

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

**FORM S-3
REGISTRATION STATEMENT**
*UNDER
THE SECURITIES ACT OF 1933*

MOLECULAR TEMPLATES, INC.
(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of
incorporation)

94-3409596
(IRS Employer
Identification No.)

9301 Amberglen Blvd
Suite 100
Austin, TX 78729
(512) 869-1555

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

Eric E. Poma, Ph.D.
Chief Executive Officer and Chief Scientific Officer
Molecular Templates, Inc.
9301 Amberglen Blvd, Suite 100
Austin, Texas 78729
(512) 869-1555

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

With copies to:

William C. Hicks, Esq.
Matthew J. Gardella, Esq.
Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.
One Financial Center
Boston, Massachusetts 02111
(617) 542-6000

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

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, a smaller reporting company, or an emerging growth company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company" and "emerging growth company" in Rule 12b-2 of the Exchange Act.

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

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

THE REGISTRANT HEREBY AMENDS THIS REGISTRATION STATEMENT ON SUCH DATE OR DATES AS MAY BE NECESSARY TO DELAY ITS EFFECTIVE DATE UNTIL THE REGISTRANT SHALL FILE A FURTHER AMENDMENT WHICH SPECIFICALLY STATES THAT THIS REGISTRATION STATEMENT SHALL THEREAFTER BECOME EFFECTIVE IN ACCORDANCE WITH SECTION 8(a) OF THE SECURITIES ACT OF 1933, AS AMENDED, OR UNTIL THE REGISTRATION STATEMENT SHALL BECOME EFFECTIVE ON SUCH DATE AS THE SECURITIES AND EXCHANGE COMMISSION, ACTING PURSUANT TO SAID SECTION 8(a), MAY DETERMINE.

The information in this prospectus is not complete and may be changed without notice. The selling stockholders 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 it is not soliciting an offer to buy these securities in any state where the offer or sale is not permitted.

SUBJECT TO COMPLETION, DATED AUGUST 10, 2023

PROSPECTUS



42,592,191 Shares of Common Stock Offered by the Selling Stockholders

The selling stockholders of Molecular Templates, Inc. (“Molecular,” “we,” “us” or the “Company”) identified in this prospectus, including their pledgees, donees, transferees, assigns or other successors in interest (“selling stockholders”), may, from time to time, offer and resell under this prospectus up to 42,592,191 shares (“Shares”) of common stock, par value \$0.001 per share, of the Company (the “Common Stock”), which consist of (i) 24,260,644 shares of Common Stock held by the selling stockholders and (ii) 18,331,547 shares of Common Stock issuable upon the exercise of pre-funded warrants (the “Pre-Funded Warrants”) to purchase shares of Common Stock held by certain selling stockholders. We will not receive any proceeds from the sale of the Shares offered by this prospectus, except the exercise price of \$0.001 per share of the Pre-Funded Warrants exercised for cash.

Our registration of the Shares covered by this prospectus does not mean that the selling stockholders will offer or sell any of the Shares. The selling stockholders may sell any, all or none of the Shares offered by this prospectus and we do not know when or in what amount the selling stockholders may sell their Shares hereunder following the effective date of this registration statement. The timing and amount of any sale are within the sole discretion of the selling stockholders.

The selling stockholders may sell the Shares through public or private transactions at market prices prevailing at the time of sale or at negotiated prices. For further information regarding the possible methods by which the Shares may be distributed, see “Plan of Distribution” beginning on page 15 in this prospectus.

Our Common Stock is listed on The Nasdaq Capital Market under the symbol “MTEM”. On August 4, 2023, the last reported sale price for our Common Stock was \$0.58 per share.

Investing in our Common Stock involves a high degree of risk. Please consider carefully the risks described in this prospectus under “[Risk Factors](#)” beginning on page 6 of this prospectus and in our filings with the Securities and Exchange Commission.

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

This prospectus is dated _____, 2023

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ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement on Form S-3 that we have filed with the Securities and Exchange Commission (the “SEC”) pursuant to which the selling stockholders named herein may, from time to time, offer and sell or otherwise dispose of the Shares covered by this prospectus. You should not assume that the information contained in this prospectus is accurate on any date subsequent to the date set forth on the front cover of this prospectus or that any information we have incorporated by reference is correct on any date subsequent to the date of the document incorporated by reference, even though this prospectus is delivered or Shares are sold or otherwise disposed of on a later date.

This prospectus does not contain all of the information included in the registration statement. For a more complete understanding of the offering of the Shares, you should refer to the registration statement including the exhibits. Copies of some of the documents referred to herein have been filed, will be filed or will be incorporated by reference as exhibits to the registration statement of which this prospectus is a part, and you may obtain copies of those documents as described below under the heading “Where You Can Find More Information.” We further note that the representations, warranties and covenants made by us in any agreement that is filed as an exhibit to any document that is incorporated by reference in the accompanying prospectus 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. It is important for you to read and consider all information contained in this prospectus, including the documents incorporated by reference therein, in making your investment decision. You should also read and consider the information in the documents to which we have referred you under “Where You Can Find More Information” and “Incorporation of Certain Documents by Reference” in this prospectus.

We and the selling stockholders have not authorized anyone to give any information or to make any representation to you other than those contained or incorporated by reference in this prospectus. You must not rely upon any information or representation not contained or incorporated by reference in this prospectus. This prospectus does not constitute an offer to sell or the solicitation of an offer to buy any of our shares of Common Stock other than the Shares covered hereby, nor does this prospectus constitute an offer to sell or the solicitation of an offer to buy any securities in any jurisdiction to any person to whom it is unlawful to make such offer or solicitation in such jurisdiction. Persons who come into possession of this prospectus in jurisdictions outside the United States are required to inform themselves about, and to observe, any restrictions as to the offering and the distribution of this prospectus applicable to those jurisdictions.

This prospectus, including the documents incorporated by reference herein, include statements that are based on various assumptions and estimates that are subject to numerous known and unknown risks and uncertainties. Some of these risks and uncertainties are described in the section entitled “Risk Factors” beginning on page 6 of this prospectus and as described in Part II, Item 1A (Risk Factors) of our most recent Quarterly Report on Form 10-Q for the quarter ended June 30, 2023 filed with the SEC on August 10, 2023, as updated by our subsequent filings with the SEC under the Securities Exchange Act of 1934, as amended (the “Exchange Act”). These and other important factors could cause our future results to be materially different from the results expected as a result of, or implied by, these assumptions and estimates. You should read the information contained in, or incorporated by reference into, this prospectus completely and with the understanding that future results may be materially different from and worse than what we expect. See the information included under the heading “Special Note Regarding Forward-Looking Statements.”

In this prospectus, references to “Molecular,” “Molecular Templates,” the “Company,” “we,” “us,” and “our” refer to Molecular Templates, Inc. and its subsidiaries. The phrase “this prospectus” refers to this prospectus and any applicable prospectus supplement, unless the context requires otherwise.

PROSPECTUS SUMMARY

The following is a summary of what we believe to be the most important aspects of our business and the offering of our securities under this prospectus. We urge you to read this entire prospectus, including the more detailed consolidated financial statements, notes to the consolidated financial statements and other information incorporated by reference from our other filings with the SEC. Investing in our securities involves risks. Therefore, carefully consider the risk factors set forth in this prospectus and in our most recent annual and quarterly filings with the SEC, as well as other information in this prospectus and the documents incorporated by reference herein.

About Molecular Templates, Inc.

Molecular Templates, Inc. is a clinical-stage biopharmaceutical company focused on the discovery and development of targeted biologic therapeutics. Our proprietary drug platform technology, known as engineered toxin bodies, leverages the resident biology of a genetically engineered form of Shiga-like Toxin A subunit to create novel therapies with potent and differentiated mechanisms of action for cancer.

To date, we have not generated revenue from therapeutic sales and do not expect to generate significant revenue from the sale of our therapeutics in development in the foreseeable future. If our development efforts for our therapeutic candidates are successful and result in regulatory approval, we may generate revenue in the future from these sales. We cannot predict if, when, or to what extent we will generate revenue from the commercialization and sale of our therapeutic candidates. We may never succeed in obtaining regulatory approval for any of our therapeutic candidates.

July 2023 Private Placement

On July 12, 2023, the Company entered into a securities purchase agreement (the “Securities Purchase Agreement”) with certain institutional and accredited investors (the “Purchasers”) which provides for the private placement (the “Private Placement”) of shares of Common Stock and warrants to purchase shares of Common Stock in two tranches, as described below.

The closing of the initial tranche occurred on July 17, 2023 and consisted of the issuance of (i) 24,260,644 shares of Common Stock held by the selling stockholders and at a price of \$0.47 per share and (ii) Pre-Funded Warrants exercisable for up to 18,331,547 shares of Common Stock. The price of the Pre-Funded Warrants was \$0.469 per underlying share of Common Stock. The Company received approximately \$20 million in gross proceeds in connection with the closing of the initial tranche and net proceeds, following the payment of related offering expenses, of approximately \$18.7 million.

The second tranche would consist of the sale of an additional 42.6 million shares of Common Stock (or additional pre-funded warrants in lieu thereof) on the same pricing terms as the initial tranche, which would represent further gross proceeds of approximately \$20 million, and would close if the following conditions were met: within a 12 month measurement period (or such longer period as approved by Purchasers who purchased a majority of the securities purchased in the initial tranche), shares of Common Stock trade at a 10-day volume weighted average price of at least \$1.41 per share with aggregate trading volume during the same 10-day period of at least 10 million shares, and certain other customary closing conditions, including the absence of a material adverse event as described in the Securities Purchase Agreement, are satisfied. This second tranche is a mandatory funding commitment of the investors subject to the foregoing conditions. The 12 month measurement period commences on the later of the filing of an amendment to the Company’s certificate of incorporation to implement a reverse stock split of shares of Common Stock currently outstanding, without making a reduction in the number of shares of Common Stock authorized, following stockholder approval, and the effectiveness of the registration statement of which this prospectus forms a part.

In addition, upon the second tranche closing, the Company would be required to issue to the investors common stock warrants representing the right to purchase an additional 85.2 million shares of Common Stock at an exercise price of \$0.47 per share (the “Warrants”), in exchange for the payment of \$0.125 per share of Common Stock underlying the Warrants. In the aggregate, these Warrants would represent 100% warrant coverage of the number of shares of Common Stock (or pre-funded warrants) sold in the initial tranche and to be sold in the second tranche closing. These Warrants would have a term of five years.

Under the terms of the Pre-Funded Warrants and the Warrants, a selling stockholder may not exercise the Pre-Funded Warrants or Warrants to the extent such exercise would cause such selling stockholder, together with its affiliates, to beneficially own a number of shares of Common Stock that would exceed 4.99% or 9.99%, as applicable, of our then outstanding shares of Common Stock following such exercise, excluding for purposes of such determination shares of Common Stock issuable upon exercise of the Pre-Funded Warrants or Warrants which have not been exercised (the “Beneficial Ownership Limitation”); provided, however, that each selling stockholder may increase or decrease the Beneficial Ownership Limitation by giving 61 days’ notice to us, but not to any percentage in excess of 19.99%.

Pursuant to the Securities Purchase Agreement, the Company granted to the Purchasers certain registration rights, pursuant to which, among other things, the Company agreed to (i) file with the SEC a registration statement on Form S-3 after each of the initial tranche and the second tranche to register for resale the shares of Common Stock issued (and the shares issuable upon exercise of any pre-funded warrants or Warrants issued) in the applicable closing, within 30 calendar days following each closing, and (ii) use its commercially reasonable efforts to have each registration statement declared effective as soon as practicable, and in any event no later than 90 days following the applicable closing date (or 120 days following the applicable closing date if the applicable registration statement is reviewed by the SEC).

The registration statement of which this prospectus is a part relates to the offer and resale of the shares of Common Stock issued to the Purchasers pursuant to the Securities Purchase Agreement in the closing of the initial tranche that occurred on July 17, 2023, including the shares issuable upon exercise of the Pre-Funded Warrants. When we refer to the selling stockholders in this prospectus, we are referring to the Purchasers named in this prospectus as the selling stockholders and, as applicable, any donee, pledgees, assignees, transferees or other successors-in-interest selling the shares of Common Stock received after the date of this prospectus from the selling stockholders as a gift, pledge, or other non-sale related transfer.

The securities issued in the Private Placement were issued and offered pursuant to the exemption from registration provided in Section 4(a)(2) of the Securities Act and Rule 506(b) promulgated thereunder.

Corporate History and Information

We were incorporated in Delaware on October 17, 2001. On August 1, 2017, we completed our business combination with Molecular Templates OpCo, Inc., or what was then known as “Molecular Templates, Inc.” (“Private Molecular”; formerly D5 Pharma Inc., a Delaware corporation incorporated on February 19, 2009), in accordance with the terms of an Agreement and Plan of Merger and Reorganization, dated as of March 16, 2017, by and among us (formerly known as Threshold Pharmaceuticals, Inc.) (Nasdaq: THLD), Trojan Merger Sub, Inc. (“Merger Sub”), our wholly owned subsidiary, and Private Molecular, pursuant to which Merger Sub merged with and into Private Molecular, with Private Molecular surviving as our wholly owned subsidiary, now “Molecular Templates OpCo, Inc.” (the “Merger”). Upon the consummation of the Merger, we changed our name to “Molecular Templates, Inc.”

Molecular and Molecular Templates OpCo, Inc. each have a principal executive office at 9301 Amberglen Boulevard, Suite 100, Austin, Texas 78729 and telephone number (512) 869-1555. Our website address is

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www.mtem.com. The information contained in, or accessible through, our website does not constitute a part of this prospectus. You should not rely on our website or any such information in making your decision whether to purchase our Common Stock.

THE OFFERING

This prospectus relates to the resale from time to time by the selling stockholders identified herein of up to 42,592,191 shares of our Common Stock. We are not offering any shares for sale under the registration statement of which this prospectus is a part.

Shares of Common Stock that may be offered by the selling stockholders:	Up to 42,592,191 shares of Common Stock, which consist of (i) 24,260,644 shares of Common Stock held by the selling stockholders and (ii) 18,331,547 shares of Common Stock issuable upon the exercise of Pre-Funded Warrants to purchase shares of Common Stock held by certain selling stockholders.
Use of proceeds:	We will not receive any proceeds from the sale of the Shares covered by this prospectus, except with respect to amounts received by us due to the exercise of Pre-Funded Warrants.
Offering price:	The selling stockholders may sell all or a portion of their Shares through public or private transactions at prevailing market prices or at privately negotiated prices.
Risk factors:	Investing in our securities involves a high degree of risk and purchasers may lose their entire investment. See the disclosure under the heading "Risk Factors" on page 6 of this prospectus.
Nasdaq Capital Market symbol:	MTEM

RISK FACTORS

Investing in our Common Stock involves a high degree of risk. You should carefully consider the risks and uncertainties and all other information, documents or reports included or incorporated by reference in this prospectus and, if applicable, any prospectus supplement or other offering materials, including the risks and uncertainties discussed and described in Part II, Item 1A (Risk Factors) of our most recent Quarterly Report on Form 10-Q for the quarter ended June 30, 2023 filed with the SEC on August 10, 2023, as updated by our subsequent filings with the SEC under Exchange Act, which are incorporated by reference, in this prospectus, and any updates to those risk factors included from time to time in our periodic and current reports filed with the SEC and incorporated by reference in this prospectus, before making any decision to invest in shares of our Common Stock. If any of the events discussed in these risk factors occurs, our business, prospects, results of operations, financial condition and cash flows could be materially harmed. If that were to happen, the trading price of our Common Stock could decline, and you could lose all or part of your investment. Additional risks not currently known to us or other factors not perceived by us to present significant risks to our business at this time also may impair our business operations.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the documents we have filed with the SEC that are incorporated by reference contain “forward-looking statements” within the meaning of Section 27A of the Securities Act and Section 21E of the Exchange Act that involve substantial risks and uncertainties. In some cases, forward-looking statements are identified by the words “anticipate,” “believe,” “continue,” “could,” “estimate,” “expect,” “future,” “goals,” “intend,” “likely,” “may,” “might,” “ongoing,” “objective,” “plan,” “potential,” “predict,” “project,” “seek,” “should,” “strategy,” “will” and “would” or the negative of these terms, or other comparable terminology intended to identify statements about the future. These statements involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to be materially different from the information expressed or implied by these forward-looking statements.

Although we believe that we have a reasonable basis for each forward-looking statement contained in this prospectus and the documents that we have filed with the SEC that are incorporated by reference, such statements are based on a combination of facts and factors currently known by us and our expectations of the future, about which we cannot be certain. Forward-looking statements include statements about:

- the implementation of our business strategies, including our ability to pursue development pathways and regulatory strategies for MT-6402, MT-8421, MT-0169 and other engineered toxin body (“ETB”) biologic candidates;
- our utilization of a de-immunized ETB scaffold that has been designed to reduce or eliminate the propensity for innate immunity, including capillary leak syndrome, via de-immunization of the Shiga-like Toxin A subunit as well as chemistry, manufacturing, and controls improvements;
- the timing and our ability to advance the development of our drug or biologic candidates;
- our plans to pursue discussions with regulatory authorities, and the anticipated timing, scope and outcome of related regulatory actions or guidance;
- our ability to establish and maintain potential new partnering or collaboration arrangements for the development and commercialization of ETB biologic candidates;
- our ability to obtain the benefits we anticipate from partnering, collaboration, or supply agreements that we may enter into;
- our financial condition, including our ability to obtain the funding necessary to advance the development of our drug or biologic candidates, any statements indicating whether or not the closing of the second tranche of our July 2023 private placement will occur, and our ability to continue as a going concern;
- our ability to comply with the terms of our Contingent Value Rights Agreement pursuant to which our obligations are secured, subject certain limited exceptions, by substantially all of our assets;
- our ability to maintain the listing of shares of our common stock on the Nasdaq Capital Market;
- the results of our special meeting at which our stockholders are being asked to approve a reverse stock split of our common stock and any statements about the effect, or potential effect, of this reverse split on the price or trading of our common stock or our ability to maintain the listing of our common stock on the Nasdaq Capital Market;
- the anticipated progress of our drug or biologic candidate development programs, including whether our ongoing and potential future clinical trials will achieve clinically relevant results;
- our ability to generate data and conduct analyses to support the regulatory approval of our drug or biologic candidates;
- our ability to establish and maintain intellectual property rights for our drug or biologic candidates;

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- whether any drug or biologic candidates that we are able to commercialize are safer or more effective than other marketed products, treatments or therapies;
- our ability to discover and develop additional drug or biologic candidates suitable for clinical testing;
- our ability to identify, in-license or otherwise acquire additional drug or biologic candidates and development programs;
- our anticipated research and development activities and projected expenditures;
- our ability to complete preclinical and clinical testing successfully for new drug or biologic candidates that we may develop or license;
- our ability to have manufactured active pharmaceutical ingredient and drug or biologic product that meet required release and stability specifications;
- our ability to have manufactured sufficient supplies of drug product for clinical testing and commercialization;
- our ability to obtain licenses to any necessary third-party intellectual property;
- our anticipated use of proceeds from any financing activities;
- the expected cost savings from our recently announced strategic restructuring;
- the extent to which global economic and political developments, including the indirect and/or long-term impact of inflation, will affect our business operations, clinical trials, or financial condition;
- the impact of laws and regulations;
- our projected financial performance; and
- the sufficiency of our cash resources.

Any forward-looking statements in this prospectus reflect our current views with respect to future events or to our future financial performance and involve known and unknown risks, uncertainties and other factors that may cause our actual results, performance or achievements to be materially different from any future results, performance or achievements expressed or implied by these forward-looking statements. Factors that may cause actual results to differ materially from current expectations include, among others, our ability to raise the additional funding we will need to continue to pursue our business and product development plans; the inherent uncertainties associated with developing new drug or biologic candidates or technologies and operating as a development stage company; our ability to develop, complete clinical trials for, obtain approvals for and commercialize any of our drug or biologic candidates, including our ability to recruit and enroll patients in our studies; our ability to address the requests of the FDA; competition in the industry in which we operate; and market conditions. You should refer to the section titled “Risk Factors” of this prospectus and as described in Part II, Item 1A (Risk Factors) of our most recent Quarterly Report on Form 10-Q for the quarter ended June 30, 2023 filed with the SEC on August 10, 2023, as updated by our subsequent filings with the SEC under the Exchange Act, as updated by our subsequent filings with the SEC under the Exchange Act for further discussion of the important factors that may cause our actual results to differ materially from those expressed or implied by our forward-looking statements. As a result of these factors, we cannot assure that the forward-looking statements in this prospectus the documents we have filed with the SEC that are incorporated by reference will prove to be accurate. Furthermore, if our forward-looking statements prove to be inaccurate, the inaccuracy may be material. In light of the significant uncertainties in these forward-looking statements, these statements should not be regarded as representations or warranties by us or any other person that we will achieve our objectives and plans in any specified time frame, or at all. We undertake no obligation to publicly update any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by law.

In addition, statements that “we believe” and similar statements reflect our beliefs and opinions on the relevant subject. These statements are based upon information available to us as of the date of this prospectus, and while

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we believe such information forms a reasonable basis for such statements, such information may be limited or incomplete, and our statements should not be read to indicate that we have conducted an exhaustive inquiry into, or review of, all potentially available relevant information. These statements are inherently uncertain and investors are cautioned not to unduly rely upon these statements as predictions of future events.

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

USE OF PROCEEDS

We are filing the registration statement of which this prospectus forms a part to permit the holders of the Shares of our Common Stock described in the section entitled “Selling Stockholders” to resell such Shares. We are not selling any securities under this prospectus, and we will not receive any proceeds from the sale or other disposition of shares of our Common Stock held by the selling stockholders, except with respect to amounts received by us due to the exercise of the Pre-Funded Warrants.

The selling stockholders will pay any underwriting discounts and commissions and expenses incurred by the selling stockholders for brokerage, accounting, tax or legal services or any other expenses incurred by the selling stockholders in disposing of these Shares. We will bear all other costs, fees and expenses incurred in effecting the registration of the Shares covered by this prospectus, including, without limitation, all registration and filing fees, Nasdaq listing fees and fees and expenses of our counsel and our accountants.

SELLING STOCKHOLDERS

This prospectus covers the resale from time to time of up to an aggregate of 42,592,191 Shares of our Common Stock by the selling stockholders, which consist of (i) 24,260,644 shares of Common Stock held by the selling stockholders and (ii) 18,331,547 shares of Common Stock issuable upon the exercise of Pre-Funded Warrants to purchase shares of Common Stock held by certain selling stockholders. The Shares registered for resale herein are pursuant to the Securities Purchase Agreement between us and the selling stockholders and relate to shares held by the selling stockholders not otherwise previously registered for resale.

The selling stockholders identified in the table below may from time to time offer and sell under this prospectus any or all of the Shares described under the column “Number of Shares of Common Stock Being Offered” in the table below. The table below has been prepared based upon information furnished to us by the selling stockholders as of July 31, 2023. The selling stockholders identified below may have sold, transferred or otherwise disposed of some or all of their shares since the date on which the information in the following table is presented in transactions exempt from or not subject to the registration requirements of the Securities Act. Information concerning the selling stockholders may change from time to time and, if necessary, we will amend or supplement this prospectus accordingly and as required.

The following table and footnote disclosure following the table sets forth the name of each selling stockholder, the nature of any position, office or other material relationship, if any, that the selling stockholders have had within the past three years with us or with any of our predecessors or affiliates, and the number of shares of our Common Stock beneficially owned by the selling stockholders before this offering. The number of shares described under the column “Shares of Common Stock Beneficially Owned Before this Offering” for each selling stockholder includes all shares of our Common Stock beneficially held by such selling stockholder as of July 31, 2023, which includes (i) all shares of our Common Stock purchased by such selling stockholder in the Private Placement and (ii) all of the shares of Common Stock issuable upon exercise of the Pre-Funded Warrants purchased by such selling stockholder in the Private Placement, subject to the Beneficial Ownership Limitation. The number of shares reflected are those beneficially owned, as determined under applicable rules of the SEC, and the information is not necessarily indicative of beneficial ownership for any other purpose. Under applicable SEC rules, beneficial ownership includes any shares of Common Stock as to which a person has sole or shared voting power or investment power and any shares of Common Stock which the person has the right to acquire within 60 days after July 31, 2023 through the exercise of any option, warrant or right or through the conversion of any convertible security. Unless otherwise indicated in the footnotes to the table below and subject to community property laws where applicable, we believe, based on information furnished to us that each of the selling stockholders named in this table has sole voting and investment power with respect to the shares indicated as beneficially owned.

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We have assumed that all shares of Common Stock reflected in the table as being offered in the offering covered by this prospectus will be sold from time to time in this offering. We cannot provide an estimate as to the number of shares of Common Stock that will be held by the selling stockholders upon termination of the offering covered by this prospectus because the selling stockholders may offer some, all or none of their shares of Common Stock being offered in the offering. Information about the selling stockholders may change over time. Any changed information will be set forth in an amendment to the registration statement or supplement to this prospectus, to the extent required by law.

	Shares of Common Stock Beneficially Owned Before this Offering		Number of Shares of Common Stock Being Offered ⁽³⁾	Shares of Common Stock To Be Beneficially Owned Upon Completion of this Offering	
	Number	Percentage ⁽²⁾		Number ⁽⁴⁾	Percentage ⁽²⁾ (4)
Selling Stockholder⁽¹⁾					
Lytton-Kambara Foundation ⁽⁵⁾	3,723,404	4.62%	3,723,404	—	—
Adage Capital Partners, L.P. ⁽⁶⁾	4,391,489	5.45%	3,191,489	1,200,000	1.49%
Entities affiliated with SilverArc Capital Management, LLC ⁽⁷⁾	5,319,148	6.60%	5,319,148	—	—
Entities affiliated with Monashee Investment Management LLC ⁽⁸⁾	2,127,659	2.64%	2,127,659	—	—
Entities affiliated with Empery Asset Management, LP ⁽⁹⁾	2,127,659	2.64%	2,127,659	—	—
Biotech Target N.V. ⁽¹⁰⁾	15,447,322	19.16%	4,255,319	11,192,003	13.88%
Allostery Investments LP ⁽¹¹⁾	531,914	0.66%	531,914	—	—
Entities affiliated with BVF Partners L.P. ⁽¹²⁾	8,061,261	9.99%	21,315,599	5,246,565	6.49%

- (1) All information regarding selling stockholders was provided by the selling stockholders as of July 31, 2023.
- (2) Percentage ownership is based on a denominator equal to the sum of (i) 80,612,666 shares of our Common Stock outstanding as of July 31, 2023 and (ii) the number of shares of Common Stock issuable upon exercise or conversion of convertible securities beneficially owned by the applicable selling stockholder.
- (3) The number of shares of Common Stock in the column “Number of Shares of Common Stock Being Offered” represents all of the shares of Common Stock that a selling stockholder may offer and sell from time to time under this prospectus, including (i) all shares of our Common Stock purchased by such selling stockholder in the Private Placement and (ii) all of the shares of Common Stock issuable upon exercise of the Pre-Funded Warrants purchased by such selling stockholder in the Private Placement, without giving effect to the Beneficial Ownership Limitation.
- (4) Assumes that all shares of Common Stock being registered under the registration statement of which this prospectus forms a part are sold in this offering, and that none of the selling stockholders acquire additional shares of our Common Stock after the date of this prospectus and prior to completion of this offering.
- (5) The shares reported under “Shares of Common Stock Beneficially Owned Before this Offering” consist of 3,723,404 shares of Common Stock purchased in the Private Placement. Laurence Lytton has voting and/or investment power over the shares held by Lytton-Kambara Foundation and may be deemed to be the beneficial owner of these shares. Mr. Lytton disclaims beneficial ownership of these shares, except to the extent of his pecuniary interest therein. The selling stockholder’s address is 467 Central Park West, 17-A, New York, NY 10025.
- (6) The shares reported under “Shares of Common Stock Beneficially Owned Before this Offering” consist of (i) 3,191,489 shares of Common Stock purchased in the Private Placement and (ii) 1,200,000 shares of Common Stock. Bob Atchinson and Phillip Gross are the managing members of Adage Capital Advisors, L.L.C., which is the managing member of Adage Capital Partners GP, L.L.C., which is the general partner of Adage Capital Partners, L.P., and each such person or entity, as the case may be, has shared voting and/or investment power over the securities held by Adage Capital Partners, L.P. and may be deemed the beneficial

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- owner of such shares, and each such person or entity, as the case may be, disclaims beneficial ownership of such securities except to the extent of their respective pecuniary interest therein. The selling stockholder's address is 200 Clarendon Street, 52nd Floor, Boston, MA 02116.
- (7) The shares reported under "Shares of Common Stock Beneficially Owned Before this Offering" consist of (i) 211,655 shares of Common Stock purchased in the Private Placement by SilverArc Capital Alpha Fund I, L.P.; (ii) 3,763,453 shares of Common Stock purchased in the Private Placement by SilverArc Capital Alpha Fund II, L.P.; and (iii) 1,344,040 shares of Common Stock purchased in the Private Placement by Squarepoint Diversified Partners Fund Limited. SilverArc Capital Management, LLC is the controlling entity of SilverArc Capital Alpha Fund I, L.P., SilverArc Capital Alpha Fund II, L.P. and Squarepoint Diversified Partners Fund Limited and is solely owned by Devesh Gandhi. Mr. Gandhi may be deemed to have shared voting and investment power of the securities managed by SilverArc Capital Management, LLC. Mr. Gandhi disclaims beneficial ownership of such securities, except to the extent of his pecuniary interest therein. The selling stockholder's address is 20 Park Plaza, 4th Floor, Boston, MA 02116.
- (8) The shares reported under "Shares of Common Stock Beneficially Owned Before this Offering" consist of (i) 382,979 shares of Common Stock purchased in the Private Placement by BEMAP Master Fund Ltd; (ii) 765,957 shares of Common Stock purchased in the Private Placement by DS Liquid Div RVA MON LLC; (iii) 446,808 shares of Common Stock purchased in the Private Placement by Blackstone CSP-MST FMAP Fund; (iv) 127,660 shares of Common Stock purchased in the Private Placement by Mission Pure Alpha LP; and (v) 404,255 shares of Common Stock purchased in the Private Placement by Monashee Pure Alpha SPV I LP. Jeff Muller, COO of Monashee Investment Management LLC, investment manager of BEMAP Master Fund LTD, DS Liquid Div RVA MON LLC, Blackstone CSP-MST FMAP Fund and Monashee Pure Alpha SPV I LP (collectively, the "Monashee Funds"), has voting and/or investment power over the securities held by the Monashee Funds and therefore may be deemed to have beneficial ownership of the securities held by the Monashee Funds. Mr. Muller, however, disclaims any beneficial ownership of the shares held by the Monashee Funds. The address of each of the Monashee Funds is 75 Park Plaza, 4th Floor, Boston, MA 02116.
- (9) The shares reported under "Shares of Common Stock Beneficially Owned Before this Offering" consist of (i) 1,294,895 shares of Common Stock purchased in the Private Placement by Empery Asset Master, Ltd.; (ii) 352,935 shares of Common Stock purchased in the Private Placement by Empery Tax Efficient, LP; and (iii) 479,829 shares of Common Stock purchased in the Private Placement by Empery Tax Efficient III, LP. Empery Asset Management, LP, the authorized agent of Empery Asset Master Ltd ("EAM"), Empery Tax Efficient, LP ("ETE") and Empery Tax Efficient III, LP ("ETE III"), has discretionary authority to vote and dispose of the shares held by each of EAM, ETE and ETE III and may be deemed to be the beneficial owner of these shares. Martin Hoe and Ryan Lane, in their capacity as investment managers of Empery Asset Management LP, may also be deemed to have investment discretion and voting power over the shares held by each of EAM, ETE and ETE III. EAM, ETE, ETE III, Mr. Hoe and Mr. Lane each disclaim any beneficial ownership of these shares. The address of Empery Asset Master, Ltd., Empery Tax Efficient, LP and Empery Tax Efficient III, LP is c/o Empery Asset Management, LP, One Rockefeller Plaza, Suite 1205, New York, NY 11530.
- (10) The shares reported under "Shares of Common Stock Beneficially Owned Before this Offering" consist of (i) 4,255,319 shares of Common Stock purchased in the Private Placement and (ii) 11,192,003 shares of Common Stock, certain of which are not included in the shares reported because they are subject to limitations on conversion if such conversion would result in the selling stockholder beneficially owning more than 9.99% of our outstanding Common Stock. Biotech Target N.V. is a wholly-owned subsidiary of BB Biotech AG. Accordingly, BB Biotech AG may be deemed to be the indirect beneficial owner of the securities of the Company held directly or indirectly by Biotech Target N.V. BB Biotech AG is a publicly listed entity in Switzerland. The selling stockholder's address is Ara Hill Top Building, Unit A-5, Pletterijweg Oost 1, Curacao.
- (11) The shares reported under "Shares of Common Stock Beneficially Owned Before this Offering" consist of 531,914 shares of Common Stock purchased in the Private Placement. David Modest and Christopher Staral are Principals of Allosterly Investments LP and may be deemed to have shared voting and investment power of the securities held by Allosterly Investments LP. Mr. Modest and Mr. Staral each disclaim any beneficial

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ownership of these securities. The selling stockholder's address is One Stamford Plaza, 263 Tresser Blvd 9th Fl, Stamford, CT 06901.

- (12) The shares reported under "Shares of Common Stock Beneficially Owned Before this Offering" consist of (i) 1,555,453 shares of Common Stock purchased in the Private Placement by Biotechnology Value Fund, L.P. ("BVF"); (ii) 9,772,828 shares of Common Stock issuable upon exercise of the Pre-Funded Warrants held by BVF; (iii) 2,704,414 shares of Common Stock held by BVF; (iv) 128,000 shares of Common Stock issuable upon conversion of 128 shares of Series A Convertible Preferred Stock ("Series A Preferred Stock") held by BVF; (v) 168,508 shares of Common Stock issuable upon exercise of warrants held by BVF; (vi) 1,254,245 shares of Common Stock purchased in the Private Placement by Biotechnology Value Fund II, L.P. ("BVF2"); (vii) 7,438,587 shares of Common Stock issuable upon exercise of the Pre-Funded Warrants held by BVF2; (viii) 1,981,580 shares of Common Stock held by BVF2; (ix) 104,000 shares of Common Stock issuable upon conversion of 104 shares of Series A Preferred Stock held by BVF2; (x) 108,536 shares of Common Stock issuable upon exercise of warrants held by BVF2; (xi) 139,515 shares of Common Stock purchased in the Private Placement by Biotechnology Value Trading Fund OS LP ("BVTF"); (xii) 868,823 shares of Common Stock issuable upon exercise of the Pre-Funded Warrants held by BVTF; (xiii) 232,575 shares of Common Stock held by BVTF; (xiv) 18,000 shares of Common Stock issuable upon conversion of 18 shares of Series A Preferred Stock held by BVTF; (xv) 30,190 shares of Common Stock issuable upon exercise of warrants held by BVTF; (xvi) 34,839 shares of Common Stock purchased in the Private Placement by MSI BVF SPV, LLC ("MSI BVF"); (xvii) 251,309 shares of Common Stock issuable upon exercise of the Pre-Funded Warrants held by MSI BVF; (xviii) 77,996 shares of Common Stock held by MSI BVF; and (xix) 35,504 shares of Common Stock issuable upon exercise of warrants held by MSI BVF, certain of which are not included in the shares reported because they are subject to limitations on conversion if such conversion would result in the selling stockholder beneficially owning more than 4.99% or 9.99% of our outstanding Common Stock. BVF I GP LLC is the general partner of BVF. BVF II GP LLC is the general partner of BVF2. BVF Partners OS Ltd. is the general partner of BVTF. BVF GP Holdings is the sole member of BVF I GP LLC and BVF II GP LLC. BVF Partners L.P. is the sole member of BVF Partners OS Ltd. and investment manager of BVF, BVF2, BVTF and MSI BVF. BVF Inc. is the general partner of BVF Partners L.P. Mark N. Lampert is director and officer of BVF Inc. Each of BVF I GP LLC, BVF II GP LLC, BVF Partners OS Ltd., BVF GP Holdings LLC, BVF Partners L.P. BVF Inc. and Mr. Lampert disclaims beneficial ownership of securities beneficially owned by the selling stockholders. The address of BVF, BVF2, BVTF and MSI BVF is 44 Montgomery St, 40th Floor, San Francisco, CA 94104.

Relationship with Selling Stockholders

As discussed in greater detail above under the section titled "*Prospectus Summary-July 2023 Private Placement*," in July 2023, we entered into the Securities Purchase Agreement with the selling stockholders, pursuant to which we sold and issued shares of our Common Stock and Pre-Funded Warrants to purchase our Common Stock. Pursuant to the Securities Purchase Agreement, we also agreed to file a registration statement with the SEC to cover the resale by the selling stockholders of the shares of our Common Stock, including the shares of Common Stock issuable upon exercise of the Pre-Funded Warrants, issued pursuant to the Securities Purchase Agreement.

None of the selling stockholders has had a material relationship with us or any of our predecessors or affiliates within the past three years, other than as a result of the ownership of our shares of Common Stock or other securities.

None of the selling stockholders has held any position or office with us or our affiliates within the last three years.

PLAN OF DISTRIBUTION

The selling stockholders, which as used herein includes donees, pledgees, transferees or other successors-in-interest selling shares of Common Stock or interests in shares of Common Stock received after the date of this prospectus from a selling stockholder as a gift, pledge, partnership distribution or other transfer, may, from time to time, sell, transfer or otherwise dispose of any or all of their shares of Common Stock or interests in shares of Common Stock on any stock exchange, market or trading facility on which the shares are traded or in private transactions. These dispositions may be at fixed prices, at prevailing market prices at the time of sale, at prices related to the prevailing market price, at varying prices determined at the time of sale, or at negotiated prices.

The selling stockholders may use any one or more of the following methods when disposing of shares or interests therein:

- ordinary brokerage transactions and transactions in which the broker-dealer solicits purchasers;
- block trades in which the broker-dealer will attempt to sell the shares as agent, but may position and resell a portion of the block as principal to facilitate the transaction;
- purchases by a broker-dealer as principal and resale by the broker-dealer for its account;
- an exchange distribution in accordance with the rules of the applicable exchange;
- privately negotiated transactions;
- short sales effected after the date the registration statement of which this prospectus is a part is declared effective by the SEC;
- through the writing or settlement of options or other hedging transactions, whether through an options exchange or otherwise;
- broker-dealers may agree with the selling stockholders to sell a specified number of such shares at a stipulated price per share;
- a combination of any such methods of sale; and
- any other method permitted by applicable law.

The selling stockholders may, from time to time, pledge or grant a security interest in some or all of the shares of Common Stock or Pre-Funded Warrants owned by them and, if they default in the performance of their secured obligations, the pledgees or secured parties may offer and sell such shares of Common Stock or Pre-Funded Warrants, from time to time, under this prospectus, or under an amendment to this prospectus under Rule 424(b)(3) or other applicable provision of the Securities Act amending the list of selling stockholders to include the pledgee, transferee or other successors in interest as selling stockholders under this prospectus. The selling stockholders also may transfer the shares of Common Stock or Pre-Funded Warrants in other circumstances, in which case the transferees, pledgees or other successors in interest will be the selling beneficial owners for purposes of this prospectus.

In connection with the sale of our Common Stock or interests therein, the selling stockholders may enter into hedging transactions with broker-dealers or other financial institutions, which may in turn engage in short sales of the Common Stock in the course of hedging the positions they assume. The selling stockholders may also sell shares of our Common Stock short and deliver these securities to close out their short positions, or loan or pledge the Common Stock to broker-dealers that in turn may sell these securities. The selling stockholders may also enter into option or other transactions with broker-dealers or other financial institutions or the creation of one or more derivative securities which require the delivery to such broker-dealer or other financial institution of shares offered by this prospectus, which shares such broker-dealer or other financial institution may resell pursuant to this prospectus (as supplemented or amended to reflect such transaction).

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The aggregate proceeds to the selling stockholders from the sale of the Common Stock offered by them will be the purchase price of the Common Stock less discounts or commissions, if any. Each of the selling stockholders reserves the right to accept and, together with their agents from time to time, to reject, in whole or in part, any proposed purchase of Common Stock to be made directly or through agents. We will not receive any of the proceeds from this offering. Upon any exercise of the Pre-Funded Warrants by payment of cash, however, we will receive the exercise price of the Pre-Funded Warrants.

The selling stockholders also may resell all or a portion of the shares in open market transactions in reliance upon Rule 144 under the Securities Act of 1933, provided that they meet the criteria and conform to the requirements of that rule.

The selling stockholders and any underwriters, broker-dealers or agents that participate in the sale of the Common Stock or interests therein may be “underwriters” within the meaning of Section 2(11) of the Securities Act. Any discounts, commissions, concessions or profit they earn on any resale of the shares may be underwriting discounts and commissions under the Securities Act. Selling stockholders who are “underwriters” within the meaning of Section 2(11) of the Securities Act will be subject to the prospectus delivery requirements of the Securities Act.

To the extent required, the shares of our Common Stock to be sold, the names of the selling stockholders, the respective purchase prices and public offering prices, the names of any agents, dealer or underwriter, any applicable commissions or discounts with respect to a particular offer will be set forth in an accompanying prospectus supplement or, if appropriate, a post-effective amendment to the registration statement that includes this prospectus.

In order to comply with the securities laws of some states, if applicable, the Common Stock may be sold in these jurisdictions only through registered or licensed brokers or dealers. In addition, in some states the Common Stock may not be sold unless it has been registered or qualified for sale or an exemption from registration or qualification requirements is available and is complied with.

We have advised the selling stockholders that the anti-manipulation rules of Regulation M under the Exchange Act may apply to sales of shares in the market and to the activities of the selling stockholders and their affiliates. In addition, to the extent applicable we will make copies of this prospectus (as it may be supplemented or amended from time to time) available to the selling stockholders for the purpose of satisfying the prospectus delivery requirements of the Securities Act. The selling stockholders may indemnify any broker-dealer that participates in transactions involving the sale of the shares against certain liabilities, including liabilities arising under the Securities Act.

We will pay certain expenses of the registration of the shares of Common Stock pursuant to the Securities Purchase Agreement, including, without limitation, SEC filing fees and expenses of compliance with state securities or “blue sky” laws; provided, however, that each selling stockholder will pay all underwriting discounts and selling commissions, if any and any related legal expenses incurred by it. We will indemnify the selling stockholders against certain liabilities, including some liabilities under the Securities Act, in accordance with the securities purchase agreement, or the selling stockholders will be entitled to contribution. We may be indemnified by the selling stockholders against civil liabilities, including liabilities under the Securities Act, that may arise from any written information furnished to us by the selling stockholders specifically for use in this prospectus, in accordance with the related Securities Purchase Agreement, or we may be entitled to contribution. We have agreed with the selling stockholders to keep the registration statement of which this prospectus constitutes a part effective until the earlier of (1) such time as all of the shares covered by this prospectus have been disposed of pursuant to and in accordance with the registration statement or (2) the date on which all of the shares may be sold without restriction pursuant to Rule 144 of the Securities Act.

LEGAL MATTERS

The validity of the Common Stock being offered by this prospectus is being passed upon by Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., Boston, Massachusetts.

EXPERTS

The consolidated financial statements of Molecular Templates, Inc. appearing in its Annual Report (Form 10-K) for the year ended December 31, 2022 have been audited by Ernst & Young LLP, independent registered public accounting firm, as set forth in their report thereon (which contains an explanatory paragraph describing conditions that raise substantial doubt about the Company's ability to continue as a going concern as described in Note 1 to the consolidated financial statements), included therein, and incorporated herein by reference. Such consolidated financial statements are incorporated herein by reference in reliance upon such report given on the authority of such firm as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We are subject to the reporting requirements of the Exchange Act, and file annual, quarterly and current reports, proxy statements and other information with the SEC. The SEC maintains an internet website at www.sec.gov that contains periodic and current reports, proxy and information statements, and other information regarding registrants that are filed electronically with the SEC. You can request copies of these documents by writing to the SEC and paying a fee for the copying cost.

This prospectus is only part of a registration statement on Form S-3 that we have filed with the SEC under the Securities Act, and therefore omits certain information contained in the registration statement. We have also filed exhibits and schedules with the registration statement that are excluded from this prospectus, and you should refer to the applicable exhibit or schedule for a complete description of any statement referring to any contract or other document. You may obtain a copy of the registration statement, including the exhibits and schedules, from the SEC's website.

We also maintain a website at <http://www.mtem.com>, through which you can access our SEC filings free of charge. The information set forth on our website is not part of this prospectus.

INCORPORATION OF CERTAIN DOCUMENTS BY REFERENCE

The SEC allows us to “incorporate by reference” information into this prospectus, which means that we can disclose important information to you by referring you to another document filed separately with the SEC. The information incorporated by reference is deemed to be part of this prospectus, and subsequent information that we file later with the SEC will automatically update and supersede this information. We filed a registration statement on Form S-3 under the Securities Act with the SEC with respect to the securities we may offer pursuant to this prospectus. This prospectus omits certain information contained in the registration statement, as permitted by the SEC. You should refer to the registration statement, including the exhibits, for further information about us and the securities we may offer pursuant to this prospectus. Statements in this prospectus regarding the provisions of certain documents filed with, or incorporated by reference in, the registration statement are not necessarily complete and each statement is qualified in all respects by that reference. Copies of all or any part of the registration statement, including the documents incorporated by reference or the exhibits, may be obtained from the SEC’s website at <http://www.sec.gov>. The documents we are incorporating by reference are:

- our Annual Report on Form [10-K](#) for the year ended December 31, 2022 that we filed with the SEC on March 30, 2023 and as amended on Form [10-K/A](#) that we filed with the SEC on April 28, 2023;
- our Quarterly Reports on Form 10-Q for the quarters ended June 30, 2023 and March 31, 2023 that we filed with the SEC on [August 10, 2023](#) and [May 15, 2023](#), respectively;
- our Current Reports on Form 8-K that we filed with the SEC on [March 3, 2023](#), [April 7, 2023](#), [May 26, 2023](#), [June 1, 2023](#), [June 20, 2023](#), [June 20, 2023](#), [July 13, 2023](#) and [August 2, 2023](#);
- the description of our Common Stock contained in our Registration Statement on Form 8-A initially filed on [January 28, 2005](#), including any amendment or report filed for the purpose of updating such description; and
- all reports and other documents subsequently filed by us pursuant to Sections 13(a), 13(c), 14 and 15(d) of the Exchange Act (including between the date of the initial registration statement and the effectiveness of the registration statement and following the effectiveness of the registration statement) and prior to the termination or completion of the offering of securities under this prospectus shall be deemed to be incorporated by reference in this prospectus and to be a part hereof from the date of filing such reports and other documents.

Any statement contained in this prospectus or in a document incorporated or deemed to be incorporated by reference into this prospectus will be deemed to be modified or superseded for purposes of this prospectus to the extent that a statement contained in this prospectus or any other subsequently filed document that is deemed to be incorporated by reference into this prospectus modifies or supersedes the statement. Any statement so modified or superseded will not be deemed, except as so modified or superseded, to constitute a part of this prospectus.

You may request, orally or in writing, a copy of any or all of the documents incorporated herein by reference. These documents will be provided to you at no cost, by contacting:

Molecular Templates, Inc.
9301 Amberglen Blvd
Suite 100
Austin, TX 78729
Telephone: (512) 869-1555

You may also access these documents on our website, <http://www.mtem.com>. The information contained on, or that can be accessed through, our website is not a part of this prospectus. We have included our website address in this prospectus solely as an inactive textual reference.

You should rely only on information contained in, or incorporated by reference into, this prospectus. We and the selling stockholders have not authorized anyone to provide you with information different from that contained in

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this prospectus or incorporated by reference in this prospectus. We and the selling stockholders are not making offers to sell the securities in any jurisdiction in which such an offer or solicitation is not authorized or in which the person making such offer or solicitation is not qualified to do so or to anyone to whom it is unlawful to make such offer or solicitation.

42,592,191 Shares



Common Stock

PROSPECTUS

, 2023

PART II
INFORMATION NOT REQUIRED IN PROSPECTUS

Item 14. Other Expenses of Issuance and Distribution.

Set forth below is an estimate (except for registration fees, which are actual) of the approximate amount of the types of fees and expenses listed below that were paid or are payable by us in connection with the issuance and distribution of the shares of Common Stock to be registered by this registration statement. None of the expenses listed below are to be borne by any of the selling stockholders named in the prospectus that forms a part of this registration statement.

Expense	Amount
SEC Registration Fee	\$ 2,769
Accounting Fees and Expenses	10,000
Legal Fees and Expenses	20,000
Miscellaneous Fees and Expenses	1,250,000
Total	\$ 1,282,769

Item 15. Indemnification of Directors and Officers.

Delaware Law

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

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

Amended and Restated Bylaws

Our amended and restated bylaws provide that we will indemnify each person who was or is a party or threatened to be made a party to any action, suit or proceeding, whether civil, criminal, administrative or investigative by reason of the fact that he or she is or was, or is or was serving 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 expense, liability and loss (including attorneys' fees, judgments, fines, ERISA excise taxes or penalties and amounts paid in settlement) reasonably incurred in connection with such action, suit or proceeding and any appeal therefrom, to the fullest extent allowed under the DGCL. Our

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amended and restated bylaws also provide that we shall advance to any person who was or is a party or is threatened to be made a party to any action, suit or proceeding, whether civil, criminal, administrative or investigative, by reason of the fact that he or she is or was a director or executive officer of the Company, or is or was serving at our request as a director or executive officer of another corporation, partnership, joint venture, trust or other enterprise, prior to the final disposition of the proceeding, promptly following request therefor, all expenses incurred by any director or executive officer in connection with such proceeding. However, if the DGCL requires, an advancement of expenses incurred by a director or executive officer in his or her capacity as a director or executive officer (and not in any other capacity in which service was or is rendered by such indemnitee, including service to an employee benefit plan) shall be made only upon delivery to us of an undertaking by or on behalf of such indemnitee, to repay all amounts so advanced if it shall ultimately be determined by final judicial decision from which there is no further right to appeal that such indemnitee is not entitled to be indemnified for such expenses under our amended and restated bylaws or otherwise.

Indemnification Agreements and Insurance Matters

In addition, we have entered into indemnification agreements with each of our current directors and executive officers. These agreements require us to indemnify these individuals to the fullest extent permitted under Delaware law against liabilities that may arise by reason of their service to us and to advance expenses incurred as a result of any proceeding against them as to which they could be indemnified. We also intend to enter into indemnification agreements with our future directors and executive officers.

We also maintain standard policies of insurance under which coverage is provided to our directors and officers against losses arising from claims made by reason of breach of duty or other wrongful act, and to us with respect to payments which may be made by us to such directors and officers pursuant to the above indemnification provisions or otherwise as a matter of law.

The above discussion of our amended and restated certificate of incorporation, as amended, our amended and restated bylaws, our indemnification agreements with our current directors and executive officers and Sections 102 and 145 of the DGCL is not intended to be exhaustive and is respectively qualified in its entirety by such amended and restated certificate of incorporation, such amended and restated bylaws, such indemnification agreements and such statutes.

To the extent that our directors, officers and controlling persons are indemnified under the provisions contained in our amended and restated certificate of incorporation, as amended, Delaware law or contractual arrangements against liabilities arising under the Securities Act, we have been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Securities Act and is therefore unenforceable.

Item 16. Exhibits and Financial Statements Schedules.

The exhibits to this registration statement are listed in the Exhibit Index immediately prior the signature page hereto, which Exhibit Index is hereby incorporated by reference into this Item 16.

Item 17. Undertakings.

(a) The undersigned registrant hereby undertakes:

- (1) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:
- (i) To include any prospectus required by section 10(a)(3) of the Securities Act of 1933;
- (ii) To reflect in the prospectus any facts or events arising after the effective date of the registration statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a

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fundamental change in the information set forth in the registration statement. Notwithstanding the foregoing, any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the Commission pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than a 20% change in the maximum aggregate offering price set forth in the "Calculation of Registration Fee" table in the effective registration statement; and

- (iii) To include any material information with respect to the plan of distribution not previously disclosed in the registration statement or any material change to such information in the registration statement;

provided, however, that paragraphs (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 that are incorporated by reference in the registration statement, or is contained in a form of prospectus filed pursuant to Rule 424(b) that is part of the registration statement.

- (2) That, for the purpose of determining any liability under the Securities Act of 1933, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.
- (3) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.
- (4) That, for the purpose of determining liability under the Securities Act of 1933 to any purchaser:
 - (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 of 1933 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.
- (b) The undersigned registrant hereby undertakes that, for purposes of determining any liability under the Securities Act of 1933, each filing of the registrant's annual report pursuant to section 13(a) or section 15(d) of the Securities Exchange Act of 1934 (and, where applicable, each filing of an employee benefit plan's annual report pursuant to section 15(d) of the Securities Exchange Act of 1934) that is incorporated by reference in the registration statement shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.
- (c) Insofar as indemnification for liabilities arising under the Securities Act of 1933 may be permitted to directors, officers and controlling persons of the registrant, the registrant has been advised that in the

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opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the 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 Act and will be governed by the final adjudication of such issue.

EXHIBIT INDEX

<u>Exhibit Number</u>	<u>Item</u>
4.1	Amended and Restated Certificate of Incorporation of the Company, as subsequently amended (incorporated by reference to Exhibit 3.1 to the Company's Annual Report on Form 10-K (File No. 001-32979) filed on March 6, 2014).
4.2	Certificate of Amendment of Amended and Restated Certificate of Incorporation of the Company, dated August 1, 2017 (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K (File No. 001-32979) filed on August 1, 2017).
4.3	Certificate of Amendment (Name Change) of Amended and Restated Certificate of Incorporation of the Company, dated August 1, 2017 (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K (File No. 001-32979) filed on August 7, 2017).
4.4	Certificate of Designation of Preferences, Rights and Limitations of Series A Convertible Preferred Stock, dated November 22, 2019 (incorporated by reference to Exhibit 3.1 to the Company's Current Report on Form 8-K (File No. 001-32979), filed on November 25, 2019).
4.5	Amended and Restated Bylaws of the Company (incorporated by reference to Exhibit 3.4 to the Company's Annual Report on Form 10-K (File No. 001-32979), filed on March 29, 2019).
4.6	Form of Pre-Funded Warrant to Purchase Common Stock (incorporated by reference to Exhibit 4.1 to the Company's Current Report on Form 8-K (File No. 001-32979), filed on July 13, 2023).
5.1*	Opinion of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.
10.1Δ	Securities Purchase Agreement, dated July 12, 2023, by and among the Company and the purchasers named therein (incorporated by reference to Exhibit 10.1 to the Company's Current Report on Form 8-K (File No. 001-32979), filed on July 13, 2023).
23.1*	Consent of Ernst & Young LLP.
23.2*	Consent of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C. (contained in Exhibit 5.1).
24.1*	Powers of Attorney (included in the signature page of this registration statement).
107*	Filing fee table.

* Filed herewith.

Δ Schedules and exhibits have been omitted pursuant to Item 601(a)(5) of Regulation S-K. The Company undertakes to furnish supplemental copies of any of the omitted schedules upon request by the U.S. Securities and Exchange Commission.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, 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 Austin, State of Texas, on August 10, 2023.

MOLECULAR TEMPLATES, INC.

By: /s/ Eric. E Poma, Ph.D.
Eric E. Poma, Ph.D.
Chief Executive Officer and Chief Scientific Officer

SIGNATURES AND POWER OF ATTORNEY

We, the undersigned officers and directors of Molecular Templates, Inc., hereby severally constitute and appoint Eric E. Poma, Ph.D. and Jason S. Kim and each of them singly (with full power to each of them to act alone), our true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution in each of them for him and in his name, place and stead, and in any and all capacities, to sign any and all amendments (including, without limitation, post-effective amendments) to this registration statement (or any other registration statement for the same offering that is to be effective upon filing pursuant to Rule 462(b) under the Securities Act of 1933), and to file the same, with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, full power and authority to do and perform each and every act and thing requisite or necessary to be done in and about the premises, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents or any of them or their or his substitute or substitutes may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, this registration statement has been signed by the following persons in the capacities and on the dates indicated.

<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ Eric E. Poma, Ph.D.</u> Eric E. Poma, Ph.D.	Chief Executive Officer, Chief Scientific Officer and Director (<i>Principal Executive Officer</i>)	August 10, 2023
<u>/s/ Jason S. Kim</u> Jason S. Kim	Chief Financial Officer (<i>Principal Financial and Accounting Officer</i>)	August 10, 2023
<u>/s/ Harold E. Selick, Ph.D.</u> Harold E. Selick, Ph.D.	Chairman of the Board of Directors	August 10, 2023
<u>/s/ Jonathan Lanfear</u> Jonathan Lanfear	Director	August 10, 2023
<u>/s/ David R. Hoffmann</u> David R. Hoffmann	Director	August 10, 2023
<u>/s/ Kevin M. Lalande</u> Kevin M. Lalande	Director	August 10, 2023
<u>/s/ Corazon "Corsee" Sanders, Ph.D.</u> Corazon "Corsee" Sanders, Ph.D.	Director	August 10, 2023

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<u>Signature</u>	<u>Title</u>	<u>Date</u>
<u>/s/ Gabriela Gruia, M.D.</u> Gabriela Gruia, M.D.	Director	August 10, 2023



August 10, 2023

Molecular Templates, Inc.
9301 Amberglen Blvd, Suite 100
Austin, Texas 78729

Ladies and Gentlemen:

We have acted as counsel to Molecular Templates, Inc., a Delaware corporation (the “Company”), in connection with the preparation and filing by the Company of a Registration Statement on Form S-3 (the “Registration Statement”) under the Securities Act of 1933, as amended (the “Securities Act”) with the Securities and Exchange Commission (the “Commission”). The Registration Statement relates to the registration for resale by the selling stockholders named in the Registration Statement (the “Selling Stockholders”) of up to an aggregate of 42,592,191 shares of the Company’s common stock, \$0.001 par value per share (“Common Stock”), consisting of (i) 24,260,644 shares of Common Stock (the “Shares”) and (ii) 18,331,547 shares of Common Stock (the “Warrant Shares”) issuable upon the exercise of pre-funded warrants to purchase shares of Common Stock (the “Warrants”). The Shares and the Pre-Funded Warrants were issued pursuant to a securities purchase agreement, dated July 12, 2023, by and among the Company and the purchasers named therein (the “Securities Purchase Agreement”). This opinion is being rendered in connection with the filing of the Registration Statement with the Commission.

In connection with this opinion, we have examined the Company’s Amended and Restated Certificate of Incorporation and Amended and Restated Bylaws, each as restated and/or amended to date and currently in effect; such other records of the corporate proceedings of the Company and certificates of the Company’s officers as we have deemed relevant; and the Registration Statement and the exhibits thereto.

In our examination, we have assumed the genuineness of all signatures, the legal capacity of natural persons, the authenticity of all documents submitted to us as originals, the conformity to original documents of all documents submitted to us as certified or photostatic copies and the authenticity of the originals of such copies, and the truth and correctness of any representations and warranties contained therein.

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

With respect to the Warrant Shares, we express no opinion to the extent that future issuances of securities of the Company, adjustments to outstanding securities of the Company and/or other matters cause the Warrants to be exercisable for more shares of Common Stock than the number that remain available for issuance. Further, we have assumed the exercise price of the Warrants will not be adjusted to an amount below the par value per share of the Common Stock.

Based upon and subject to the foregoing, it is our opinion that the Shares are validly issued, fully paid and non-assessable and that the Warrant Shares, when issued against payment therefor in accordance with the terms of the Warrants, will be validly issued, fully paid and non-assessable.

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.

BOSTON LOS ANGELES NEW YORK SAN DIEGO SAN FRANCISCO TORONTO WASHINGTON
MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C.



We understand that you wish to file 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 promulgated under the Securities Act and to reference the firm's name under the caption "Legal Matters" in the prospectus which forms part of the Registration Statement, and we hereby consent thereto. In giving this consent, we do not admit that we are within the category of persons whose consent is required under Section 7 of the Securities Act or the rules and regulations of the Commission promulgated thereunder.

Very truly yours,

/s/ Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.

BOSTON LOS ANGELES NEW YORK SAN DIEGO SAN FRANCISCO TORONTO WASHINGTON
MINTZ, LEVIN, COHN, FERRIS, GLOVSKY AND POPEO, P.C.

Consent of Independent Registered Public Accounting Firm

We consent to the reference to our firm under the caption “Experts” in the Registration Statement (FormS-3) and related Prospectus of Molecular Templates, Inc. for the registration of 24,260,644 shares of common stock and 18,331,547 shares of common stock issuable upon the exercise of pre-funded warrants and to the incorporation by reference therein of our report dated March 30, 2023, with respect to the consolidated financial statements of Molecular Templates, 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

Austin, Texas
August 10, 2023

Calculation of Filing Fee Tables

Form S-3
(Form Type)**Molecular Templates, Inc.**
(Exact Name of Registrant as Specified in its Charter)

Table 1: Newly Registered Securities

	Security Type	Security Class Title	Fee Calculation Rule	Amount Registered(1)(2)	Proposed Maximum Offering Price Per Share(3)	Maximum Aggregate Offering Price	Fee Rate	Amount of Registration Fee
Fees to Be Paid	Equity	Common Stock, par value \$0.001 per share	457(c)	42,592,191	\$0.59	\$25,129,393	0.00011020	\$2,769.26
Total Offering Amounts						\$25,129,393		\$2,769.26
Total Fees Previously Paid								—
Total Fee Offsets								—
Net Fee Due								\$2,769.26

- (1) The shares of common stock will be offered for resale by the selling stockholders pursuant to the prospectus contained herein. Pursuant to Rule 416 under the Securities Act of 1933, as amended (the "Securities Act"), this registration statement also covers any additional number of shares of common stock issuable upon stock splits, stock dividends, or other distribution, recapitalization or similar events with respect to the shares of common stock being registered pursuant to this registration statement.
- (2) This registration statement registers the resale of (i) 24,260,644 shares of common stock of the Registrant held by the selling stockholders and (ii) 18,331,547 shares of common stock of the Registrant issuable upon the exercise of pre-funded warrants to purchase shares of common stock held by the selling stockholders.
- (3) Estimated solely for purposes of calculating the registration fee pursuant to Rule 457(c) under the Securities Act, based on average of high and low price per share of the common stock as reported on the Nasdaq Capital Market on August 4, 2023.