock Warrants, and investors purchasing shares or other securities in the future could have rights superior to existing stockholders. The prices per share at which we sell additional shares of our common stock, or securities convertible or exchangeable into common stock, in future transactions may be higher or lower than the exercise price of the Common Stock Warrants.

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

Each Pre-Funded Warrant is exercisable from the date of issuance until the date the warrant is exercised in full and will be exercisable only by means of a cashless exercise, and each Common Stock Warrant may, under certain circumstances, be exercised by means of a cashless exercise, meaning that the holder would not pay a cash purchase price upon exercise, but instead would receive upon such exercise the net number of shares of our common stock determined according to the formula set forth in the applicable

form of Warrant. Accordingly, we will not receive any additional funds upon any exercise of the Warrants and may not receive any additional funds upon any exercise of the Common Stock Warrants.

We have broad discretion over the use of our cash and cash equivalents, including the net proceeds we may receive in this offering, and may not use them effectively.

Our management has broad discretion to use our cash and cash equivalents, including the net proceeds we may receive in this offering, to fund our operations and could spend these funds in ways that do not improve our results of operations or enhance the value of our common stock. The failure by our management 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 common stock to decline and delay the development of our product candidates. Pending their use to fund operations, we may invest our cash and cash equivalents in a manner that does not produce income or that loses value.

Except for the right to participate in certain dividends and distributions, holders of Warrants will have no rights as common stockholders unless and until such holders exercise their Warrants for shares of our common stock.

Unless and until holders of Warrants exercise the applicable Warrants and acquire shares of our common stock, such holders will have no rights with respect to the shares of our common stock underlying such Warrants, except for the right to participate in certain dividends and distributions. Upon exercise of such Warrants, the holders will be entitled to exercise the rights of a common stockholder only as to matters for which the record date occurs after the exercise date.

The Common Stock Warrants are speculative in nature.

Except for the right to participate in certain dividends and distributions, the Common Stock Warrants do not confer any rights of common stock ownership on their holders, but rather merely represent the right to acquire shares of common stock at a fixed price for a limited period of time. Specifically, commencing on the date of issuance, the holders of the Common Stock Warrants may exercise their right to acquire the common stock and pay an exercise price of \$8.025 per share, subject to certain adjustments, prior to five years from the date of issuance, after which date any unexercised Common Stock Warrants will expire and have no further value. Moreover, the market value of the Common Stock Warrants, if any, is uncertain. The Common Stock Warrants will not be listed or quoted for trading on any market or exchange. There can be no assurance that the market price of the common stock will ever equal or exceed the exercise price of the Common Stock Warrants, and consequently, it may not ever be profitable for holders of the Common Stock Warrants to exercise the Common Stock Warrants.

FORWARD-LOOKING STATEMENTS

This prospectus and the information incorporated by reference in 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. All statements, other than statements of historical facts, contained or incorporated by reference in this prospectus, including statements regarding our strategy, future operations, future financial position, future revenue, projected costs, prospects, plans and objectives of management, preclinical and clinical development programs, regulatory filings and expected market growth are forward-looking statements. The words “anticipate,” “believe,” “continue,” “could,” “estimate,” “expect,” “intend,” “may,” “plan,” “potential,” “predict,” “project,” “should,” “target,” “would” and similar expressions are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words.

These forward-looking statements include, among other things, statements about:

- our expectations regarding the timing of availability of final results from our Phase 1a clinical trial of STAR-0215;
- our expectations regarding the potential significance of the preliminary results from the Phase 1a STAR-0215 clinical trial and the anticipated nature and timing of receipt of additional data from such trial;
- our expectations regarding the timing, nature, goals and results of our Phase 1b/2 clinical trial of STAR-0215 and that favorable results from such trial could allow us to move directly into a Phase 3 pivotal trial of STAR-0215 as a potential treatment for HAE;
- our expectations about the design and anticipated timing of a Phase 3 pivotal clinical trial for STAR-0215 as a potential treatment for HAE, assuming positive data from the Phase 1b/2 trial;
- our expectations about the unmet medical need for HAE, the potential differentiating attributes of STAR-0215 as a potential treatment for HAE, along with the potential market impact of such differentiation, the potential of STAR-0215 to be a best-in-class monoclonal antibody inhibitor of plasma kallikrein able to provide long-acting, effective attack prevention for HAE, and our vision for STAR-0215 to become the first-choice preventative treatment for HAE with administration every three or six months with the goal of normalizing the lives of people living with HAE;
- the nature and anticipated growth of the global HAE market and HAE therapies;
- our plans to optimize the formulation of STAR-0215 and corresponding work to develop a drug-device combination for STAR-0215 for potential use in late-stage clinical trials and commercially, if approved;
- our expectations that we have scaled the manufacturing process for STAR-0215 in a manner to generate sufficient material for our planned STAR-0215 nonclinical and clinical studies;
- the potential therapeutic benefits and potential attributes of STAR-0310, a preclinical stage product candidate which we recently in-licensed, and our plans to develop STAR-0310 as a treatment for atopic dermatitis, or AD;
- our expectations regarding the timing of regulatory filings for STAR-0310;
- our expectations about the design and anticipated timing of planned clinical trials of STAR-0310;
- our expectations regarding the timing and nature of anticipated data from planned clinical trials of STAR-0310;
- the potential commercial opportunity for STAR-0310 in AD and the likelihood that it can effectively compete in AD, assuming it is approved;
- the estimated size and anticipated growth of the AD market and the need for treatments for AD;
- the potential to pursue the development of STAR-0310 in additional indications;
- our goals and visions for the STAR-0310 program;

- our expectations regarding our ability to expand our pipeline;
- the potential benefits of any future acquisition, in-license, collaboration or preclinical development activities;
- our manufacturing plans, capabilities and strategy;
- our intellectual property position and strategy;
- our estimates regarding our cash runway, expenses, future revenue, capital requirements and needs for additional financing, including additional financing to fund our long-term operations;
- developments relating to our competitors and our industry; and
- the impact of government laws and regulations.

You are cautioned that these forward-looking statements are only predictions and are subject to risks, uncertainties and assumptions, including those referenced in the section of this prospectus entitled “Risk Factors” and in the sections entitled “Risk Factors” in our most recent Annual Report on Form 10-K, our Quarterly Reports on Form 10-Q and the other filings we make with the SEC from time to time that are incorporated by reference herein. We undertake no obligation to revise or update any forward-looking statements, except to the extent required by law.

USE OF PROCEEDS

If the Common Stock Warrants to purchase the shares of our common stock we are offering in this offering are exercised in full in cash exercises, we will receive gross proceeds of \$59.1 million, however we do not know when, if or the extent to which such warrants may be exercised, or whether such warrants will be exercised in cash exercises, and it is possible that no such warrants may be exercised or that any such warrants will be exercised in cashless exercises, in which case we would not receive any proceeds from this offering. Each Pre-Funded Warrant is exercisable only by means of a cashless exercise, and accordingly, we will not receive any additional funds upon any exercise of the Pre-Funded Warrants.

We plan to use any proceeds from this offering for preclinical studies, clinical trials and other research and development activities; continued growth of our manufacturing capabilities; initial investments in commercial and medical affairs infrastructure to support our transition to a commercial-stage company; and for working capital and other general corporate purposes.

Pending our use of any proceeds from this offering, we intend to invest any such proceeds in short term, investment grade, interest-bearing instruments and U.S. government securities.

DIVIDEND POLICY

We have never declared nor paid cash dividends on our common stock. We currently intend to retain all of our future earnings, if any, to finance the growth and development of our business. We do not intend to pay cash dividends in respect of our common stock in the foreseeable future.

DILUTION

Our net tangible book value as of September 30, 2023 was approximately \$184.5 million, or approximately \$6.58 per share of common stock. Net tangible book value per share is equal to our total tangible assets, less our total liabilities, divided by the number of shares outstanding as of September 30, 2023.

Our pro forma net tangible book value as of September 30, 2023 was approximately \$244.1 million, or approximately \$5.40 per share of common stock. Pro forma net tangible book value per share is equal to our total tangible assets, less our total liabilities, divided by the number of shares outstanding as of September 30, 2023, in each case, after giving effect to our sale in an underwritten offering in October 2023 of (i) 8,253,895 shares of common stock and accompanying Common Stock Warrants to purchase 6,190,418 shares of our common stock and (ii) Pre-Funded Warrants to purchase 1,571,093 shares of common stock and accompanying Common Stock Warrants to purchase 1,178,320 shares of our common stock for aggregate net proceeds of \$59.6 million (and assuming no exercise of the Pre-Funded Warrants and Common Stock Warrants and that such warrants are classified and accounted for as equity). Dilution with respect to net tangible book value per share represents the difference between the exercise price of the Common Stock Warrants and the net tangible book value per share of our common stock immediately after the exercise of the Common Stock Warrant being exercised.

If you exercise a Common Stock Warrant to purchase a share of our common stock in this offering, and assuming no other Warrants are exercised in this offering, you will experience immediate dilution of approximately \$2.63 per share, representing the difference between our pro forma net tangible book value per share as of September 30, 2023 and the exercise price of the Common Stock Warrants.

In addition, if previously issued options or warrants to acquire common stock are exercised at prices below the exercise price of the Common Stock Warrants, you will experience further dilution.

The discussion above is based on 28,042,296 shares of our common stock outstanding as of September 30, 2023. The number of shares outstanding as of September 30, 2023 excludes:

- 3,321,448 shares of our common stock issuable upon the exercise of stock options outstanding as of September 30, 2023 at a weighted-average exercise price of \$14.01 per share;
- 4,404,922 shares of our common stock available for future issuance as of September 30, 2023 under our amended and restated 2015 stock incentive plan;
- 161,900 shares of our common stock available for future issuance as of September 30, 2023 under our 2022 inducement stock incentive plan;
- 331,858 shares of our common stock that had been reserved for issuance in connection with warrants outstanding as of 331,858 (not including the Warrants) at a weighted-average exercise price of \$37.50 per share;
- 43,060 shares of our common stock available for future issuance as of September 30, 2023 under our 2015 employee stock purchase plan; and
- 5,184,591 shares of our common stock issuable upon the conversion of shares of Series X Preferred Stock outstanding as of September 30, 2023.

DESCRIPTION OF CAPITAL STOCK

The following description of our capital stock is intended as a summary only and therefore is not a complete description of our capital stock. This description is based upon, and is qualified by reference to, our certificate of incorporation, our by-laws and applicable provisions of Delaware corporate law. You should read our certificate of incorporation and by-laws, which are filed as exhibits to the registration statement of which this prospectus forms a part, for the provisions that are important to you.

Our authorized capital stock consists of 150,000,000 shares of common stock, \$0.001 par value per share, and 5,000,000 shares of preferred stock, \$0.001 par value per share. As of November 30, 2023, 36,296,191 shares of our common stock were outstanding and 31,107 shares of our Series X Preferred Stock were outstanding.

Common Stock

Voting Rights. Holders of our common stock are entitled to one vote for each share held on all matters submitted to a vote of stockholders, except that unless otherwise required by law, holders of our common stock are not entitled to vote on any amendment to the certificate of incorporation that relates solely to the terms of one or more outstanding series of preferred stock, if the holders of such affected series are entitled, either separately or together as a class with the holders of one or more such other series, to vote thereon pursuant to the certificate of incorporation. Holders of our common stock do not have cumulative voting rights.

An election of directors will be decided by a plurality of the votes cast by the stockholders entitled to vote on the election at a duly held stockholders' meeting at which a quorum is present. All other questions will be decided by a majority of the votes cast by stockholders entitled to vote thereon at a duly held meeting of stockholders at which a quorum is present, except when a different vote is required by law, our certificate of incorporation or by-laws.

Dividends. Holders of common stock are entitled to receive proportionately any dividends as may be declared by our board of directors, subject to any preferential dividend or other rights of any series of preferred stock that we may designate and issue in the future.

Liquidation and Dissolution. In the event of our liquidation or dissolution, the holders of common stock are entitled to receive proportionately our net assets available for distribution to stockholders after the payment of all debts and other liabilities and subject to the prior rights of any outstanding preferred stock.

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

Transfer Agent and Registrar. The transfer agent and registrar for our common stock is Equiniti Trust Company, LLC.

Listing on The Nasdaq Global Market. Our common stock is listed on The Nasdaq Global Market under the symbol "ATXS."

Preferred Stock

General Description

Under our restated certificate of incorporation, we are authorized to issue "blank check" preferred stock, which may be issued in one or more series upon authorization of our board of directors. Our board of directors is authorized to fix the designation of the series, the number of authorized shares of the series, dividend rights and terms, conversion rights, voting rights, redemption rights and terms, liquidation preferences and any other rights, powers, preferences and limitations applicable to each series of preferred stock. The authorized shares of our preferred stock are available for issuance without further action by our

stockholders, unless such action is required by applicable law or the rules of any stock exchange on which our securities may be listed. If the approval of our stockholders is not required for the issuance of shares of our preferred stock, our board may determine not to seek stockholder approval.

A series of our preferred stock could, depending on the terms of such series, impede the completion of a merger, tender offer or other takeover attempt. Our board of directors will make any determination to issue preferred shares based upon its judgment as to the best interests of our stockholders. Our directors, in so acting, could issue preferred stock having terms that could discourage an acquisition attempt through which an acquirer may be able to change the composition of our board of directors, including a tender offer or other transaction that some, or a majority, of our stockholders might believe to be in their best interests or in which stockholders might receive a premium for their stock over the then-current market price of the stock.

Series X Preferred Stock

Pursuant to our Certificate of Designation of Preferences, Rights and Limitations of Series X Convertible Preferred Stock, or the Certificate of Designation, we designated 91,380 shares of our authorized and unissued preferred stock as Series X convertible preferred stock, or Series X Preferred Stock, and established the rights, preferences and privileges of the Series X Preferred Stock, which are summarized below. As of November 30, 2023, we had 31,107 outstanding shares of Series X Preferred Stock.

Conversion. The Series X Preferred Stock is convertible at the option of the holder thereof into a number of registered shares of common stock determined by dividing the aggregate stated value of the Series X Preferred Stock being converted by the conversion price then in effect. Each share of Series X Preferred Stock is convertible into 166.67 shares of common stock. At November 30, 2023, the number of shares of common stock issuable upon conversion of the remaining outstanding shares of Series X Preferred Stock is 5,184,591. No holder may request a conversion of its Series X Preferred Stock to the extent such conversion would result in the holder and its affiliates beneficially owning more than a pre-set conversion blocker threshold, which was initially set at 9.99% of our common stock then outstanding (as of November 30, 2023, these percentages are set at 9.99% and can be adjusted by the holder to a number between 4.99% and 19.99%). The amount of beneficial ownership of a holder and its affiliates will be determined in accordance with Section 13(d) of the Exchange Act and the rules and regulations of that section.

Conversion Price Adjustment — Stock Dividends and Stock Splits. If we pay a stock dividend or otherwise make a distribution payable in common stock on our common stock or any common stock equivalents, subdivide or combine our outstanding common stock, or reclassify our common stock in such a way that we issue additional shares of our capital stock, the conversion price of the Series X Preferred Stock will be adjusted by multiplying the then-existing conversion price by a fraction, the numerator of which is the number of shares of common stock outstanding immediately before the distribution, dividend, adjustment or recapitalization and the denominator of which is the number of shares of common stock outstanding immediately after such action.

Fundamental Transaction. If we effect a “fundamental transaction” (as defined below), then upon any future conversion of the Series X Preferred Stock, a holder of our Series X Preferred Stock will have the right to receive, for each common share such holder would have received upon such conversion, the same kind and amount of securities, cash or property as such holder would have been entitled to receive in the fundamental transaction had such holder been a holder of common stock immediately prior to the fundamental transaction.

The term “fundamental transaction” means any of the following:

- a merger or consolidation of us with or into another entity or any stock sale to, or other business combination in which we are not the surviving entity;
- the sale of all or substantially all of our assets in one transaction or a series of related transactions;
- any completed tender offer or exchange offer involving holders of common stock in which more than 50% of our common stock is converted or exchanged into other securities, cash or property, regardless of who makes such offer; or

- any reclassification of our common stock or any compulsory share exchange by which our common stock is effectively converted into or exchanged for other securities, cash or property (but not a reverse stock split).

If the holders of our common stock are given a choice as to the securities, cash or property to be received in a fundamental transaction, the holders of Series X Preferred Stock will be given the same choice on conversion of such holders' shares.

Dividends. Holders of Series X Preferred Stock are entitled to receive dividends, subject to certain beneficial ownership limitations, on shares of Series X Preferred Stock equal, on an as-if-converted-to-common-stock basis, and in the same form as dividends actually paid on shares of the Company's common stock.

Voting Rights. Except as otherwise required by law, the Series X Preferred Stock does not have voting rights. However, as long as any shares of Series X Preferred Stock are outstanding, the Company may not, without the affirmative vote of the holders of a majority of the then outstanding shares of the Series X Preferred Stock, (i) alter or change adversely the powers, preferences or rights given to the Series X Preferred Stock or alter or amend the Certificate of Designation that authorized the Series X Preferred Stock, amend or repeal any provision of, or add any provision to, the Company's Certificate of Incorporation or bylaws, or file any articles of amendment, certificate of designations, preferences, limitations and relative rights of any series of preferred stock, if such action would adversely alter or change the preferences, rights, privileges or powers of, or restrictions provided for the benefit of the Series X Preferred Stock, (ii) issue further shares of Series X Preferred Stock or increase or decrease (other than by conversion) the number of authorized shares of Series X Preferred Stock, or (iii) enter into any agreement with respect to any of the foregoing.

Stock Options

As of November 30, 2023, options to purchase 3,403,269 shares of our common stock at a weighted-average exercise price of \$13.79 per share were outstanding, of which options to purchase 1,073,808 shares of our common stock were exercisable, at a weighted-average exercise price of \$18.83 per share.

Warrants

As of November 30, 2023, we had outstanding warrants, including the Warrants, to purchase shares of our common stock exercisable for an aggregate of 9,271,689 shares of our common stock at a weighted-average exercise price of \$7.72 per share.

Provisions of Our Certificate of Incorporation and By-laws and Delaware Law That May Have Anti-Takeover Effects

Delaware law, our certificate of incorporation and our by-laws contain provisions that could have the effect of delaying, deferring or discouraging another party from acquiring control of us. These provisions, which are summarized below, are expected to discourage coercive takeover practices and inadequate takeover bids. These provisions are also designed to encourage persons seeking to acquire control of us to first negotiate with our board of directors.

Staggered Board; Removal of Directors. Our certificate of incorporation and by-laws divide our board of directors into three classes with staggered three-year terms. In addition, a director is only able to be removed for cause and only by the affirmative vote of the holders of at least 75% of the votes that all of our stockholders would be entitled to cast in an annual election of directors. Any vacancy on our board of directors, including a vacancy resulting from an enlargement of our board of directors, is only able to be filled by vote of a majority of our directors then in office. The classification of our board of directors and the limitations on the removal of directors and filling of vacancies could make it more difficult for a third party to acquire, or discourage a third party from seeking to acquire, control of our company.

Stockholder Action by Written Consent; Special Meetings. Our certificate of incorporation provides that any action required or permitted to be taken by our stockholders must be effected at a duly called annual or special meeting of our stockholders and may not be effected by any consent in writing by our

stockholders. Our certificate of incorporation and by-laws also provide that, except as otherwise required by law, special meetings of our stockholders can only be called by our chairman of the board, our chief executive officer or our board of directors.

Advance Notice Requirements for Stockholder Proposals. Our by-laws establish an advance notice procedure for stockholder proposals to be brought before an annual meeting of stockholders, including proposed nominations of persons for election to our board of directors. Stockholders at an annual meeting are only able to consider proposals or nominations specified in the notice of meeting or brought before the meeting by or at the direction of our board of directors or by a stockholder of record on the record date for the meeting who is entitled to vote at the meeting and who has delivered timely written notice in proper form to our secretary of the stockholder's intention to bring such business before the meeting. These provisions could have the effect of delaying until the next stockholder meeting stockholder actions that are favored by the holders of a majority of our outstanding voting securities.

Delaware Business Combination Statute. We are subject to Section 203 of the General Corporation Law of the State of Delaware. Subject to certain exceptions, Section 203 prevents a publicly held Delaware corporation from engaging in a "business combination" with any "interested stockholder" for three years following the date that the person became an interested stockholder, unless the interested stockholder attained such status with the approval of our board of directors or unless the business combination is approved in a prescribed manner. A "business combination" includes, among other things, a merger or consolidation involving us and the "interested stockholder" and the sale of more than 10% of our assets. In general, an "interested stockholder" is any entity or person beneficially owning 15% or more of our outstanding voting stock and any entity or person affiliated with or controlling or controlled by such entity or person.

Amendment of Certificate of Incorporation and By-laws. The General Corporation Law of the State of Delaware provides generally that the affirmative vote of a majority of the shares entitled to vote on any matter is required to amend a corporation's certificate of incorporation or by-laws, unless a corporation's certificate of incorporation or by-laws, as the case may be, requires a greater percentage. Our by-laws may be amended or repealed by a majority vote of our board of directors or by the affirmative vote of the holders of at least 75% of the votes that all of our stockholders would be entitled to cast in any annual election of directors. In addition, the affirmative vote of the holders of at least 75% of the votes that all of our stockholders would be entitled to cast in any annual election of directors is required to amend or repeal or to adopt any provisions inconsistent with any of the provisions of our certificate of incorporation described above under "*— Staggered Board; Removal of Directors*" and "*— Stockholder Action by Written Consent; Special Meetings.*"

Exclusive Forum Selection. Our certificate of incorporation provides that, unless we consent in writing to the selection of an alternative forum, the Court of Chancery of the State of Delaware (or if the Court of Chancery does not have jurisdiction, the federal district court for the District of Delaware) shall be the sole and exclusive forum for (1) any derivative action or proceeding brought on behalf of our company, (2) any action asserting a claim of breach of a fiduciary duty owed by any of our directors, officers or employees to our company or our stockholders, (3) any action asserting a claim against our company arising pursuant to any provision of the General Corporation Law of the State of Delaware or our certificate of incorporation or by-laws, or (4) any action asserting a claim against our company governed by the internal affairs doctrine. This exclusive forum provision would not apply to suits brought to enforce any liability or duty created by the Securities Act or the Exchange Act or any other claim for which the federal courts have exclusive jurisdiction. To the extent that any such claims may be based upon federal law claims, Section 27 of the Exchange Act creates exclusive federal jurisdiction over all suits brought to enforce any duty or liability created by the Exchange Act or the rules and regulations thereunder. Furthermore, Section 22 of the Securities Act creates concurrent jurisdiction for federal and state courts over all suits brought to enforce any duty or liability created by the Securities Act or the rules and regulations thereunder. Although our restated certificate contains the choice of forum provision described above, it is possible that a court could rule that such a provision is inapplicable for a particular claim or action or that such provision is unenforceable. Although our certificate of incorporation contains the choice of forum provision described above, it is possible that a court could rule that such a provision is inapplicable for a particular claim or action or that such provision is unenforceable.

Authorized but Unissued Shares. Our authorized but unissued shares of common stock and preferred stock are available for future issuance without stockholder approval, subject to any limitations imposed by the listing requirements of The Nasdaq Global Market. These additional shares may be used for a variety of corporate finance transactions, acquisitions and employee benefit plans. The existence of authorized but unissued and unreserved common stock and preferred stock could make it more difficult or discourage an attempt to obtain control of us by means of a proxy contest, tender offer, merger or otherwise.

DESCRIPTION OF WARRANTS

We are offering (i) 1,571,093 shares of common stock issuable upon the exercise of outstanding Pre-Funded Warrants and (ii) 7,368,738 shares of common stock issuable upon the exercise of outstanding Common Stock Warrants that we issued and sold in October 2023 in an underwritten offering.

The following summaries of certain terms and provisions of the Pre-Funded Warrants and the Common Stock Warrants are not complete and are subject to, and qualified in their entirety by, the provisions of the applicable forms of Warrants. Prospective investors should carefully review the terms and provisions of the form of Pre-Funded Warrant and the form of Common Stock Warrant, which, in each case, was filed as an exhibit to our Current Report on Form 8-K on October 12, 2023, for a complete description of the terms and conditions of the applicable Warrants.

Pre-Funded Warrants

Term

Each Pre-Funded Warrant will expire on the date the warrant is exercised in full.

Exercisability

The Pre-Funded Warrants are exercisable at any time after their original issuance. The Pre-Funded Warrants will be exercisable solely by means of a cashless exercise at the option of each holder, in whole or in part, by delivering to us a duly executed exercise notice, in which case the holder would receive upon such cashless exercise the net number of shares of our common stock determined according to the formula set forth in the form of Pre-Funded Warrant. No fractional shares of our common stock will be issued in connection with the exercise of a Pre-Funded Warrant. In lieu of fractional shares, we will pay the holder an amount in cash equal to the fractional amount multiplied by the last trade price of our common stock on the exercise date.

Exercise Limitations

We may not effect the exercise of any Pre-Funded Warrant, and a holder will not be entitled to exercise any portion of any Pre-Funded Warrant that, upon giving effect to or immediately prior to such exercise, would cause: (1) the aggregate number of shares of our common stock beneficially owned by such holder (together with its affiliates) to exceed 9.99% of the number of shares of our common stock outstanding immediately after giving effect to the exercise; or (2) the combined voting power of our securities beneficially owned by such holder (together with its affiliates) to exceed 9.99% of the combined voting power of all of our securities outstanding immediately after giving effect to the exercise, as such percentage ownership is determined in accordance with the terms of the Pre-Funded Warrants. However, any holder of a Pre-Funded Warrant may increase or decrease such percentage to any other percentage not in excess of 19.99% provided that any such increase will not be effective until the 61st day after notice from the holder is delivered to us.

Exercise Price

The exercise price of our common stock purchasable upon the exercise of the Pre-Funded Warrants is \$0.001 per share. The exercise price of the Pre-Funded Warrants and the number of shares of our common stock issuable upon exercise of the Pre-Funded Warrants are subject to appropriate adjustment in the event of certain stock dividends and distributions, stock splits, stock combinations, reclassifications or similar events affecting our common stock, as well as upon any distribution of assets, including cash, stock or other property, to our stockholders. The exercise price of the Pre-Funded Warrants will not be adjusted below the par value of our common stock.

Transferability

Subject to applicable laws, the Pre-Funded Warrants may be offered for sale, sold, transferred or assigned without our consent.

Exchange Listing

There is no established public trading market for the Pre-Funded Warrants, and we do not expect a market to develop. We do not intend to list the Pre-Funded Warrants on The Nasdaq Global Market, any other national securities exchange or any other nationally recognized trading system.

Fundamental Transactions

Upon the consummation of a fundamental transaction (as described in the Pre-Funded Warrants, and generally including any reorganization, recapitalization or reclassification of our common stock, the sale, transfer or other disposition of all or substantially all of our assets, our consolidation or merger with or into another person in which we are not the surviving entity, the acquisition of more than 50% of our outstanding common stock by any person or group, or any person or group becoming the beneficial owner of 50% of the voting power of our outstanding common stock), the holders of the Pre-Funded Warrants will be entitled to receive, upon exercise of the Pre-Funded Warrants, the same kind and amount of securities, cash or other property that such holders would have received had they exercised the Pre-Funded Warrants immediately prior to such fundamental transaction, without regard to any limitations on exercise contained in the Pre-Funded Warrants. Notwithstanding the foregoing, in the event of a fundamental transaction where the consideration consists solely of cash, solely of marketable securities or a combination of cash and marketable securities, then each Pre-Funded Warrant shall automatically be deemed to be exercised in full in a cashless exercise effective immediately prior to and contingent upon the consummation of such fundamental transaction.

No Rights as a Stockholder

Except by virtue of such holder's ownership of shares of our common stock, and except for the right to participate in certain dividends and distributions, the holder of a Pre-Funded Warrant does not have the rights or privileges of a holder of our common stock, including any voting rights, until such holder receives shares of our common stock upon the due exercise of a Pre-Funded Warrant.

Common Stock Warrants***Term and Exercisability***

Each Common Stock Warrant is exercisable at any time after their original issuance and may be exercised until the date that is five years after the original issuance date. Except as noted below, the Common Stock Warrants will be exercisable solely by means of a cash exercise at the option of each holder, in whole or in part, by delivering to us a duly executed exercise notice and the exercise price.

Cashless Exercise

If, at the time a holder exercises its Common Stock Warrants, a registration statement registering the issuance of the shares of common stock underlying the Common Stock 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 form of Common Stock Warrants. No fractional shares will be issued upon the exercise of the warrant. We will, at our election, either pay a cash adjustment in respect of any such final fraction in an amount equal to such fraction multiplied by the exercise price or round up to the next whole share.

Exercise Limitations

We may not effect the exercise of any Common Stock Warrant, and a holder will not be entitled to exercise any portion of any Common Stock Warrant that, upon giving effect to or immediately prior to such exercise, would cause: (1) the aggregate number of shares of our common stock beneficially owned by such holder (together with its affiliates) to exceed 4.99% of the number of shares of our common stock outstanding immediately after giving effect to the exercise; or (2) the combined voting power of our securities beneficially owned by such holder (together with its affiliates) to exceed 4.99% of the combined

voting power of all of our securities outstanding immediately after giving effect to the exercise, as such percentage ownership is determined in accordance with the terms of the Common Stock Warrants. However, any holder of a Common Stock Warrant may increase or decrease such percentage to any other percentage not in excess of 9.99% provided that any such increase will not be effective until the 61st day after notice from the holder is delivered to us.

Exercise Price

The exercise price per share of our common stock purchasable upon the exercise of the Common Stock Warrants is \$8.025. The exercise price of the Common Stock Warrants and the number of shares of our common stock issuable upon exercise of the Common Stock Warrants are subject to appropriate adjustment in the event of certain stock dividends and distributions, stock splits, stock combinations, reclassifications or similar events affecting our common stock, as well as upon any distribution of assets, including cash, stock or other property, to our stockholders. The exercise price of the Common Stock Warrants will not be adjusted below the par value of our common stock.

Transferability

Subject to applicable laws, the Common Stock Warrants may be offered for sale, sold, transferred or assigned without our consent.

Exchange Listing

There is no established public trading market for the Common Stock Warrants, and we do not expect a market to develop. We do not intend to list the Common Stock Warrants on The Nasdaq Global Market, any other national securities exchange or any other nationally recognized trading system.

Fundamental Transactions

In the event of a fundamental transaction, as described in the Common Stock Warrants and generally including any reorganization, recapitalization or reclassification of our common stock, the sale, transfer or other disposition of all or substantially all of our properties or assets, our consolidation or merger with or into another person, the acquisition of more than 50% of our outstanding common stock by any person or group, or any person or group becoming the beneficial owner of 50% of the voting power represented by our outstanding common stock, the holders of the Common Stock Warrants will be entitled to receive upon exercise of the Common Stock Warrants the kind and amount of securities, cash or other property that the holders would have received had they exercised the Common Stock Warrants immediately prior to such fundamental transaction. In addition, in the event of a fundamental transaction which is approved by our board of directors, the holders of the Common Stock Warrants have the right to require us or a successor entity to redeem the Common Stock Warrant for cash in the amount of the Black-Scholes value of the unexercised portion of the Common Stock Warrant on the date of the consummation of the fundamental transaction. In the event of a fundamental transaction which is not approved by our board of directors, the holders of the Common Stock Warrants have the right to require us or a successor entity to redeem the Common Stock Warrant for the consideration paid in the fundamental transaction in the amount of the Black Scholes value of the unexercised portion of the Common Stock Warrant on the date of the consummation of the fundamental transaction.

No Rights as a Stockholder

Except by virtue of such holder's ownership of shares of our common stock, and except for the right to participate in certain dividends and distributions, the holder of a Common Stock Warrant does not have the rights or privileges of a holder of our common stock, including any voting rights, until such holder receives shares of our common stock upon the due exercise of a Common Stock Warrant.

Exchange Listing

There is no established public trading market for the Common Stock Warrants, and we do not expect a market to develop. We do not intend to list the Common Stock Warrants on The Nasdaq Global Market or any other national securities exchange or nationally recognized trading system.

MATERIAL U.S. FEDERAL TAX CONSIDERATIONS FOR HOLDERS OF COMMON STOCK, PRE-FUNDED WARRANTS OR COMMON STOCK WARRANTS

The following is a discussion of material U.S. federal income and estate tax considerations relating to ownership and disposition of our common stock, pre-funded warrants or common stock warrants. For purposes of this discussion, the term “U.S. holder” means a beneficial owner (other than a partnership or other pass-through entity) of our common stock, pre-funded warrants or common stock warrants that is, for U.S. federal income tax purposes:

- an individual who is a citizen or resident of the United States;
- a corporation, or other entity treated 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;
- an estate the income of which is subject to U.S. federal income taxation regardless of its source; or
- a trust if (1) a U.S. court is able to exercise primary supervision over the administration of the trust and one or more U.S. persons have authority to control all substantial decisions of the trust or (2) the trust has a valid election in effect under applicable U.S. Treasury Regulations to be treated as a U.S. person.

A “Non-U.S. holder” is, for U.S. federal income tax purposes, a beneficial owner of common stock, pre-funded warrants or common stock warrants that is not a U.S. holder or a partnership or other pass-through entity for U.S. federal income tax purposes.

This discussion does not address the tax treatment of partnerships or other entities or arrangements that are pass-through entities for U.S. federal income tax purposes or persons who hold their shares of our common stock, pre-funded warrants or common stock warrants through partnerships or such other pass-through entities or arrangements. A partner in a partnership or other pass-through entity that will hold our common stock, pre-funded warrants or common stock warrants should consult his, her or its own tax advisor regarding the tax consequences of the ownership and disposition of our common stock, pre-funded warrants or common stock warrants through a partnership or other pass-through entity, as applicable.

This discussion is based on current provisions of the Internal Revenue Code of 1986, or the Code, existing and proposed U.S. Treasury Regulations promulgated thereunder, current administrative rulings and judicial decisions, all as in effect as of the date of this prospectus supplement and all of which are subject to change or to differing interpretation, possibly with retroactive effect. Any change or differing interpretation could alter the tax consequences to holders described in this prospectus supplement. We have not requested a ruling from the IRS with respect to the statements made and the conclusions reached in the following discussion and there can be no assurance that the Internal Revenue Service, or the IRS, will not challenge one or more of the tax consequences described in this prospectus supplement.

We assume in this discussion that each holder holds shares of our common stock, pre-funded warrants or common stock warrants as a “capital asset” within the meaning of Section 1221 of the Code (generally, property held for investment). This discussion does not address all aspects of U.S. federal income and estate taxation that may be relevant to a particular holder in light of that holder’s individual circumstances nor does it address any aspects of U.S. state, local or non-U.S. taxes, the alternative minimum tax, the special tax accounting rules under Section 451(b) of the Code or the Medicare tax on net investment income. This discussion also does not consider any specific facts or circumstances that may apply to a holder and does not address the special tax rules applicable to particular holders, such as:

- banks, financial institutions, investment funds;
- brokers or dealers in securities;
- tax-exempt organizations and governmental organizations;
- pension plans, including “qualified foreign pension funds” as defined in Section 897(1)(2) of the Code and entities all of the interests of which are held by qualified foreign pension funds;
- persons deemed to sell our common stock or pre-funded warrants under the constructive sale provisions of the Code;

- persons that hold our common stock or pre-funded warrants as part of a straddle, hedge, conversion transaction, synthetic security or other integrated investment or who have elected to mark securities to market;
- insurance companies;
- controlled foreign corporations;
- passive foreign investment companies;
- persons that hold our common stock or pre-funded warrants that constitute “qualified small business stock” under Section 1202 of the Code, or “Section 1244 stock” under Section 1244 of the Code;
- non-U.S. governments; and
- certain U.S. expatriates and former citizens or former long-term residents of the United States.

THIS DISCUSSION IS FOR INFORMATIONAL PURPOSES ONLY AND IS NOT, AND IS NOT INTENDED TO BE, LEGAL OR TAX ADVICE. PROSPECTIVE INVESTORS SHOULD CONSULT THEIR OWN TAX ADVISORS REGARDING THE U.S. FEDERAL, STATE, LOCAL, AND NON-U.S. INCOME, ESTATE AND OTHER TAX CONSIDERATIONS OF ACQUIRING, HOLDING AND DISPOSING OF OUR COMMON STOCK, PRE-FUNDED WARRANTS OR COMMON STOCK WARRANTS.

Treatment of Pre-Funded Warrants

Although it is not entirely free from doubt, a pre-funded warrant should be treated as a share of our 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, upon exercise, no gain or loss should be recognized and 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. Our characterization is not binding on the IRS, and the IRS may treat our pre-funded warrants as warrants to acquire shares of our common stock. In that case, the amount and character of a holder’s gain with respect to pre-funded warrants could be materially different than the discussion set forth below. Each holder should consult his, her or its own tax advisor regarding the tax consequences associated with holding a pre-funded warrant (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.

Tax Considerations Applicable to U.S. Holders

Exercise and Expiration of Common Stock Warrants

In general, a U.S. holder will not recognize gain or loss for U.S. federal income tax purposes upon exercise of a common stock warrant. The U.S. holder will take a tax basis in the shares acquired on the exercise of a common stock warrant equal to the exercise price of the warrant, increased by the U.S. holder’s adjusted tax basis in the common stock warrant exercised. The U.S. holder’s holding period in the shares of our common stock acquired on exercise of the common stock warrant will begin on the date of exercise of the warrant (or possibly, the day after), and will not include any period for which the U.S. holder held the warrant.

In certain limited circumstances, a U.S. holder may be permitted to undertake a cashless exercise of common stock warrants into our common stock. The U.S. federal income tax treatment of a cashless exercise of common stock warrants into our common stock is unclear, and the tax consequences of a cashless exercise could differ from the consequences upon the exercise of a common stock warrant described in the preceding paragraph. U.S. holders should consult their own tax advisors regarding the U.S. federal income tax consequences of a cashless exercise of common stock warrants, including with respect to their holding period and tax basis in the shares of common stock acquired on the exercise of common stock warrants.

The lapse or expiration of a common stock warrant will be treated as if the U.S. holder sold or exchanged the common stock warrant and recognized a loss in an amount equal to the U.S. holder's tax basis in the common stock warrant. Any such loss generally will be a capital loss and will be long-term capital loss if the common stock warrant is held for more than one year. The deductibility of capital losses is subject to limitations.

Certain Adjustments to and Distributions on the Common Stock Warrants

Under Section 305 of the Code, an adjustment to (or failure to adjust) the number of shares of common stock issued on the exercise of the common stock warrants, or an adjustment to (or failure to adjust) the exercise price of the common stock warrants, may be treated as a constructive distribution to a U.S. holder of the common stock warrants if, and to the extent that, such adjustment (or failure to adjust) has the effect of increasing such U.S. holder's proportionate interest in our "earnings and profits" or assets, as determined under U.S. federal income tax principles, depending on the circumstances of such adjustment. An adjustment made pursuant to a bona fide reasonable adjustment formula that has the effect of preventing dilution should generally not be considered to result in a constructive distribution. Any such constructive distribution would be taxable whether or not there is an actual distribution in cash or other property to the holders of common stock warrants. In certain circumstances, if we were to make a distribution in cash or other property with respect to our common stock after the issuance of the common stock warrants, then we may make a corresponding distribution to a warrant holder. The taxation of a distribution received with respect to a common stock warrant is unclear. It is possible such a distribution would be treated as a distribution (or constructive distribution), although other treatments are possible. For more information regarding the tax considerations related to distributions, see the discussion below regarding "Distributions on Common Stock and Pre-Funded Warrants". U.S. holders should consult their tax advisors regarding the proper treatment of any adjustments to and distributions on the common stock warrants.

Distributions on Common Stock and Pre-Funded Warrants

If we make distributions in respect of our common stock or pre-funded warrants, those distributions generally will constitute dividends for U.S. federal income tax purposes to the extent paid from our current or accumulated earnings and profits, as determined under U.S. federal income tax principles. If a distribution exceeds our current and accumulated earnings and profits, the excess will be treated as a tax-free return of the U.S. holder's investment, up to the holder's tax basis in the common stock or pre-funded warrants (and will reduce the U.S. holder's basis in the common stock or pre-funded warrants, but not below zero). Any remaining excess will be treated as capital gain, subject to the tax treatment described below under the heading "Gain on Sale, Exchange or Other Taxable Disposition of Our Common Stock, Pre-Funded Warrants or Common Stock Warrants."

Gain on Sale, Exchange or Other Taxable Disposition of Our Common Stock, Pre-Funded Warrants or Common Stock Warrants

Upon a sale, exchange or other taxable disposition of our common stock, pre-funded warrants or common stock warrants (other than by exercise), a U.S. holder generally will recognize capital gain or loss in an amount equal to the difference between the amount of cash and the fair market value of any property received upon the sale, exchange or other taxable disposition and the U.S. holder's adjusted tax basis in the common stock, pre-funded warrants or common stock warrants, as applicable. 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 stock warrants, as applicable, exceeds one year. Long-term capital gains recognized by certain non-corporate U.S. holders, including individuals, generally will be subject to reduced rates of U.S. federal income tax. The deductibility of capital losses is subject to certain limitations. U.S. holders who recognize losses with respect to a sale, exchange or other taxable disposition of our common stock, pre-funded warrants or common stock warrants should consult their own tax advisors regarding the tax treatment of such losses.

Information Reporting and Backup Withholding

Information reporting requirements generally will apply to distributions (including constructive distributions) on the common stock, pre-funded warrants or common stock warrants and to the proceeds

of a sale or other disposition of common stock, pre-funded warrants or common stock warrants paid by us to a U.S. holder unless such U.S. holder is an exempt recipient from backup withholding, such as C corporations and certain tax-exempt organizations. 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 may 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 tax advisors regarding their qualification for an exemption from backup withholding and the procedures for obtaining such an exemption.

Tax Considerations Applicable To Non-U.S. Holders

Exercise and Expiration of Common Stock Warrants

In general, a Non-U.S. holder will not be subject to U.S. federal income tax on the exercise of the common stock warrants into shares of common stock. The U.S. federal income tax treatment of a cashless exercise of common stock warrants into our common stock is unclear. A Non-U.S. holder should consult his, her, or its own tax advisor regarding the U.S. federal income tax consequences of a cashless exercise of our common stock warrants.

The expiration or lapse of a common stock warrant will be treated as if the Non-U.S. holder sold or exchanged the warrant and recognized a capital loss equal to the Non-U.S. holder's tax basis in the common stock warrant. However, a Non-U.S. holder will not be able to utilize a loss recognized upon expiration or lapse of a common stock 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 maintained by the Non-U.S. holder in the United States) or is treated as a U.S.-source loss and the Non-U.S. holder is present in the United States for 183 days or more in the taxable year of disposition and certain other conditions are met.

Certain Adjustments to and Distributions on the Common Stock Warrants

As described under "— Tax Considerations Applicable to U.S. Holders — Certain Adjustments to and Distributions on the Common Stock Warrants", an adjustment to the common stock warrants could result in a constructive distribution to a Non-U.S. holder, which would be treated as described under "— Tax Considerations Applicable to Non-U.S. Holders — Distributions on our Common Stock or Pre-Funded Warrants" below, and the tax treatment of a distribution on a common stock warrant is unclear. 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 and distributions on the common stock warrants.

Distributions on our Common Stock or Pre-Funded Warrants

If we make distributions in respect of our common stock or pre-funded warrants, those distributions generally will constitute dividends for U.S. federal income tax purposes to the extent paid from our current or accumulated earnings and profits, as determined under U.S. federal income tax principles. If a distribution exceeds our current and accumulated earnings and profits, the excess will be treated as a tax-free return of the non-U.S. holder's investment, up to the holder's tax basis in the common stock or pre-funded warrants (and will reduce the non-U.S. holder's basis in the common stock or pre-funded warrants, but not below zero). Any remaining excess will be treated as capital gain, subject to the tax treatment described below under the heading "Gain on Sale, Exchange or Other Taxable Disposition of Our Common Stock, Pre-Funded Warrants or Common Stock Warrants." Any distributions will also be subject to the discussions below under the headings "Information Reporting and Backup Withholding" and "FATCA."

Except as described below, dividends paid to a non-U.S. holder generally will be subject to withholding of U.S. federal income tax at a 30% rate 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. A non-U.S. holder of our common

stock or pre-funded warrants who claims the benefit of an applicable income tax treaty between the United States and such holder's country of residence generally will be required to provide us or our paying agent with a properly executed IRS Form W-8BEN or W-8BEN-E (or successor form) and satisfy applicable certification and other requirements. A non-U.S. holder that is eligible for a reduced rate of U.S. withholding tax under an income tax treaty may obtain a refund or credit of any excess amounts withheld by timely filing an appropriate claim with the IRS. Non-U.S. holders are urged to consult their own tax advisors regarding their entitlement to benefits under a relevant income tax treaty and the specific methods available to them to satisfy these requirements.

Dividends that are treated as effectively connected with a trade or business conducted by a non-U.S. holder within the United States, and, if an applicable income tax treaty so provides, that are attributable to a permanent establishment or a fixed base maintained by the non-U.S. holder within the United States, are generally exempt from the 30% withholding tax if the non-U.S. holder satisfies applicable certification and disclosure requirements (generally including provision of a valid IRS Form W-8ECI (or applicable successor form) certifying that the dividends are effectively connected with the non-U.S. holder's conduct of a trade or business within the United States). However, such U.S. effectively connected income is taxed on a net income basis at the same U.S. federal income tax rates applicable to U.S. persons (as defined in the Code). Any U.S. effectively connected income received by a non-U.S. holder that is classified as a corporation for U.S. federal income tax purposes may also, under certain circumstances, be subject to an additional "branch profits tax" at a 30% rate 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. Non-U.S. holders should consult their tax advisors with respect to other U.S. tax consequences of the ownership and disposition of our common stock and pre-funded warrants, including the possible imposition of the branch profits tax.

Gain on Sale, Exchange or Other Taxable Disposition of Our Common Stock, Pre-Funded Warrants or Common Stock Warrants

Subject to the discussions below under "— Information Reporting and Backup Withholding" and "FATCA," a non-U.S. holder generally will not be subject to U.S. federal income tax on any gain realized upon such non-U.S. holder's sale, exchange or other disposition of our common stock, pre-funded warrants or common stock 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 generally will be taxed on a net income basis at the same U.S. federal income tax rates applicable to U.S. persons (as defined in the Code), and, if the non-U.S. holder is a foreign corporation, the branch profits tax described above under the heading "— Tax Considerations Applicable to Non-U.S. Holders — Distributions on our Common Stock or Pre-funded Warrants" may also apply;
- the non-U.S. holder is a non-resident alien individual 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, provided that the non-U.S. holder has timely filed U.S. federal income tax returns with respect to such losses; or
- 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, if shorter) a "U.S. real property holding corporation" unless our common stock is regularly traded on an established securities market 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 our common stock. Special rules may apply to a holder of a pre-funded warrant or common stock warrants. Non-U.S. holders are urged to consult their own tax advisors regarding the application of these rules to pre-funded warrants or common stock warrants. If we are determined to be a U.S. real property holding corporation and the foregoing exception does not apply, then the non-U.S. holder

generally will be taxed on its net gain derived from the disposition at the U.S. federal income tax rates applicable to U.S. persons (as defined in the Code). Generally, a corporation is a “U.S. real property holding corporation” if the fair market value of its “U.S. real property interests” 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 our common stock will be regularly traded on an established securities market for purposes of the rule described above.

U.S. Federal Estate Tax

Shares of our common stock or pre-funded warrants that are owned or treated as owned by an individual who is a non-U.S. holder (as specially defined for U.S. federal estate tax purposes) at the time of death are considered U.S. situs assets and will be included in the individual’s gross estate for U.S. federal estate tax purposes. Such shares, 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 stock warrants.

Information Reporting and Backup Withholding

We must report annually to the IRS and to each non-U.S. holder the gross amount of the distributions (including constructive distributions) on our common stock, pre-funded warrants or common stock 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 with respect to distributions on our common stock or pre-funded warrants. Generally, a non-U.S. holder will comply with such procedures if it provides a properly executed IRS Form W-8BEN or W-8BEN-E (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 on Common Stock or Pre-funded Warrants,” will generally be exempt from U.S. backup withholding.

Information reporting and backup withholding generally will apply to the proceeds of a disposition of our common stock, pre-funded warrants or common stock warrants by a non-U.S. holder effected by or through the U.S. office of any broker, U.S. or non-U.S., 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 non-U.S. 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. Rather, 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.

FATCA

Provisions of the Code commonly referred to as the Foreign Account Tax Compliance Act, or FATCA, generally impose a 30% withholding tax on dividends on, and gross proceeds from the sale or other disposition of, our common stock, pre-funded warrants or common stock warrants if paid to a foreign entity unless (1) if the foreign entity is a “foreign financial institution” (which is broadly defined for this purpose and in general includes investment vehicles), the foreign entity undertakes certain due diligence, reporting, withholding, and certification obligations, (2) if the foreign entity is not a “foreign financial institution,” the foreign entity identifies certain of its U.S. investors, or (3) the foreign entity is otherwise excepted under FATCA.

Withholding under FATCA generally applies to payments of dividends (including constructive dividends) on our common stock, pre-funded warrants or common stock warrants. While withholding under FATCA may apply to payments of gross proceeds from a sale or other disposition of our common stock, pre-funded warrants or common stock warrants, withholding on payments of gross proceeds is not required under proposed U.S. Treasury Regulations. Although such regulations are not final, applicable withholding agents may rely on the proposed regulations until final regulations are issued.

If withholding under FATCA is required on any payment related to our common stock, pre-funded warrants or common stock warrants, investors not otherwise subject to withholding (or that otherwise would be entitled to a reduced rate of withholding) on such payment may be required to seek a refund or credit from the IRS. An intergovernmental agreement between the United States and an applicable foreign country may modify the requirements described in this section. Non-U.S. holders should consult their own tax advisors regarding the possible implications of FATCA on their investment in our common stock, pre-funded warrants or common stock warrants and the entities through which they hold our common stock, pre-funded warrants or common stock warrants.

The preceding discussion of material U.S. federal tax considerations is for informational purposes only. It is not legal or 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 our common stock, pre-funded warrants or common stock warrants, including the consequences of any proposed changes in applicable laws.

PLAN OF DISTRIBUTION

In accordance with the terms of the Pre-Funded Warrants and the Common Stock Warrants to purchase the shares of our common stock we are offering in this offering, we will issue shares of common stock to the holders of such warrants upon due exercise of such warrants. No underwriter or other person has been engaged by us to facilitate the sale of the shares of common stock issuable upon exercise of the Warrants in this offering. We will receive all of the proceeds from any cash exercise of the Common Stock Warrants. All costs associated with this registration were borne by us.

The exercise price of the Pre-Funded Warrants is \$0.001 per share of common stock and the Pre-Funded Warrants are exercisable until exercised in full. The exercise price of the Common Stock Warrants is \$8.025 per share of common stock and the Common Stock Warrants are exercisable from the date of issuance until the date that is five years after the date of issuance. The exercise prices of the Warrants and the number of shares of our common stock issuable upon exercise of the Warrants are subject to appropriate adjustment in the event of certain stock dividends and distributions, stock splits, stock combinations, reclassifications or similar events affecting our common stock, as well as upon any distribution of assets, including cash, stock or other property, to our stockholders. The exercise prices of the Warrants will not be adjusted below the par value of our common stock.

The Pre-Funded Warrants are exercisable solely by means of a cashless exercise at the option of each holder, in whole or in part, by delivering to us a duly executed exercise notice, in which case the holder would receive upon such cashless exercise the net number of shares of our common stock determined according to the formula set forth in the form of Pre-Funded Warrant.

The Common Stock Warrants will be exercisable by means of a cash exercise at the option of each holder, in whole or in part, by delivering to us a duly executed exercise notice and the exercise price; provided that, if, at the time a holder exercises its Common Stock Warrants, a registration statement registering the issuance of the shares of common stock underlying the Common Stock 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 form of Common Stock Warrants.

We may not effect the exercise of any Pre-Funded Warrant, and a holder will not be entitled to exercise any portion of any Pre-Funded Warrant that, upon giving effect to or immediately prior to such exercise, would cause: (1) the aggregate number of shares of our common stock beneficially owned by such holder (together with its affiliates) to exceed 9.99% of the number of shares of our common stock outstanding immediately after giving effect to the exercise; or (2) the combined voting power of our securities beneficially owned by such holder (together with its affiliates) to exceed 9.99% of the combined voting power of all of our securities outstanding immediately after giving effect to the exercise, as such percentage ownership is determined in accordance with the terms of the Pre-Funded Warrants. However, any holder of a Pre-Funded Warrant may increase or decrease such percentage to any other percentage not in excess of 19.99% provided that any such increase will not be effective until the 61st day after notice from the holder is delivered to us.

We may not effect the exercise of any Common Stock Warrant, and a holder will not be entitled to exercise any portion of any Common Stock Warrant that, upon giving effect to or immediately prior to such exercise, would cause: (1) the aggregate number of shares of our common stock beneficially owned by such holder (together with its affiliates) to exceed 4.99% of the number of shares of our common stock outstanding immediately after giving effect to the exercise; or (2) the combined voting power of our securities beneficially owned by such holder (together with its affiliates) to exceed 4.99% of the combined voting power of all of our securities outstanding immediately after giving effect to the exercise, as such percentage ownership is determined in accordance with the terms of the Common Stock Warrants. However, any holder of a Common Stock Warrant may increase or decrease such percentage to any other percentage not in excess of 9.99% provided that any such increase will not be effective until the 61st day after notice from the holder is delivered to us.

No fractional shares of common stock will be issued upon the exercise of the Warrants. In lieu of fractional shares, we will pay the holder an amount in cash equal to the fractional amount multiplied by the last trade price of our common stock on the exercise date.

LEGAL MATTERS

The validity of the securities offered hereby will be passed upon for us by Wilmer Cutler Pickering Hale and Dorr LLP, Boston, Massachusetts.

EXPERTS

Ernst & Young, LLP, independent registered public accounting firm, has audited our consolidated financial statements included in our [Annual Report on Form 10-K for the year ended December 31, 2022](#), as set forth in their report, which is incorporated by reference in this prospectus and elsewhere in the registration statement. Our financial statements are incorporated by reference in reliance on Ernst & Young LLP's report, given on their authority as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We file annual, quarterly and current reports, proxy statements and other information with the SEC. Our SEC filings are available to the public over the Internet at the SEC's website at <http://www.sec.gov>. Copies of certain information filed by us with the SEC are also available on our website at www.astriatx.com. Our website is not a part of this prospectus and is not incorporated by reference in this prospectus.

This prospectus is part of a registration statement we filed with the SEC. This prospectus omits some information contained in the registration statement in accordance with SEC rules and regulations. You should review the information and exhibits in the registration statement for further information about us and our consolidated subsidiary and the securities we are offering. Statements in this prospectus concerning any document we filed as an exhibit to the registration statement or that we otherwise filed with the SEC are not intended to be comprehensive and are qualified by reference to these filings. You should review the complete document to evaluate these statements.

INCORPORATION BY REFERENCE

The SEC allows us to incorporate by reference much of the information we file with the SEC, which means that we can disclose important information to you by referring you to those publicly available documents. The information that we incorporate by reference in this prospectus is considered to be part of this prospectus. Because we are incorporating by reference future filings with the SEC, this prospectus is continually updated and those future filings may modify or supersede some of the information included or incorporated in this prospectus. This means that you must look at all of the SEC filings that we incorporate by reference to determine if any of the statements in this prospectus or in any document previously incorporated by reference have been modified or superseded. This prospectus incorporates by reference the documents listed below (File No. 001-37467) and any future filings we make with the SEC under Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act (in each case, other than those documents or the portions of those documents not deemed to be filed) between the date of the initial registration statement and the effectiveness of the registration statement and following the effectiveness of the registration statement until the offering of the securities under the registration statement is terminated or completed:

- [Annual Report on Form 10-K for the fiscal year ended December 31, 2022, filed with the SEC on March 22, 2023](#), including the information specifically incorporated by reference into the Annual Report on Form 10-K from our [Definitive Proxy Statement on Schedule 14A filed with the SEC on April 20, 2023](#);
- Quarterly Reports on Form 10-Q for the quarterly periods ended March 31, 2023 and June 30, 2023, filed with the SEC on [May 11, 2023](#), [August 7, 2023](#) and [November 11, 2023](#), respectively;
- Current Reports on Form 8-K filed with the SEC on [January 5, 2023](#) (other than Item 2.02, Item 7.01 and Item 9.01), [February 2, 2023](#), [March 31, 2023](#), [June 6, 2023](#), [October 11, 2023](#) (other than Item 7.01 and Exhibit 99.1), [October 12, 2023](#), and [October 12, 2023](#); and
- [The description of our common stock contained in our Registration Statement on Form 8-A filed with the SEC on June 23, 2015, including any amendments or reports filed for the purpose of updating such description.](#)

You may request a copy of these filings, at no cost, by writing or telephoning us at the following address or telephone number:

Astria Therapeutics, Inc.
75 State Street, Suite 1400
Boston, MA 02109
Attn: Investor Relations
(617) 349-1971

ASTRIA THERAPEUTICS, INC.

**1,571,093 Shares of Common Stock Underlying Previously
Issued Pre-Funded Warrants**

**7,368,738 Shares of Common Stock Underlying Previously Issued Common
Stock Warrants**

PROSPECTUS

, 2023

PART II
INFORMATION NOT REQUIRED IN PROSPECTUS

Item 14. Other Expenses of Issuance and Distribution.

Set forth below are estimates (except in the case of the SEC registration fee) of the amount of fees and expenses to be incurred in connection with the issuance and distribution of the offered securities, other than underwriting discounts and commissions.

SEC registration fee	\$55,075
FINRA filing fee	\$ (1)
Printing and engraving	\$ (1)
Accounting services	\$ (1)
Legal fees of registrant's counsel	\$ (1)
Miscellaneous	\$ (1)
Total	<u>\$ (1)</u>

- (1) These fees and expenses are calculated based on the securities offered and the number of issuances and accordingly are not estimated at this time and will be reflected in the applicable prospectus supplement.

Item 15. Indemnification of Directors and Officers.

Section 145 of the General Corporation Law of the State of Delaware ("DGCL") provides, generally, that a corporation shall have the power to 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 (except actions by or in the right of the corporation) by reason of the fact that such person is or was a director, officer, employee or agent of the corporation against all expenses, judgments, fines and amounts paid in settlement actually and reasonably incurred by such person in connection with such action, suit or proceeding if such person acted in good faith and in a manner such person reasonably believed to be in or not opposed to the best interests of the corporation and, with respect to any criminal action or proceeding, had no reasonable cause to believe his or her conduct was unlawful. A corporation may similarly indemnify such person for expenses actually and reasonably incurred by such person in connection with the defense or settlement of any action or suit by or in the right of the corporation, *provided* that such person acted in good faith and in a manner he or she reasonably believed to be in or not opposed to the best interests of the corporation, and, in the case of claims, issues and matters as to which such person shall have been adjudged liable to the corporation, *provided* that a court shall have determined, upon application, that, despite the adjudication of liability but in view of all of the circumstances of the case, such person is fairly and reasonably entitled to indemnity for such expenses which such court shall deem proper.

Section 102(b)(7) of the DGCL provides, generally, that our certificate of incorporation may contain a provision eliminating or limiting the personal liability of a director or officer to the corporation or its stockholders for monetary damages for breach of fiduciary duty as a director or officer, *provided* that such provision may not eliminate or limit the liability of (i) a director or officer for any breach of the director's or officer's duty of loyalty to the corporation or its stockholders, (ii) a director or officer for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, (iii) a director under section 174 of the DGCL, (iv) a director or officer for any transaction from which the director or officer derived an improper personal benefit or (v) an officer in any action by or in the right of the corporation. No such provision may eliminate or limit the liability of a director or officer for any act or omission occurring prior to the date when such provision became effective.

Our certificate of incorporation provides that no director shall be personally liable to us or our stockholders for monetary damages for any breach of fiduciary duty as a director, notwithstanding any provision of law imposing such liability, except to the extent that the DGCL prohibits the elimination or limitation of liability of directors for breaches of fiduciary duty. Our certificate of incorporation also provides that no officer shall be personally liable to our stockholders for monetary damages for any breach of

fiduciary duty as an officer, notwithstanding any provision of law imposing such liability, except to the extent that the DGCL prohibits the elimination or limitation of liability of officers for breaches of fiduciary duty. Our certificate of incorporation also provides that we will indemnify each person who was or is a party or threatened to be made a party to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative (other than an action by or in the right of us), by reason of the fact that he or she is or was, or has agreed to become, our director or officer, or is or was serving, or has agreed to serve, at our request as a director, officer, partner, employee or trustee of, or in a similar capacity with, another corporation, partnership, joint venture, trust or other enterprise (all such persons being referred to as an Indemnitee), or by reason of any action alleged to have been taken or omitted in such capacity, against all expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred in connection with such action, suit or proceeding and any appeal therefrom if such Indemnitee acted in good faith and in a manner he or she reasonably believed to be in, or not opposed to, our best interests, and, with respect to any criminal action or proceeding, he or she had no reasonable cause to believe his or her conduct was unlawful.

Our certificate of incorporation also provides that we will indemnify any Indemnitee who was or is a party to an action or suit by or in the right of us to procure a judgment in our favor by reason of the fact that the Indemnitee is or was, or has agreed to become, our director or officer, or is or was serving, or has agreed to serve, at our request as a director, officer, partner, employee or trustee or, in a similar capacity with, another corporation, partnership, joint venture, trust or other enterprise, or by reason of any action alleged to have been taken or omitted in such capacity, against all expenses (including attorneys' fees) and, to the extent permitted by law, amounts paid in settlement actually and reasonably incurred in connection with such action, suit or proceeding, and any appeal therefrom, if the Indemnitee acted in good faith and in a manner he or she reasonably believed to be in, or not opposed to, our best interests, except that no indemnification shall be made with respect to any claim, issue or matter as to which such person shall have been adjudged to be liable to us, unless a court determines that, despite such adjudication but in view of all of the circumstances, he or she is entitled to indemnification of such expenses. Notwithstanding the foregoing, to the extent that any Indemnitee has been successful, on the merits or otherwise, he or she will be indemnified by us against all expenses (including attorneys' fees) actually and reasonably incurred by him or her or on his or her behalf in connection therewith. If we do not assume the defense, expenses must be advanced to an Indemnitee under certain circumstances.

We have entered into indemnification agreements with our directors and executive officers. In general, these agreements provide that we will indemnify the director or executive officer to the fullest extent permitted by law for claims arising in his or her capacity as a director or officer of our company or in connection with their service at our request for another corporation or entity. The indemnification agreements also provide for procedures that will apply in the event that a director or executive officer makes a claim for indemnification and establish certain presumptions that are favorable to the director or executive officer.

We maintain a general liability insurance policy that covers certain liabilities of our directors and officers arising out of claims based on acts or omissions in their capacities as directors or officers.

In any underwriting agreement we enter into in connection with the sale of securities being registered hereby, the underwriters will agree to indemnify, under certain conditions, us, our directors and officers (as well as certain other persons) against certain liabilities arising in connection with such offering.

Insofar as the forgoing provisions permit indemnification of directors, executive officers, or persons controlling us for liability arising under the Securities Act of 1933, as amended, or the Securities Act, 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.

Item 16. Exhibits.

Exhibit No.	Description
1*	Form of Underwriting Agreement
4.1	Restated Certificate of Incorporation of the Registrant, as amended (incorporated by reference to Exhibit 3.2 to the Registrant's Current Report on Form 8-K (File No. 001-37467) filed with the SEC on June 6, 2023).
4.2	Amended and Restated Bylaws of the Registrant (incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K (File No. 001-37467) filed with the SEC on June 6, 2023).
4.3*	Form of Deposit Agreement
4.4*	Form of Warrant Agreement
4.5*	Form of Unit Agreement
4.6	Form of Pre-Funded Warrant (incorporated by reference to Exhibit 4.1 to the Registrant's Current Report on Form 8-K (File No. 001-37467) filed with the SEC on October 12, 2023).
4.7	Form of Common Stock Warrant (incorporated by reference to Exhibit 4.2 to the Registrant's Current Report on Form 8-K (File No. 001-37467) filed with the SEC on October 12, 2023).
5.1	Opinion of Wilmer Cutler Pickering Hale and Dorr LLP
23.1	Consent of Ernst & Young LLP, independent registered public accounting firm for the Registrant
23.2	Consent of Wilmer Cutler Pickering Hale and Dorr LLP (included in Exhibit 5.1)
24	Powers of Attorney (included in the signature pages to the Registration Statement)
107	Filing Fee Table

* To be filed by amendment or by a Current Report on Form 8-K.

Item 17. Undertakings

The undersigned Registrant hereby undertakes:

- (a)(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 (the "Securities Act");
 - (ii) to reflect in the prospectus any facts or events arising after the effective date of this 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 this 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 Commission pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than a 20 percent 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 this registration statement or any material change to such information in this registration statement;

provided, however, that paragraphs (a)(1)(i), (a)(1)(ii) and (a)(1)(iii) do not apply if the information required to be included in a post-effective amendment by those paragraphs is contained in reports filed with or furnished to the Commission by the Registrant pursuant to Section 13 or Section 15(d) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), that are incorporated by reference

- in this registration statement, or is contained in a form of prospectus filed pursuant to Rule 424(b) that is part of this registration statement.
- (2) That, for the purposes 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 the 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 to any purchaser:
 - (i) each prospectus filed by the Registrant pursuant to Rule 424(b)(3) shall be deemed to be part of the registration statement as of the date the filed prospectus was deemed part of and included in the registration statement; and
 - (ii) each prospectus required to be filed pursuant to Rule 424(b)(2), (b)(5), or (b)(7) as part of a registration statement in reliance on Rule 430B relating to an offering made pursuant to Rule 415(a)(1)(i), (vii) or (x) for the purpose of providing the information required by Section 10(a) of the Securities Act shall be deemed to be part of and included in the registration statement as of the earlier of the date such form of prospectus is first used after effectiveness or the date of the first contract of sale of securities in the offering described in the prospectus. As provided in Rule 430B, for liability purposes of the issuer and any person that is at that date an underwriter, such date shall be deemed to be a new effective date of the registration statement relating to the securities in the registration statement to which that prospectus relates, and the offering of such securities at that time shall be deemed to be the initial *bona fide* offering thereof; *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 effective date, 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 effective date.
 - (5) That, for the purpose of determining liability of the Registrant under the Securities Act 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:
 - (i) the information omitted from the form of prospectus filed as part of the registration statement in reliance upon Rule 430A and contained in the form of prospectus filed by the Registrant

pursuant to Rule 424(b)(1) or (4) or 497(h) under the Securities Act shall be deemed to be part of the registration statement as of the time it was declared effective; and

- (ii) each post-effective amendment that contains a form of prospectus shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial *bona fide* offering thereof.
- (b) The undersigned Registrant hereby undertakes 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 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 this 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.
- (c) 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 indemnification provisions described herein, or otherwise, the Registrant has been advised that in the opinion of the Commission 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.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, as amended, the Registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-3 and has duly caused this Registration Statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the city of Boston, Commonwealth of Massachusetts, on this 15th day of December 2023.

ASTRIA THERAPEUTICS, INC.By: /s/ JILL C. MILNE

Name: Jill C. Milne, Ph.D.

Title: *President and Chief Executive Officer***SIGNATURES AND POWER OF ATTORNEY**

We, the undersigned officers and directors of Astria Therapeutics, Inc. hereby severally constitute and appoint Jill C. Milne, Benjamin Harshbarger and Noah Clauser, and each of them singly, our true and lawful attorneys with full power to any of them, and to each of them singly, to sign for us and in our names in the capacities indicated below the Registration Statement on Form S-3 filed herewith and any and all amendments (including post-effective amendments) to said Registration Statement, and any registration statement filed pursuant to Rule 462 under the Securities Act of 1933, as amended, in connection with said Registration Statement, and to file or cause to be filed the same, with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, and generally to do all such things in our name and on our behalf in our capacities as officers and directors to enable Astria Therapeutics, Inc. to comply with the provisions of the Securities Act of 1933, as amended, and all requirements of the Securities and Exchange Commission, hereby ratifying and confirming all that said attorneys, and each of them, or their substitute or substitutes, shall do or cause to be done by virtue hereof.

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

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ JILL C. MILNE</u> Jill C. Milne	President and Chief Executive Officer and Director (Principal Executive Officer)	December 15, 2023
<u>/s/ NOAH CLAUSER</u> Noah Clauser	Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	December 15, 2023
<u>/s/ KENNETH BATE</u> Kenneth Bate	Chairman	December 15, 2023
<u>/s/ JOANNE BECK</u> Joanne Beck	Director	December 15, 2023
<u>/s/ FREDERICK P. CALLORI</u> Frederick P. Callori	Director	December 15, 2023
<u>/s/ HUGH COLE</u> Hugh Cole	Director	December 15, 2023

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ MICHAEL KISHBAUCH</u> Michael Kishbauch	Director	December 15, 2023
<u>/s/ GREGG LAPOINTE</u> Gregg Lapointe	Director	December 15, 2023
<u>/s/ JONATHAN VIOLIN</u> Jonathan Violin	Director	December 15, 2023

WILMERHALE

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December 15, 2023

Astria Therapeutics, Inc.
 75 State Street
 Suite 1400
 Boston, Massachusetts 02109

Re: Registration Statement on Form S-3

Ladies and Gentlemen:

This opinion is furnished to you in connection with a Registration Statement on Form S-3 (the "Registration Statement") to be filed by Astria Therapeutics, Inc., a Delaware corporation (the "Company"), with the Securities and Exchange Commission (the "Commission") under the Securities Act of 1933, as amended (the "Securities Act"), for the registration of the following securities of the Company (the "Securities"):

- i. common stock, par value \$0.001 per share (the "Common Stock");
- ii. preferred stock, par value \$0.001 per share (the "Preferred Stock");
- iii. depositary shares representing an interest in a fractional share or multiple shares of Preferred Stock (the "Depositary Shares");
- iv. units consisting of any combination of Common Stock, Preferred Stock, Depositary Shares or Warrants (as defined below) (the "Units"); and
- v. warrants to purchase Common Stock, Preferred Stock or Depositary Shares (the "Warrants"),

all of which may be issued from time to time on a delayed or continuous basis pursuant to Rule 415 under the Securities Act at an aggregate offering price not to exceed \$500,000,000, as set forth in the Registration Statement, the base prospectus contained therein (the "Prospectus") and any amendments or supplements thereto.

We are also acting as counsel for the Company in connection with the warrant share prospectus included in the Registration Statement (the "Warrant Share Prospectus") relating to the issuance of up to 8,939,831 shares of Common Stock (the "Warrant Shares") to be issued by the Company upon the exercise of certain outstanding warrants (the "Outstanding Warrants") previously offered and sold by the Company under an underwriting agreement, dated October 11, 2023, between the Company and Jefferies LLC and Evercore Group L.L.C. as representatives of the several underwriters named therein (the "Underwriting Agreement").

We are acting as counsel for the Company in connection with the filing of the Registration Statement. The preferences, limitations and relative rights of shares of any series of Preferred Stock will be set forth in a certificate of designation (a "Certificate of Designation") with respect thereto. The shares of Preferred Stock represented by Depositary Shares will be deposited pursuant to a depositary agreement (the "Depositary Agreement") between the Company and a bank or trust company as depositary, and the preferences, limitations and relative rights of such shares of Preferred Stock will be set forth in a Certificate of Designation with respect thereto. The Units may be issued pursuant to a unit agreement (the "Unit Agreement") between the Company and a bank or trust company as unit agent. The Warrants may be issued pursuant to a warrant agreement (the "Warrant Agreement") between the Company and a bank or trust company as warrant agent.

Wilmer Cutler Pickering Hale and Dorr LLP, 60 State Street, Boston, Massachusetts 02109

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We have examined and relied upon signed copies of the Registration Statement to be filed with the Commission, including the exhibits thereto. We have also examined and relied upon the Underwriting Agreement, the Outstanding Warrants, the Restated Certificate of Incorporation of the Company (as amended or restated from time to time, the "Certificate of Incorporation"), the Amended and Restated Bylaws of the Company (as amended or restated from time to time, the "Bylaws") and minutes of meetings and consents of the stockholders and the board of directors of the Company including duly authorized committees thereof as provided to us by the Company, and such other documents as we have deemed necessary for purposes of rendering the opinions set forth hereinafter.

In our examination of the foregoing documents, we have assumed the genuineness of all signatures, the authenticity of all documents submitted to us as originals, the conformity to original documents of all documents submitted to us as copies, the authenticity of the originals of such latter documents and the legal capacity of all signatories to such documents.

We have relied as to certain matters on information obtained from public officials and officers of the Company, and we have assumed that (i) other than for the Warrant Shares, one or more prospectus supplements will have been prepared and filed with the Commission describing the Securities offered thereby; (ii) all Securities will be issued and sold in compliance with applicable federal and state securities laws and in the manner stated in the Registration Statement, the Prospectus, the Warrant Share Prospectus with respect to the Warrant Shares, and any applicable prospectus supplement; (iii) other than for the Warrant Shares, a definitive purchase, underwriting or similar agreement with respect to any Securities offered will be duly authorized, executed and delivered by all parties thereto other than the Company; (iv) any Securities issuable upon conversion, exchange or exercise of any Security being offered will be duly authorized, created and, if appropriate, reserved for issuance upon such conversion, exchange or exercise; (v) with respect to shares of Common Stock or Preferred Stock offered, there will be sufficient shares of Common Stock or Preferred Stock authorized under the Certificate of Incorporation and not otherwise reserved for issuance; and (vi) the Company will be validly existing as a corporation and in good standing under the laws of the State of Delaware.

We are expressing no opinion herein as to the application of any federal or state law or regulation to the power, authority or competence of any party to any agreement with respect to any of the Securities other than the Company. We have assumed that such agreements are, or will be, the valid and binding obligations of each party thereto other than the Company, and enforceable against each such other party in accordance with their respective terms.

We have assumed for purposes of our opinions below that no authorization, approval or other action by, and no notice to or filing with, any governmental authority or regulatory body or any other third party is required for the due execution, delivery or performance by the Company, or, if any such authorization, approval, consent, action, notice or filing is required, it will have been duly obtained, taken, given or made and will be in full force and effect. We have also assumed that the execution and delivery by the Company of the Depositary Agreement, the Unit Agreement and the Warrant Agreement and the Securities and the performance by the Company of its obligations thereunder do not and will not violate, conflict with or constitute a default under (i) any agreement or instrument to which the Company or any of its properties is then subject, (ii) any law, rule, or regulation to which the Company or any of its properties is then subject or (iii) any judicial or regulatory order or decree of any governmental authority.

We have also assumed that there will not have occurred, prior to the date of issuance of the Securities, any change in law affecting the validity or enforceability of such Securities and that at the time of the issuance and sale of the Securities, the board of directors of the Company (or any committee thereof acting pursuant to authority properly delegated to such committee by the board of directors of the Company) shall not have taken any action to rescind or otherwise reduce its prior authorization of the issuance of the Securities.

Our opinions below are qualified to the extent that they may be subject to or affected by (i) applicable bankruptcy, insolvency, reorganization, receivership, moratorium, usury, fraudulent conveyance, fraudulent transfer or similar laws relating to or affecting the rights or remedies of creditors generally, (ii) duties and standards imposed on creditors and parties to contracts, including, without limitation, requirements of materiality, good faith, reasonableness and fair dealing and (iii) general equitable principles. Furthermore, we express no opinion as to the availability of any equitable or specific remedy upon any breach of any of the agreements as to which we are opining herein, or any of the agreements, documents or obligations referred to therein, or to the successful assertion of any equitable defenses, inasmuch as the availability of such remedies or the success of any equitable defenses may be subject to the discretion of a court. We express no opinion herein as to the laws of any state or jurisdiction other than the state laws of the State of New York and the General Corporation Law of the State of Delaware. We also express no opinion herein with respect to compliance by the Company with the securities or "blue sky" laws of any state or other jurisdiction of the United States or of any foreign jurisdiction. In addition, we express no opinion and make no statement herein with respect to the antifraud laws of any jurisdiction.

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We also express no opinion herein as to any provision of any agreement (i) that may be deemed to or construed to waive any right, defense or counterclaim of the Company, (ii) to the effect that rights and remedies are not exclusive, that every right or remedy is cumulative and may be exercised in addition to or with any other right or remedy and does not preclude recourse to one or more other rights or remedies, (iii) relating to the effect of invalidity or unenforceability of any provision of any agreement on the validity or enforceability of any other provision thereof, (iv) that is in violation of public policy, (v) relating to indemnification and contribution with respect to securities law matters, (vi) which provides that the terms of any agreement may not be waived or modified except in writing, (vii) purporting to indemnify any person against his, her or its own negligence or intentional misconduct, (viii) requiring the payment of penalties, consequential damages or liquidated damages or (ix) relating to choice of law or consent to jurisdiction.

Based upon and subject to the foregoing, we are of the opinion that:

1. With respect to the Common Stock (other than the Warrant Shares), when (i) specifically authorized for issuance by proper action of the Company's board of directors or an authorized committee thereof ("Authorizing Resolutions"), (ii) the terms of the issuance and sale of the Common Stock have been duly established in conformity with the Certificate of Incorporation and Bylaws, (iii) the shares of Common Stock have been issued and delivered in accordance with the applicable underwriting or other purchase agreement against payment therefor, and (iv) the Company has received the consideration provided for in the Authorizing Resolutions and the applicable underwriting agreement or other purchase agreement and such consideration per share is not less than the par value per share of the Common Stock, the Common Stock will be validly issued, fully paid and non-assessable.
2. With respect to shares of any series of Preferred Stock, when (i) Authorizing Resolutions have specifically authorized the issuance and terms of the shares of the series, the terms of the offering thereof and related matters, including resolutions establishing and designating the series and fixing and determining the preferences, limitations and relative rights thereof and the filing of a Certificate of Designation with respect to the series with the Secretary of State of the State of Delaware, and such Certificate of Designation has been duly filed, (ii) the terms of the issuance and sale of the series of Preferred Stock have been duly established in conformity with the Certificate of Incorporation and Bylaws, (iii) the shares of the series of Preferred Stock have been issued and delivered in accordance with the applicable underwriting or other purchase agreement against payment therefor, and (iv) the Company has received the consideration provided for in the Authorizing Resolutions and the applicable underwriting agreement or other purchase agreement and such consideration per share is not less than the par value per share of the Preferred Stock, the shares of such series of Preferred Stock will be validly issued, fully paid and non-assessable.
3. With respect to the Depositary Shares, when (i) the Authorizing Resolutions have specifically authorized the issuance and terms of the Depositary Shares, the terms of the offering thereof and related matters, including the adoption of a Certificate of Designation relating to the Preferred Stock underlying the Depositary Shares and the filing of the Certificate of Designation with the Secretary of State of the State of Delaware, and such Certificate of Designation has been duly filed, (ii) the applicable Depositary Agreement relating to the Depositary Shares has been duly authorized, executed and delivered; any depositary receipts evidencing rights in the Depositary Shares have been executed; and the depositary appointed by the Company, (iii) the terms of the issuance and sale of the Depositary Shares have been duly established in conformity with the Certificate of Incorporation and Bylaws, (iv) the Depositary Shares have been issued and sold as contemplated by the Registration Statement, the Prospectus and the applicable prospectus supplement, (v) the shares of Preferred Stock underlying the Depositary Shares have been deposited with a bank or trust company (which meets the requirements for the depositary set forth in the Registration Statement), and (vi) the Company has received the consideration provided for in the Authorizing Resolutions and the applicable underwriting agreement or other purchase agreement, the Depositary Shares will be legally issued and will entitle the holders of such Depositary Shares to the rights specified in the applicable Depositary Agreement and the applicable depositary receipts.

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4. With respect to the Units, when (i) specifically authorized for issuance by Authorizing Resolutions, (ii) the applicable Unit Agreement has been duly authorized, executed and delivered, (iii) the terms of the Units and of their issuance and sale have been duly established in conformity with the applicable Unit Agreement and the Authorizing Resolutions, (iv) the Units have been duly executed and delivered in accordance with the applicable Unit Agreement and issued and delivered in accordance with the applicable underwriting or other purchase agreement against payment therefor, and (v) the Company has received the consideration provided for in the Authorizing Resolutions and the applicable underwriting agreement or other purchase agreement, such Units will constitute valid and binding obligations of the Company enforceable against the Company in accordance with their terms.
5. With respect to the Warrants, when (i) specifically authorized for issuance by Authorizing Resolutions, (ii) the applicable Warrant Agreement relating to the Warrants has been duly authorized, executed and delivered, (iii) the terms of the Warrants and of their issuance and sale have been duly established in conformity with the applicable Warrant Agreement and the Authorizing Resolutions, (iv) the Warrants have been duly executed and countersigned in accordance with the applicable Warrant Agreement and issued and delivered in accordance with the applicable underwriting or other purchase agreement against payment therefor, and (v) the Company has received the consideration provided for in the Authorizing Resolutions and the applicable underwriting agreement or other purchase agreement, such Warrants will constitute valid and binding obligations of the Company enforceable against the Company in accordance with their terms.
6. With respect to the Warrant Shares, such Warrant Shares have been duly authorized for issuance and when (i) the Registration Statement has become effective under the Securities Act and (ii) the Warrant Shares have been issued and paid for in accordance with the terms and conditions of the Outstanding Warrants, the Warrant Shares will be validly issued, fully paid and nonassessable.

Please note that we are opining only as to the matters expressly set forth herein, and no opinion should be inferred as to any other matters. This opinion is based upon currently existing statutes, rules, regulations and judicial decisions, and we disclaim any obligation to advise you of any change in any of these sources of law or subsequent legal or factual developments which might affect any matters or opinions set forth herein.

We hereby consent to the filing of this opinion with the Commission as an exhibit to the Registration Statement in accordance with the requirements of Item 601(b) (5) of Regulation S-K under the Securities Act and to the use of our name therein and in the related Prospectus, the Warrant Share Prospectus and in any prospectus supplement under the caption "Legal Matters." In giving such consent, we do not hereby 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.

Very truly yours,

/s/ WILMER CUTLER PICKERING HALE AND DORR LLP
WILMER CUTLER PICKERING HALE AND DORR LLP

Wilmer Cutler Pickering Hale and Dorr LLP, 60 State Street, Boston, Massachusetts 02109

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Consent of Independent Registered Public Accounting Firm

We consent to the reference to our firm under the caption “Experts” in the Registration Statement (Form S-3) and related Prospectus of Astria Therapeutics, Inc. for the registration of common stock, preferred stock, depositary shares, units and warrants of Astria Therapeutics, Inc. and to the incorporation by reference therein of our report dated March 22, 2023, with respect to the consolidated financial statements of Astria Therapeutics, Inc. included in its Annual Report (Form 10-K) for the year ended December 31, 2022, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

Boston, Massachusetts
December 15, 2023

Calculation of Filing Fee Tables

Form S-3
(Form Type)Astria Therapeutics, Inc.
(Exact Name of Registrant as Specified in its Charter)

Table 1: Newly Registered and Carry Forward Securities

	Security Type	Security Class Title	Fee Calculation or Carry Forward Rule	Amount Registered	Proposed Maximum Offering Price Per Unit	Maximum Aggregate Offering Price	Fee Rate	Amount of Registration Fee	Carry Forward Form Type	Carry Forward File Number	Carry Forward Initial Effective Date	Filing Fee Previously Paid In Connection with Unsold Securities to be Carried Forward
Newly Registered Securities												
Fees to Be Paid	Equity	Common Stock, par value \$0.001 per share	(1)	(1)	(1)	(1)	(1)	(1)	-	-	-	-
Fees to Be Paid	Equity	Preferred Stock, par value \$0.001 per share	(1)	(1)	(1)	(1)	(1)	(1)	-	-	-	-
Fees to Be Paid	Other	Depository Shares (2)	(1)	(1)	(1)	(1)	(1)	(1)	-	-	-	-
Fees to Be Paid	Other	Units (3)	(1)	(1)	(1)	(1)	(1)	(1)	-	-	-	-
Fees to Be Paid	Other	Warrants (4)	(1)	(1)	(1)	(1)	(1)	(1)	-	-	-	-
Fees to be Paid	Unallocated (Universal) Shelf	Unallocated (Universal) Shelf	457(o)	(1)	(1)	\$373,132,524	\$147.60 per \$1,000,000	\$55,075	-	-	-	-
Fees Previously Paid	-	-	-	-	-	-	-	-	-	-	-	-
Carry Forward Securities												
Carry Forward Securities	Equity	Common Stock, par value \$0.001 per share	415(a)(6)	8,939,831 (5)	(6)	\$59,134,123 (7)	-	-	S-3	333-271848	May 23, 2023	\$6,517
Carry Forward Securities	Unallocated Shelf	Unallocated (Universal) Shelf	415(a)(6)	(1)	(1)	\$126,867,476 (7)	-	-	S-3	333-271848	May 23, 2023	\$13,981
		Total Offering Amounts				\$559,134,123 (7)		\$55,075				
		Total Fees Previously Paid						-				
		Total Fee Offsets						-				
		Net Fee Due						\$55,075				

(1) Pursuant to Instruction 2.A(iii)(b) of Item 16(b) of Form S-3, this information is not required to be included. An indeterminate amount of the securities of each identified class is being registered as may from time to time be offered under this registration statement at indeterminate prices, along with an indeterminate number of securities that may be issued upon exercise, settlement, exchange or conversion of securities offered or sold under this registration statement, as shall have an aggregate initial offering price up to \$500,000,000. Pursuant to Rule 416 under the Securities Act of 1933, as amended, or the Securities Act, this registration statement also covers any additional securities that may be offered or issued in connection with any stock split, stock dividend or pursuant to anti-dilution provisions of any of the securities. Separate consideration may or may not be received for securities that are issuable upon conversion, exercise or exchange of other securities. In addition, the total amount to be registered and the proposed maximum offering price are estimated solely for the purpose of calculating the registration fee pursuant to Rule 457(o) under the Securities Act.

(2) Each depositary share will be issued under a deposit agreement, will represent an interest in a fractional share or multiple shares of preferred stock and will be evidenced by a depositary receipt.

(3) Units may be issued under a unit agreement and will represent an interest in one or more securities registered under this registration statement including shares of common stock, preferred stock or warrants, in any combination, which may or may not be separable from one another.

(4) The warrants covered by this registration statement may be warrants for common stock, preferred stock, or depository shares issued by any registrant.

(5) Pursuant to Rule 416 under the Securities Act, this registration statement also covers any additional securities that may be offered or issued in connection with any stock split, stock dividend or pursuant to anti-dilution provisions of any of these securities. Separate consideration may or may not be received for securities that are issuable upon conversion, exercise or exchange of other securities.

(6) The exercise price per share of the Common Stock Warrants is \$8.025. The exercise per share of the Pre-Funded Warrants is \$0.001 per share and the Pre-

Funded Warrants are exercisable only by means of a cashless exercise.

- (7) The \$559,134,123 of securities registered pursuant to this registration statement includes \$186,001,599 of securities (the “Unsold Securities”) registered pursuant to the Registration Statement on Form S-3 (No. 333-271848), which became effective on May 23, 2023 (the “Prior Registration Statement”), including 7,368,738 shares of common stock that may be issued and sold upon the exercise of certain outstanding common stock warrants (the “Common Stock Warrants”) for an aggregate exercise price of up to \$59,134,123 and up to 1,571,093 shares of common stock that may be issued upon cashless exercise of certain outstanding pre-funded warrants (the “Pre-Funded Warrants”). Pursuant to Rule 415(a)(6) under the Securities Act, the filing fees previously paid in connection with the Unsold Securities will continue to be applied to the Unsold Securities. To the extent that, after the filing date hereof and prior to the effectiveness of this registration statement, the registrant sells any Unsold Securities pursuant to the Prior Registration Statement, the registrant will identify in a pre-effective amendment to this registration statement the updated amount of Unsold Securities from the Prior Registration Statement to be included in this registration statement pursuant to Rule 415(a)(6) and the updated amount of new securities to be registered on this registration statement. Pursuant to Rule 415(a)(6), the offering of securities under the Prior Registration Statement will be deemed terminated as of the date of effectiveness of this registration statement.
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