
**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 or organization)

94-3409596
(I.R.S. Employer
Identification Number)

**9301 Amberglen Blvd, Suite 100
Austin, Texas 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
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)

Copy to:

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

Approximate date 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, or a smaller reporting company. See definition of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer Accelerated filer
Non-accelerated filer (Do not check if a smaller reporting company) 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 13(a) of the Exchange Act.

CALCULATION OF REGISTRATION FEE

Title of Each Class of Securities to be Registered	Amount to be Registered(1)	Proposed Maximum Offering Price Per Share(2)	Proposed Maximum Aggregate Offering Price(2)	Amount of Registration Fee
Common Stock, par value \$0.001 per share	11,612,582 shares	\$6.86	\$79,662,312.52	\$9,233.00

- (1) This Registration Statement registers (i) 8,716,056 shares of common stock of the Registrant and (ii) 2,896,526 shares of common stock of the Registrant issuable upon the exercise of certain outstanding warrants issued by the Registrant. Pursuant to Rule 416(a) of the Securities Act of 1933, as amended, this Registration Statement shall also cover any additional shares of the Registrant's common stock that become issuable by reason of any stock dividend, stock split, recapitalization or other similar transaction effected without receipt of consideration that increases the number of the Registrant's outstanding shares of common stock.
- (2) Estimated in accordance with Rule 457(c) solely for purposes of calculating the registration fee on the basis of the average of the high and low prices of the Registrant's common stock as reported on The NASDAQ Capital Market on September 8, 2017.

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

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The information in this prospectus is not complete and may be changed. A registration statement relating to these securities has been filed with the Securities and Exchange Commission. The selling stockholders may not sell these securities until the Securities and Exchange Commission declares the registration statement effective. This prospectus is not an offer to sell these securities and is not soliciting an offer to buy these securities in any state where the offer or sale is not permitted.

SUBJECT TO COMPLETION, DATED SEPTEMBER 15, 2017

PROSPECTUS



**11,612,582 Shares of
Common Stock**

The selling stockholders of Molecular Templates, Inc. (“Molecular,” “we,” “us” or the “Company”) listed beginning on page 9 of this prospectus may offer and resell under this prospectus (i) up to 8,716,056 shares of our common stock and (ii) up to 2,896,526 shares of our common stock issuable upon exercise of warrants acquired by certain of the selling stockholders under the Financing Securities Purchase Agreement (defined below) (the “Warrants”). The selling stockholders acquired the shares of common stock and the Warrants from us either:

- pursuant to a Securities Purchase Agreement (the “Financing Securities Purchase Agreement”), dated August 1, 2017, by and among the Company and the investors listed therein (the “PIPE Investors”); or
- pursuant to a Stock Purchase Agreement (the “Takeda Stock Purchase Agreement”), dated June 23, 2017, by and between the Company and Millennium Pharmaceuticals, Inc., a wholly owned subsidiary of Takeda Pharmaceutical Company Ltd. (“Takeda,” and together with the PIPE Investors, the “Investors”).

We are registering the resale of the shares of common stock covered by this prospectus as required by the Registration Rights Agreement we entered into with the Investors on August 1, 2017. The selling stockholders will receive all of the proceeds from any sales of the shares offered hereby. We will not receive any of the proceeds, but we will incur expenses in connection with the offering. To the extent the Warrants are exercised for cash, if at all, we will receive the exercise price of the Warrants.

The selling stockholders may sell these shares through public or private transactions at market prices prevailing at the time of sale or at negotiated prices. The timing and amount of any sale are within the sole discretion of the selling stockholders. Our registration of the shares of common stock covered by this prospectus does not mean that the selling stockholders will offer or sell any of the shares. For further information regarding the possible methods by which the shares may be distributed, see “Plan of Distribution” beginning on page 13 of this prospectus.

Our common stock is listed on The NASDAQ Capital Market under the symbol “MTEM.” The last reported sale price of our common stock on September 14, 2017 was \$6.74 per share.

Investing in our common stock is highly speculative and involves a significant degree of risk. Please consider carefully the specific factors set forth under “[Risk Factors](#)” beginning on page 3 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 passed upon the accuracy or adequacy of the disclosures in this prospectus. Any representation to the contrary is a criminal offense.

The date of this prospectus is _____, 2017

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ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement 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 of our common stock 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 of common stock are sold or otherwise disposed of on a later date. 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 Additional Information” and “Information Incorporated by Reference” in this prospectus.

We 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 of our common stock 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.

Unless we have indicated otherwise, or the context otherwise requires, references in this prospectus to “Molecular,” the “Company,” “we,” “us” and “our” refer to Molecular Templates, Inc.

PROSPECTUS SUMMARY

This summary description about us and our business highlights selected information contained elsewhere in this prospectus or incorporated by reference into this prospectus. It does not contain all the information you should consider before investing in our securities. Important information is incorporated by reference into this prospectus. To understand this offering fully, you should read carefully the entire prospectus, including “Risk Factors” and “Cautionary Note Regarding Forward-Looking Statements,” together with the additional information described under “Information Incorporated by Reference.”

Our Company

We are a clinical-stage oncology company focused on the discovery and development of differentiated, targeted, biologic therapeutics for cancer. We believe our proprietary biologic drug platforms, which we refer to as engineered toxin bodies (“ETBs”), provide a differentiated mechanism of action that solves problems associated with currently available cancer therapeutics. We have developed ETBs for various targets, including CD20, CD38, HER2, PD-L1, and CD45. CD20 is central to B cell malignancies and is clinically validated as a target for the treatment of lymphomas and autoimmune disease. Our lead compound, MT-3724, is a first generation ETB that recognizes CD20, a B cell marker. MT-4019 is our most advanced second-generation ETB and specifically targets CD38. We have launched additional programs against the key targets HER2 and PD-L1.

Recent Developments

On August 1, 2017, we completed our business combination with Molecular Templates OpCo, Inc. (formerly known as Molecular Templates, Inc.), a privately held Delaware corporation (“Molecular Templates OpCo”), in accordance with the terms of an Agreement and Plan of Merger and Reorganization, dated as of March 16, 2017 (the “Merger Agreement”). Pursuant to the Merger Agreement, we formed a wholly owned subsidiary that merged with and into Molecular Templates OpCo, with Molecular Templates OpCo surviving the merger and becoming our wholly owned subsidiary (the “Merger”). Upon the consummation of the Merger, we changed our name from “Threshold Pharmaceuticals, Inc.” to “Molecular Templates, Inc.” See “The Merger” beginning on page 4 of this prospectus.

On August 1, 2017, we closed the Private Placement and the Takeda Financing. See “The Private Placement and the Takeda Financing” beginning on page 5 of this prospectus.

Corporate Information

We were incorporated in Delaware on October 17, 2001. Upon the consummation of the Merger, we changed our name from “Threshold Pharmaceuticals, Inc.” to “Molecular Templates, Inc.” Our principal executive offices are located at 9301 Amberglen Boulevard, Suite 100, Austin, Texas 78729, and our telephone number is (512) 869 1555. Our website address is www.mtem.com. Our website and the information contained on, or that can be accessed through, our website will not be deemed to be incorporated by reference in, and are not considered part of, this prospectus. You should not rely on our website or any such information in making your decision whether to purchase our common stock.

THE OFFERING

Shares of Common Stock that May be Offered by the Selling Stockholders

Up to 11,612,582 shares of common stock.

Use of Proceeds

We will not receive any proceeds from the sale of the common stock by the selling stockholders. However, if all of the Warrants are exercised for cash, we would receive gross proceeds of approximately \$19.8 million. We currently intend to use such proceeds, if any, for working capital and general corporate purposes.

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.

NASDAQ Capital Market Symbol

MTEM

Risk Factors

Investing in our common stock involves a high degree of risk. See “Risk Factors” beginning on page 3 of this prospectus, and any other risk factors described in the documents incorporated by reference herein, for a discussion of certain factors to consider carefully before deciding to invest in our common stock.

Throughout this prospectus, when we refer to the shares of our common stock being registered on behalf of the selling stockholders for offer and sale, we are referring to the shares of common stock sold to the selling stockholders, as well as the shares of common stock issuable upon exercise of the Warrants, each as described under “The Private Placement and the Takeda Financing” and “Selling Stockholders.” When we refer to the selling stockholders in this prospectus, we are referring to the selling stockholders identified in this prospectus and, as applicable, their 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.

RISK FACTORS

An investment in our common stock involves a high degree of risk. Prior to making a decision about investing in our common stock, you should carefully consider the risks, uncertainties and assumptions discussed under Item 1A, “Risk Factors,” in our Annual Report on Form 10-K for the fiscal year ended December 31, 2016 filed with the SEC on March 27, 2017 (as amended by Amendment No. 1 on Form 10-K/A filed on April 28, 2017), as updated by our subsequent filings with the SEC under the Securities Exchange Act of 1934, as amended (the “Exchange Act”), which are incorporated herein by reference, together with the information in this prospectus and any other information incorporated by reference into this prospectus. See “Where You Can Find Additional Information” and “Information Incorporated by Reference.” Additional risks and uncertainties not presently known to us or that we currently deem immaterial may also affect our business, financial condition or results of operations. The occurrence of any of these known or unknown risks might cause you to lose all or part of your investment in our common stock.

THE MERGER

On August 1, 2017, we completed our business combination with Molecular Templates OpCo in accordance with the terms of the Merger Agreement. Pursuant to the Merger Agreement, we formed a wholly owned subsidiary that merged with and into Molecular Templates OpCo, with Molecular Templates OpCo surviving the Merger and becoming our wholly owned subsidiary. In connection with and prior to the consummation of the Merger, we effected an 11-for-1 reverse stock split (the “Reverse Stock Split”) of the shares of our common stock. The Merger and the Reverse Stock Split were both approved by our stockholders at the annual meeting of stockholders held on July 31, 2017. Upon the consummation of the Merger, we changed our name from “Threshold Pharmaceuticals, Inc.” to “Molecular Templates, Inc.”

Immediately prior to and in connection with the Merger, each outstanding share of Molecular Templates OpCo preferred stock was converted into one share of Molecular Templates OpCo common stock at ratios determined in accordance with Molecular Templates OpCo’s certificate of incorporation then in effect. Under the terms of the Merger Agreement, at the effective time of the Merger, we issued shares of our common stock to Molecular Templates OpCo stockholders at an exchange ratio of 7.7844 shares of our common stock, after taking into account the Reverse Stock Split, in exchange for each share of Molecular Templates OpCo common stock outstanding immediately prior to the Merger. The exchange ratio was determined through arms’-length negotiations between us and Molecular Templates OpCo. An aggregate of approximately 11,656,475 shares of our common stock were issued to the Molecular Templates OpCo stockholders in the Merger. We also assumed all of the stock options issued and outstanding under Molecular Templates OpCo’s 2009 Stock Plan, as amended, and issued and outstanding warrants of Molecular Templates OpCo, with such stock options and warrants henceforth representing the right to purchase a number of shares of our common stock equal to 7.7844 multiplied by the number of shares of Molecular Templates OpCo common stock previously represented by such stock options and warrants, as applicable, after taking into account the Reverse Stock Split.

The issuance of the shares of our common stock to the former stockholders of Molecular Templates OpCo was registered with the SEC on a Registration Statement on Form S-4 (Reg. No. 333-217993).

The foregoing description of the Merger and the Merger Agreement is not complete and is subject to and qualified in its entirety by reference to the Merger Agreement, a copy of which is filed as an exhibit hereto and is incorporated herein by reference. The representations, warranties and covenants made by us in the Merger Agreement 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 thereto, and should not be deemed to be a representation, warranty or covenant to you. Moreover, such representations, warranties or covenants were made as of an earlier date. Accordingly, such representations, warranties and covenants should not be relied on as accurately representing the current state of our affairs.

THE PRIVATE PLACEMENT AND THE TAKEDA FINANCING

On August 1, 2017, we entered into the Financing Securities Purchase Agreement with Longitude Venture Partners III, L.P. and certain other accredited investors, pursuant to which we sold an aggregate of 5,793,063 units (the “Units”) having an aggregate purchase price of \$40.0 million, each such Unit consisting of (i) one (1) share (the “Shares”) of our common stock and (ii) a Warrant to purchase 0.50 shares of our common stock (the “Private Placement”). The Private Placement was pursuant to Equity Commitment Letter agreements entered into by and between us and each of the PIPE Investors in March and June 2017. The purchase price per Unit was \$6.9048. The Warrants will be exercisable for a period of seven years from the date of their issuance at a per-share exercise price of \$6.8423 (which exercise price shall be payable in cash or through a cashless exercise mechanic), subject to certain adjustments as specified in the Warrants.

In connection with the execution on June 23, 2017 of a collaboration and license agreement between Molecular Templates OpCo and Millennium Pharmaceuticals, Inc., a wholly owned subsidiary of Takeda, on June 23, 2017, we and Molecular Templates OpCo entered into the Takeda Stock Purchase Agreement with Takeda, pursuant to which Takeda agreed to purchase shares of our common stock to occur following the consummation of the Merger and the Private Placement. Pursuant to the Takeda Stock Purchase Agreement, on August 1, 2017, following the consummation of the Merger and the Private Placement, we sold 2,922,993 shares of our common stock to Takeda (the “Takeda Shares”) at a price per share of \$6.8423 (the “Takeda Financing”).

In connection with the Private Placement and the subsequent consummation of the Takeda Financing, we entered into a Registration Rights Agreement (the “Registration Rights Agreement”) with each Investor, pursuant to which we are obligated, among other things, to file a registration statement with the SEC within 45 days following the closing of the Private Placement and the Takeda Financing for purposes of registering the Shares and Takeda Shares and the shares of our common stock issuable upon exercise of the Warrants for resale by the PIPE Investors, (ii) use our commercially reasonable efforts to have the registration statement declared effective as soon as practicable after filing, and in any event no later than 120 days after the closing of the Private Placement and the Takeda Financing, and (iii) maintain the registration until all registrable securities may be sold pursuant to Rule 144 under the Securities Act of 1933, as amended (the “Securities Act”), without restriction as to volume. If the registration statement (i) is not filed with the SEC by the filing deadline, (ii) is not declared effective by the effectiveness deadline, (iii) in certain circumstances, ceases to be effective or the Investors are not permitted to use the prospectus to resell their shares, in each case, for more than 30 consecutive trading days or 60 trading days during any 12 month period, or (iv) is not effective and we fail to satisfy the current public information requirement pursuant to Rule 144(c)(1), we must pay liquidated damages equal to 1% of the aggregate purchase price paid by the Investor and, for each 30 day period thereafter, pay an additional 1%, subject to a maximum amount of 6% in the aggregate.

The foregoing description of the Registration Rights Agreement is not complete and is subject to and qualified in its entirety by reference to the Registration Rights Agreement, a copy of which is filed as an exhibit hereto and is incorporated herein by reference.

CAUTIONARY NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the documents incorporated by reference herein contain forward-looking statements within the meaning of Section 27A of the Securities Act and Section 21E of the Exchange Act. These statements relate to future events or to our future financial performance and involve known and unknown risks, uncertainties and other factors which may cause our actual results, performance or achievements to be materially different from any future results, performances or achievements expressed or implied by the forward-looking statements. Forward-looking statements may include, but are not limited to, statements about:

- the timing and success of preclinical studies and clinical trials conducted by us and our development partners;
- the ability to obtain and maintain regulatory approval of our product candidates, and the labeling for any approved products;
- the size and growth of the potential markets for MT-3724 or other product candidates and the ability to serve those markets;
- our expectations regarding our expenses and revenue, the sufficiency of our cash resources and needs for additional financing;
- the rate and degree of market acceptance of any of MT-3724 or other product candidates;
- our expectations regarding competition;
- our anticipated growth strategies;
- our ability to attract or retain key personnel;
- our ability to establish and maintain development partnerships;
- our expectations regarding federal, state and foreign regulatory requirements;
- regulatory developments in the United States and foreign countries;
- our ability to obtain and maintain intellectual property protection for our product candidates; and
- the anticipated trends and challenges in our business and the market in which we operate.

In some cases, you can identify forward-looking statements by terms such as “anticipate,” “believe,” “could,” “estimate,” “expect,” “intend,” “may,” “plan,” “project,” “should,” “target,” “will,” “would” or other words that convey uncertainty of future events or outcomes to identify these forward-looking statements. These statements reflect our current views with respect to future events and are based on assumptions and subject to risks and uncertainties. Given these uncertainties, you should not place undue reliance on these forward-looking statements. We discuss many of these risks in greater detail in our reports filed from time to time under the Securities Act and/or the Exchange Act, including the risks identified in our Annual Report on Form 10-K for the fiscal year ended December 31, 2016 filed with the SEC on March 27, 2017 (as amended by Amendment No. 1 on Form 10-K/A filed on April 28, 2017), as updated by our subsequent filings with the SEC under the Exchange Act. We encourage you to read these filings as they are made. Also, these forward-looking statements represent our estimates and assumptions only as of the date of the document containing the applicable statement.

You should read this prospectus, the documents incorporated by reference herein, and any prospectus supplement or free writing prospectus that we have authorized for use in connection with this offering completely and with the understanding that our actual future results may be materially different from what we expect. We qualify all of the forward-looking statements in the foregoing documents by these cautionary statements.

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Unless required by law, we undertake no obligation to update or revise any forward-looking statements to reflect new information or future events or developments. Thus, you should not assume that our silence over time means that actual events are bearing out as expressed or implied in such forward-looking statements.

USE OF PROCEEDS

We will not receive any of the proceeds from the sale of the common stock by the selling stockholders named in this prospectus. The selling stockholders will receive all of the proceeds from this offering.

Pursuant to conditions set forth in the Warrants, the Warrants are exercisable under certain circumstances on a cashless basis, and should a selling stockholder elect to exercise on a cashless basis we will not receive any proceeds from the sale of common stock issued upon the cashless exercise of the Warrant. The holders of the Warrants are not obligated to exercise their Warrants, and we cannot predict whether holders of the Warrants will choose to exercise all or any of their Warrants or if they will do so for cash or on a cashless basis. However, if all of the Warrants were exercised for cash, we would receive gross proceeds of approximately \$19.8 million. We currently intend to use such proceeds, if any, for working capital and general corporate purposes.

SELLING STOCKHOLDERS

This prospectus relates to the sale or other disposition of up to 11,612,582 shares of our common stock and shares of common stock issuable to the selling stockholders upon exercise of the Warrants by the selling stockholders named below, and their 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. The shares of common stock covered hereby were issued by us in the Private Placement and the Takeda Financing. See “The Private Placement and the Takeda Financing” beginning on page 5 of this prospectus.

The table below sets forth information as of the date of this prospectus, to our knowledge, for the selling stockholders and other information regarding the beneficial ownership (as determined under Section 13(d) of the Exchange Act and the rules and regulations thereunder) of the shares of common stock held by the selling stockholders. The second column lists the number of shares of common stock beneficially owned by the selling stockholders as of August 15, 2017. The third column lists the maximum number of shares of common stock that may be sold or otherwise disposed of by the selling stockholders pursuant to the registration statement of which this prospectus forms a part. The selling stockholders may sell or otherwise dispose of some, all or none of their shares. Pursuant to Rules 13d-3 and 13d-5 of the Exchange Act, beneficial ownership includes any shares of our common stock as to which a stockholder has sole or shared voting power or investment power, and also any shares of our common stock which the stockholder has the right to acquire within 60 days of August 15, 2017. The percentage of beneficial ownership for the selling stockholders is based on 26,880,857 shares of our common stock outstanding as of August 15, 2017 and the number of shares of our common stock issuable upon exercise or conversion of convertible securities that are currently exercisable or convertible or are exercisable or convertible within 60 days of August 15, 2017 beneficially owned by the applicable selling stockholder. Except as described below, to our knowledge, none of the selling stockholders has been an officer or director of ours or of our affiliates within the past three years or has any material relationship with us or our affiliates within the past three years. Our knowledge is based on information provided by the selling stockholders in connection with the filing of this prospectus, as well as information obtained from relevant Schedule 13D and 13G filings.

The shares of common stock being covered hereby may be sold or otherwise disposed of from time to time during the period the registration statement of which this prospectus is a part remains effective, by or for the account of the selling stockholders. After the date of effectiveness of such registration statement, the selling stockholders may have sold or transferred, in transactions covered by this prospectus or in transactions exempt from the registration requirements of the Securities Act, some or all of their common stock.

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.

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Selling Stockholder	Shares of Common Stock Beneficially Owned Before this Offering		Number of Shares of Common Stock Being Offered	Shares of Common Stock To Be Beneficially Owned Upon Completion of this Offering	
	Number	Percentage(1)		Number	Percentage
Perceptive Life Science Master Fund Ltd.	1,086,199(2)	3.99%	1,086,199	—	—
Biotechnology Value Fund, LP	505,525(3)	1.87%	505,525	—	—
Biotechnology Value Fund II, LP	325,609(4)	1.21%	325,609	—	—
Biotechnology Value Trading Fund OS, LP	90,571(5)	0.34%	90,571	—	—
Investment 10, LLC	57,979(6)	0.22%	57,979	—	—
MSI BVF SPV, LLC	106,512(7)	0.40%	106,512	—	—
AJU Growth and Healthcare Fund	232,384(8)	0.86%	72,412	159,972	0.59%
Santé Health Ventures Annex Fund, L.P.	869,492(9)	3.23%	14,482	855,010	3.18%
Santé Health Ventures I, L.P.	7,916,608(10)	29.43%	57,930	7,858,678	29.21%
Excel Venture Fund II, L.P.	1,497,696(11)	5.57%	72,412	1,425,284	5.30%
Longitude Venture Partners III, L.P.	4,344,802(12)	15.34%	4,344,802	—	—
Baker Bros. Advisors, LP	108,618(13)	0.40%	108,618	—	—
CDK Associates L.L.C.	1,520,680(14)	5.55%	1,520,680	—	—
Shrewsbury Capital Partners LLC	217,239(15)	0.81%	217,239	—	—
Franklin M. Berger	108,619(16)	0.40%	108,619	—	—
Millennium Pharmaceuticals, Inc.	2,922,993(17)	10.87%	2,922,993	—	—

- (1) Based on a denominator equal to the sum of (i) 26,880,857 shares of our common stock outstanding on August 15, 2017 and (ii) the number of shares of our common stock issuable upon exercise or conversion of convertible securities that are currently exercisable or convertible or are exercisable or convertible within 60 days of August 15, 2017 beneficially owned by the applicable selling stockholder.
- (2) Consists of (i) 724,133 shares of common stock held by the selling stockholder and (ii) 362,066 shares of common stock issuable upon exercise of Warrants held by the selling stockholder. The selling stockholder's address is 51 Astor Place, 10th Floor, New York, New York 10003.
- (3) Consists of (i) 337,017 shares of common stock held by the selling stockholder and (ii) 168,508 shares of common stock issuable upon exercise of Warrants held by the selling stockholder. BVF Partners LP ("Partners"), as the general partner of Biotechnology Value Fund, LP (the "selling stockholder"), may be deemed to beneficially own the 337,017 shares of common stock and 168,508 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by the selling stockholder. BVF Inc., as the general partner of Partners, may be deemed to beneficially own the 337,017 shares of common stock and 168,508 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by Partners. Mark Lampert ("Mr. Lampert"), as a director and officer of BVF Inc., may be deemed to beneficially own the 337,017 shares of common stock and 168,508 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by BVF Inc. The foregoing should not be construed in and of itself as an admission by any BVF-managed or advised fund, entity or account (each a "Reporting Person" and collectively "Reporting Persons") as to beneficial ownership of any common stock owned by another Reporting Person. Each of Partners, BVF Inc. and Mr. Lampert disclaims beneficial ownership of the common stock beneficially owned by the selling stockholder, and the foregoing shall not be construed as an admission that any such person or entity is the beneficial owner of any such securities. The selling stockholder's address is One Sansome Street, 30th Floor, San Francisco, California 94104.
- (4) Consists of (i) 217,073 shares of common stock held by the selling stockholder and (ii) 108,536 shares of common stock issuable upon exercise of Warrants held by the selling stockholder. Partners, as the general partner of Biotechnology Value Fund II, LP (the "selling stockholder"), may be deemed to beneficially own the 217,073 shares of common stock and 108,536 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by the selling stockholder. BVF Inc., as the general partner of Partners, may be deemed to beneficially own the 217,073 shares of common stock and 108,536 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by Partners. Mr. Lampert, as a director and officer of BVF Inc., may be deemed to beneficially own the 217,073 shares of common stock and 108,536 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by BVF Inc. The foregoing should not be construed in and of itself as an admission by any Reporting Person as to beneficial ownership of any common stock owned by another Reporting Person. Each of Partners, BVF Inc. and Mr. Lampert disclaims beneficial ownership of the common stock beneficially owned by the selling stockholder, and the foregoing shall not be construed as an admission that any such person or entity is the beneficial owner of any such securities. The selling stockholder's address is One Sansome Street, 30th Floor, San Francisco, California 94104.

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- (5) Consists of (i) 60,381 shares of common stock held by the selling stockholder and (ii) 30,190 shares of common stock issuable upon exercise of Warrants held by the selling stockholder. BVF Partners OS Ltd. (“BVF OS”), as the general partner of Biotechnology Value Trading Fund OS, LP (the “selling stockholder”), may be deemed to beneficially own the 60,381 shares of common stock and 30,190 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by the selling stockholder. Partners, as the sole shareholder of BVF OS, may be deemed to beneficially own the 60,381 shares of common stock and 30,190 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by BVF OS. BVF Inc., as the general partner of Partners, may be deemed to beneficially own the 60,381 shares of common stock and 30,190 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by Partners. Mr. Lampert, as a director and officer of BVF Inc., may be deemed to beneficially own the 60,381 shares of common stock and 30,190 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by BVF Inc. The foregoing should not be construed in and of itself as an admission by any Reporting Person as to beneficial ownership of any common stock owned by another Reporting Person. Each of BVF OS, Partners, BVF Inc. and Mr. Lampert disclaims beneficial ownership of the common stock beneficially owned by the selling stockholder, and the foregoing shall not be construed as an admission that any such person or entity is the beneficial owner of any such securities. The selling stockholder’s address is Ugland House, South Church Street, George Town, Grand Cayman, KYI-1104, Cayman Islands.
- (6) Consists of (i) 38,653 shares of common stock held by the selling stockholder and (ii) 19,326 shares of common stock issuable upon exercise of Warrants held by the selling stockholder. Partners, as the investment manager of Investment 10, LLC (the “selling stockholder”), may be deemed to beneficially own the 38,653 shares of common stock and 19,326 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by the selling stockholder. BVF Inc., as the general partner of Partners, may be deemed to beneficially own the 38,653 shares of common stock and 19,326 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by Partners. Mr. Lampert, as a director and officer of BVF Inc., may be deemed to beneficially own the 38,653 shares of common stock and 19,326 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by BVF Inc. The foregoing should not be construed in and of itself as an admission by any Reporting Person as to beneficial ownership of any common stock owned by another Reporting Person. Each of Partners, BVF Inc. and Mr. Lampert disclaims beneficial ownership of the common stock beneficially owned by the selling stockholder, and the foregoing shall not be construed as an admission that any such person or entity is the beneficial owner of any such securities. The selling stockholder’s address is 900 N. Michigan Avenue, Suite 1100, Chicago, Illinois 60611.
- (7) Consists of (i) 71,008 shares of common stock held by the selling stockholder and (ii) 35,504 shares of common stock issuable upon exercise of Warrants held by the selling stockholder. Partners, as the investment manager of MSI BVF SPV LLC (the “selling stockholder”), may be deemed to beneficially own the 71,008 shares of common stock and 35,504 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by the selling stockholder. BVF Inc., as the general partner of Partners, may be deemed to beneficially own the 71,008 shares of common stock and 35,504 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by Partners. Mr. Lampert, as a director and officer of BVF Inc., may be deemed to beneficially own the 71,008 shares of common stock and 35,504 shares of common stock issuable upon exercise of Warrants held by the selling stockholder that are beneficially owned by BVF Inc. The foregoing should not be construed in and of itself as an admission by any Reporting Person as to beneficial ownership of any common stock owned by another Reporting Person. Each of Partners, BVF Inc. and Mr. Lampert disclaims beneficial ownership of the common stock beneficially owned by the selling stockholder, and the foregoing shall not be construed as an admission that any such person or entity is the beneficial owner of any such securities. The selling stockholder’s address is Maples Corporate Services Ltd., PO Box 309, Ugland House, Grand Cayman, KYI-1104, Cayman Islands.
- (8) Includes (i) 208,247 shares of common stock held by AJU Growth and Healthcare Fund (“AJU Healthcare”) and (ii) 24,137 shares of common stock issuable upon the exercise of Warrants held by the AJU Healthcare. This figure excludes 1,080,562 shares of common stock held by AJU Life Science Overseas Platform Fund, an affiliate of the AJU Healthcare. The shares held by AJU Healthcare may be deemed to be beneficially owned by AJU IB Investment, Co., Ltd., its General Partner (“AJU IB”). AJU IB may be deemed to share voting and investment power over the shares held by AJU Healthcare and disclaims beneficial ownership of such shares except to the extent of its pecuniary interest therein. AJU Healthcare’s address is 800 Boylston St., Suite 2510, Boston, Massachusetts 02199.
- (9) Consists of (i) 864,665 shares of common stock held by the selling stockholder and (ii) 4,827 shares of common stock issuable upon exercise of Warrants held by the selling stockholder. The securities held by Sante Health Ventures I Annex Fund, L.P. may be deemed to be beneficially owned by Kevin Lalande, a member of our board of directors, Joe Cunningham, M.D. and Douglas D. French, who are managing directors (the “SHV Directors”) of SHV Management Services, LLC (“SHV Management”). SHV Management is the general partner of SHV Annex Services, LP, which is the general partner of Sante Health Ventures I Annex Fund, L.P. Each of the SHV Directors, SHV Management and SHV Annex Services, LP disclaims beneficial ownership of the reported securities except to the extent of his or its pecuniary interest therein. The selling stockholder’s address is 300 W. 6th Street, Suite 2300, Austin, Texas 78701.

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- (10) Consists of (i) 7,897,298 shares of common stock held by the selling stockholder and (ii) 19,310 shares of common stock issuable upon exercise of Warrants held by the selling stockholder. The securities held by Sante Health Ventures I, L.P. may be deemed to be beneficially owned by Kevin Lalande, a member of our board of directors, Joe Cunningham, M.D. and Douglas D. French, who are managing directors of SHV Management. SHV Management is the general partner of SHV Management Services, LP, which is the general partner of Sante Health Ventures I, L.P. Each of the SHV Directors, SHV Management and SHV Management Services, LP disclaims beneficial ownership of the reported securities except to the extent of his or its pecuniary interest therein. The selling stockholder's address is 300 W. 6th Street, Suite 2300, Austin, Texas 78701.
- (11) Consists of (i) 1,473,559 shares of common stock held by the selling stockholder and (ii) 24,137 shares of common stock issuable upon exercise of Warrants held by the selling stockholder. The securities held by Excel Venture Fund II, L.P. may be deemed to be beneficially owned by Steven R. Gullans, Juan Enriquez, Caleb M. Winder and Frederick R. Blume who are managing directors (the "Excel Directors") of Excel Ventures II GP, LLC ("Excel GP"). Excel GP is the general partner of Excel Venture Fund II, L.P. Each of the Excel Directors and Excel GP may be deemed to share voting and investment power over the shares held by Excel Venture Fund II and disclaims beneficial ownership of such shares except to the extent of its, his or her pecuniary interest therein. The selling stockholder's address is 800 Boylston Street, Suite 2825, Boston, MA 02199.
- (12) Consists of (i) 2,896,535 shares of common stock held by the selling stockholder and (ii) 1,448,267 shares of common stock issuable upon exercise of Warrants held by the selling stockholder. Such securities are held by Longitude Venture Partners III, L.P. ("Longitude Venture III") and may be deemed to be beneficially owned by Longitude Capital Partners III, LLC ("Longitude Capital III"), David Hirsch, a member of our board of directors ("Dr. Hirsch"), Patrick G. Enright ("Mr. Enright"), and Juliet Tammenoms Bakker ("Ms. Bakker"). Longitude Capital III is the general partner of Longitude Venture III and may be deemed to share voting and investment power over our securities held by Longitude Venture III. Dr. Hirsch, Mr. Enright and Ms. Bakker are members of Longitude Capital III and Mr. Enright and Ms. Bakker are the managing members of Longitude Capital III, and all of them may be deemed to share voting and investment power over our securities held by Longitude Venture III. Each of Longitude Capital III, Dr. Hirsch, Mr. Enright and Ms. Bakker disclaims beneficial ownership of such securities except to the extent of its, his or her pecuniary interest therein. The selling stockholder's address is 2740 Sand Hill Road, 2nd Floor, Menlo Park, California 94025.
- (13) The shares of common stock reported to us as beneficially owned by Baker Bros. Advisors LP ("BBA") are held by the following selling stockholders: (i) 667, L.P. ("667") (7,322 shares of common stock and 3,661 shares of common stock issuable upon exercise of Warrants held by the selling stockholder) and (ii) Baker Brothers Life Sciences, L.P. ("BBLS") (65,090 shares of common stock and 32,545 shares of common stock issuable upon exercise of Warrants held by the selling stockholder). BBA is the management company and investment adviser to 667 and BBLS and may be deemed to beneficially own all of our securities held by 667 and BBLS. Baker Bros. Advisors (GP) LLC ("BBA-GP") is the sole general partner of BBA. Julian C. Baker and Felix J. Baker have voting and investment power over our securities held by each of 667 and BBLS, as principals of BBA-GP. Julian C. Baker, Felix J. Baker, BBA and BBA-GP disclaim beneficial ownership of our securities held by 667 and BBLS, except to the extent of their pecuniary interest therein. The selling stockholder's address is 667 Madison Avenue, New York, New York 10065.
- (14) Consists of (i) 1,013,787 shares of common stock held by the selling stockholder and (ii) 506,893 shares of common stock issuable upon exercise of Warrants held by the selling stockholder. These shares are held by CDK Associates, L.L.C. and may be deemed to be beneficially owned by (x) Scott Morenstein, a member of our board of directors and a Managing Director of Caxton Alternative Management LP, the investment manager of CDK Associates, L.L.C., (y) Caxton Corporation, the manager of CDK Associates, LLC and (z) Bruce Kovner, the chairman and sole shareholder of Caxton Corporation. Caxton Corporation, Bruce Kovner and CDK Associates, L.L.C. may be considered directors by deputization due to their affiliation with Scott Morenstein. Each of Scott Morenstein, Caxton Corporation and Bruce Kovner disclaims beneficial ownership of these shares except to the extent of its or his pecuniary interest, if any, therein, and the foregoing shall not be deemed to be an admission that any such person is the beneficial owner of such securities for purposes of Section 16 or for any other purpose. The selling stockholder's address is 731 Alexander Road, Building 2, Suite 500, Princeton, New Jersey 08540.
- (15) Consists of (i) 144,826 shares of common stock held by the selling stockholder and (ii) 72,413 shares of common stock issuable upon exercise of Warrants held by the selling stockholder. The securities held by the selling stockholder may be deemed to be beneficially owned by Jonathan E. Gold, the Managing Member of the selling stockholder. Mr. Gold may be deemed to share voting and investment power over the shares held by the selling stockholder and disclaims beneficial ownership of such shares except to the extent of his pecuniary interest therein. The selling stockholder's address is PO Box 3322, New York, New York 10163.
- (16) Consists of (i) 72,413 shares of common stock held by the selling stockholder and (ii) 36,206 shares of common stock issuable upon exercise of Warrants held by the selling stockholder. The selling stockholder's address is 257 Park Avenue South, 15th Floor, New York, New York 10010.
- (17) Consists of 2,922,993 shares of common stock held by the selling stockholder. Millennium Pharmaceuticals, Inc. is a wholly owned subsidiary of Takeda Pharmaceutical Company Limited. The selling stockholder's address is 35 Landsdowne Street, Cambridge, Massachusetts 02139.

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 owned by them and, if they default in the performance of their secured obligations, the pledgees or secured parties may offer and sell the shares of common stock, 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 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 Warrants by payment of cash, however, we will receive the exercise price of the 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, 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 of which this prospectus is a part.

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 all expenses of the registration of the shares of common stock pursuant to the Registration Rights 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 Registration Rights 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 Registration Rights Agreement, or we may be entitled to contribution.

We have agreed with the selling stockholders to keep the registration statement of which this prospectus is a part effective until the earlier of (i) 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 (ii) 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 shares of common stock offered in this prospectus has been passed upon for us by Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., Boston, Massachusetts.

EXPERTS

The consolidated financial statements of Threshold Pharmaceuticals, Inc. appearing in Threshold Pharmaceuticals, Inc.'s Annual Report (Form 10-K) for the year ended December 31, 2016 have been audited by Ernst & Young LLP, independent registered public accounting firm, as set forth in their report thereon, 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 ADDITIONAL INFORMATION

We are subject to the information requirements of the Exchange Act and we therefore file periodic reports, proxy statements and other information with the SEC relating to our business, financial statements and other matters. The reports, proxy statements and other information we file may be inspected and copied at prescribed rates at the SEC's Public Reference Room located at 100 F Street, N.E., Washington, D.C. 20549. You may obtain information on the operation of the SEC's Public Reference Room by calling the SEC at 1-800-SEC-0330. The SEC also maintains a website that contains reports, proxy and information statements and other information regarding issuers like us that file electronically with the SEC. The address of the SEC's website is <http://www.sec.gov>.

This prospectus constitutes part of a registration statement filed under the Securities Act with respect to the shares of common stock covered hereby. As permitted by the SEC's rules, this prospectus omits some of the information, exhibits and undertakings included in the registration statement. You may read and copy the information omitted from this prospectus but contained in the registration statement, as well as the periodic reports and other information we file with the SEC, at the public reference room and website of the SEC referred to above. You may also access our filings with the SEC on our website, which is located at <http://www.mtem.com/>. The information contained on our website is not part of this prospectus.

Statements contained in this prospectus as to the contents of any contract or other document are not necessarily complete, and in each instance we refer you to the copy of the contract or other document filed or incorporated by reference as an exhibit to the registration statement or as an exhibit to our Exchange Act filings, each such statement being qualified in all respects by such reference.

INFORMATION INCORPORATED BY REFERENCE

We are allowed to incorporate by reference information contained in documents that we file with the SEC. This means that we can disclose important information to you by referring you to those documents and that the information in this prospectus is not complete and you should read the information incorporated by reference for more detail. Information in this prospectus supersedes information incorporated by reference that we filed with the SEC prior to the date of this prospectus, while information that we file later with the SEC will automatically update and supersede the information in this prospectus.

We incorporate by reference the documents listed below and any future filings we will make with the SEC under Section 13(a), 13(c), 14 or 15 (d) of the Exchange Act (i) after the date of the initial filing of the registration statement of which this prospectus is a part and prior to effectiveness of such registration statement and (ii) from the date of this prospectus but prior to the termination of the offering of the securities covered by this prospectus (other than Current Reports or portions thereof furnished under Item 2.02 or 7.01 of Form 8-K):

- our Annual Report on Form 10-K for the fiscal year ended December 31, 2016, filed with the SEC on March 27, 2017 (as amended by Amendment No. 1 on Form 10-K/A filed on April 28, 2017);

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- our Quarterly Reports on Form 10-Q for the quarter ended March 31, 2017, filed with the SEC on May 15, 2017, and for the quarter ended June 30, 2017, filed with the SEC on July 31, 2017;
- our Current Reports on Form 8-K filed with the SEC on March 17, 2017, March 29, 2017, March 30, 2017, June 2, 2017, June 22, 2017, July 20, 2017, August 1, 2017 and August 7, 2017 (other than any portions thereof deemed furnished and not filed); and
- the description of our common stock set forth in the registration statement on Form 8-A registering our common stock under Section 12 of the Exchange Act, which was filed with the SEC on August 9, 2006, including any amendments or reports filed for purposes of updating such description.

We will provide to each person, including any beneficial owner, to whom a prospectus is delivered, a copy of any or all of the information that is incorporated by reference in this prospectus but not delivered with this prospectus, including exhibits that are specifically incorporated by reference in such documents. You may request a copy of such documents, which will be provided to you at no cost, by writing or telephoning us at the following address or telephone number:

MOLECULAR TEMPLATES, INC.
9301 Amberglen Blvd, Suite 100
Austin, Texas 78729
Attention: Chief Executive Officer
Telephone: (512) 869-1555

11,612,582 Shares



Common Stock

PROSPECTUS

PART II

INFORMATION NOT REQUIRED IN PROSPECTUS

ITEM 14. OTHER EXPENSES OF ISSUANCE AND DISTRIBUTION

The following table sets forth the fees and expenses incurred and to be incurred in connection with the registration of the securities being registered hereby, all of which will be borne by us. Except for the SEC registration fee, all amounts are estimates.

SEC Registration Fee	\$ 9,233
Accounting Fees and Expenses	\$15,000
Legal Fees and Expenses	\$35,000
Miscellaneous Fees and Expenses	\$ 2,767
Total	\$62,000

ITEM 15. INDEMNIFICATION OF OFFICERS AND DIRECTORS

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

Section 145 of the Delaware General Corporation Law authorizes a court to award, or a corporation's board of directors to grant, indemnity to directors and officers in terms sufficiently broad to permit such indemnification under certain circumstances for liabilities, including reimbursement for expenses incurred, arising under the Securities Act.

Section 145 of the Delaware General Corporation Law states:

(a) A corporation shall have 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, whether civil, criminal, administrative or investigative (other than an action by or in the right of the corporation) by reason of the fact that the person is or was a director, officer, employee or agent of the corporation, or is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise, against expenses (including attorneys' fees), judgments, fines and amounts paid in settlement actually and reasonably incurred by the person in connection with such action, suit or proceeding if the person acted in good faith and in a manner the 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 the person's conduct was unlawful. The termination of any action, suit or proceeding by judgment, order, settlement, conviction, or upon a plea of nolo contendere or its equivalent, shall not, of itself, create a presumption that the person did not act in good faith and in a manner which the 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 reasonable cause to believe that the person's conduct was unlawful.

(b) A corporation shall have 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 or suit by or in the right of the corporation to procure a judgment in its favor by reason of the fact that the person is or was a director, officer, employee or agent of the corporation, or is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise against expenses (including attorneys' fees)

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actually and reasonably incurred by the person in connection with the defense or settlement of such action or suit if the person acted in good faith and in a manner the person reasonably believed to be in or not opposed to the best interests of the corporation and except that no indemnification shall be made in respect of 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 the court in which such action or suit was brought shall determine upon application that, despite the adjudication of liability but in view of all 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.

(c) To the extent that a present or former director or officer of a corporation has been successful on the merits or otherwise in defense of any action, suit or proceeding referred to in subsections (a) and (b) of this section, or in defense of any claim, issue or matter therein, such person shall be indemnified against expenses (including attorneys' fees) actually and reasonably incurred by such person in connection therewith.

(d) Any indemnification under subsections (a) and (b) of this section (unless ordered by a court) shall be made by the corporation only as authorized in the specific case upon a determination that indemnification of the present or former director, officer, employee or agent is proper in the circumstances because the person has met the applicable standard of conduct set forth in subsections (a) and (b) of this section. Such determination shall be made, with respect to a person who is a director or officer of the corporation at the time of such determination:

- (1) By a majority vote of the directors who are not parties to such action, suit or proceeding, even though less than a quorum; or
- (2) By a committee of such directors designated by majority vote of such directors, even though less than a quorum; or
- (3) If there are no such directors, or if such directors so direct, by independent legal counsel in a written opinion; or
- (4) By the stockholders.

(e) Expenses (including attorneys' fees) incurred by an officer or director of the corporation in defending any civil, criminal, administrative or investigative action, suit or proceeding may be paid by the corporation in advance of the final disposition of such action, suit or proceeding upon receipt of an undertaking by or on behalf of such director or officer to repay such amount if it shall ultimately be determined that such person is not entitled to be indemnified by the corporation as authorized in this section. Such expenses (including attorneys' fees) incurred by former directors and officers or other employees and agents of the corporation or by persons serving at the request of the corporation as directors, officers, employees or agents of another corporation, partnership, joint venture, trust or other enterprise may be so paid upon such terms and conditions, if any, as the corporation deems appropriate.

(f) The indemnification and advancement of expenses provided by, or granted pursuant to, the other subsections of this section shall not be deemed exclusive of any other rights to which those seeking indemnification or advancement of expenses may be entitled under any bylaw, agreement, vote of stockholders or disinterested directors or otherwise, both as to action in such person's official capacity and as to action in another capacity while holding such office. A right to indemnification or to advancement of expenses arising under a provision of the certificate of incorporation or a bylaw shall not be eliminated or impaired by an amendment to the certificate of incorporation or the bylaws after the occurrence of the act or omission that is the subject of the civil, criminal, administrative or investigative action, suit or proceeding for which indemnification or advancement of expenses is sought, unless the provision in effect at the time of such act or omission explicitly authorizes such elimination or impairment after such action or omission has occurred.

(g) A corporation shall have power to purchase and maintain insurance on behalf of any person who is or was a director, officer, employee or agent of the corporation, or is or was serving at the request of the corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise against any liability asserted against such person and incurred by such person in any such capacity, or arising out of such person's status as such, whether or not the corporation would have the power to indemnify such person against such liability under this section.

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(h) For purposes of this section, references to “the corporation” shall include, in addition to the resulting corporation, any constituent corporation (including any constituent of a constituent) absorbed in a consolidation or merger which, if its separate existence had continued, would have had power and authority to indemnify its directors, officers, and employees or agents, so that any person who is or was a director, officer, employee or agent of such constituent corporation, or is or was serving at the request of such constituent corporation as a director, officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise, shall stand in the same position under this section with respect to the resulting or surviving corporation as such person would have with respect to such constituent corporation if its separate existence had continued.

(i) For purposes of this section, references to “other enterprises” shall include employee benefit plans; references to “fines” shall include any excise taxes assessed on a person with respect to any employee benefit plan; and references to “serving at the request of the corporation” shall include any service as a director, officer, employee or agent of the corporation which imposes duties on, or involves services by, such director, officer, employee or agent with respect to an employee benefit plan, its participants or beneficiaries; and a person who acted in good faith and in a manner such person reasonably believed to be in the interest of the participants and beneficiaries of an employee benefit plan shall be deemed to have acted in a manner “not opposed to the best interests of the corporation” as referred to in this section.

(j) The indemnification and advancement of expenses provided by, or granted pursuant to, this section shall, unless otherwise provided when authorized or ratified, continue as to a person who has ceased to be a director, officer, employee or agent and shall inure to the benefit of the heirs, executors and administrators of such a person.

(k) The Court of Chancery is hereby vested with exclusive jurisdiction to hear and determine all actions for advancement of expenses or indemnification brought under this section or under any bylaw, agreement, vote of stockholders or disinterested directors, or otherwise. The Court of Chancery may summarily determine a corporation’s obligation to advance expenses (including attorneys’ fees).

As permitted by Delaware law, our amended and restated certificate of incorporation limits or eliminates the personal liability of our directors to the maximum extent permitted by Delaware law.

Our amended and restated bylaws provide for indemnification of our directors and executive officers to the maximum extent permitted by the Delaware General Corporation Law.

In addition, we have entered into indemnification agreements with each of our current directors and we intend to enter into new indemnification agreements with certain of our executive officers. These agreements will 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, our amended and restated bylaws, our indemnification agreements with our current directors and executive officers and Sections 102 and 145 of the Delaware General Corporation Law 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.

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To the extent that our directors, officers and controlling persons are indemnified under the provisions contained in our amended and restated certificate of incorporation, 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

EXHIBIT INDEX

<u>Exhibit Number</u>	<u>Item</u>
2.1	Agreement and Plan of Merger and Reorganization, dated March 16, 2017, by and among the Registrant, Trojan Merger Sub, Inc. and Molecular Templates, Inc. (incorporated by reference to Annex A to the Registrant's Registration Statement on Form S-4/A filed with the Securities and Exchange Commission on June 27, 2017).
3.1	Amended and Restated Certificate of Incorporation of the Registrant, as subsequently amended (incorporated by reference to Exhibit 3.1 to the Registrant's Annual Report on Form 10-K filed with the Securities and Exchange Commission on March 6, 2014).
3.2	Certificate of Amendment of Amended and Restated Certificate of Incorporation of the Registrant, dated August 1, 2017 (incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on August 1, 2017).
3.3	Certificate of Amendment of Amended and Restated Certificate of Incorporation of the Registrant, dated August 1, 2017 (incorporated by reference to Exhibit 3.1 to the Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on August 7, 2017).
3.4	Amended and Restated Bylaws of the Registrant (incorporated by reference to Exhibit 3.2 to the Registrant's Quarterly Report on Form 10-Q filed with the Securities and Exchange Commission on November 7, 2016).
4.1	Registration Rights Agreement, dated August 1, 2017, by and among the Registrant and the investors named therein (incorporated by reference to Exhibit 10.3 to the Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on August 7, 2017).
4.2	Form of Warrant (incorporated by reference to Exhibit 10.4 to the Registrant's Current Report on Form 8-K filed with the Securities and Exchange Commission on August 7, 2017).
5.1*	Opinion of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C.
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 hereto).
24.1*	Powers of Attorney (included in the signature page of this registration statement).

* Filed herewith.

ITEM 17. UNDERTAKINGS

The undersigned registrant hereby undertakes:

- (1) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:
 - (i) To include any prospectus required by Section 10(a)(3) of the Securities Act;
 - (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

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aggregate, represent a fundamental change in the information set forth in the registration statement. Notwithstanding the foregoing, any increase or decrease in volume of securities offered (if the total dollar value of securities offered would not exceed that which was registered) and any deviation from the low or high end of the estimated maximum offering range may be reflected in the form of prospectus filed with the Securities and Exchange 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 (1)(i), (1)(ii) and (1)(iii) of this section 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 Exchange Act 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, 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 to any purchaser:

(i) If the registrant is relying on Rule 430B:

- (A) 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
- (B) 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; or

(ii) If the registrant is subject to Rule 430C, each prospectus filed pursuant to Rule 424(b) as part of a registration statement relating to an offering, other than registration statements relying on Rule 430B or other than

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prospectuses filed in reliance on Rule 430A, shall be deemed to be part of and included in the registration statement as of the date it is first used after effectiveness. Provided, however, that no statement made in a registration statement or prospectus that is part of the registration statement or made in a document incorporated or deemed incorporated by reference into the registration statement or prospectus that is part of the registration statement will, as to a purchaser with a time of contract of sale prior to such first use, supersede or modify any statement that was made in the registration statement or prospectus that was part of the registration statement or made in any such document immediately prior to such date of first use.

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 Section 15(d) of the Exchange Act (and, where applicable, each filing of an employee benefit plan's annual report pursuant to Section 15(d) of the Exchange Act) that is incorporated by reference in the registration statement shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to directors, officers and controlling persons of the registrant pursuant to the foregoing provisions, or otherwise, the registrant has been advised that in the opinion of the Securities and Exchange 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 a 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.

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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 Austin, State of Texas, on September 15, 2017.

MOLECULAR TEMPLATES, INC.

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

POWERS OF ATTORNEY

Each person whose signature appears below hereby constitutes and appoints Eric E. Poma, Ph.D. and Jason S. Kim, and each of them, as his true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to sign any and all amendments (including post-effective amendments and registration statements filed pursuant to Rule 462) to this registration statement, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto each said attorney-in-fact and agent, full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as he might or could do in person, hereby ratifying and confirming all that each said attorney-in-fact and agent or his substitutes or substitute, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, as amended, this registration statement on Form S-3 has been signed by the following persons in the capacities and on the dates indicated.

<u>Name</u>	<u>Title</u>	<u>Date</u>
<u>/s/ Eric E. Poma, Ph.D.</u> Eric E. Poma, Ph.D.	Chief Executive Officer (Principal Executive Officer) and Director	September 15, 2017
<u>/s/ Jason S. Kim</u> Jason S. Kim	President and Chief Operating Officer (Principal Financial and Accounting Officer)	September 15, 2017
<u>/s/ Harold E. Selick, Ph.D.</u> Harold E. Selick, Ph.D.	Director	September 15, 2017
<u>/s/ Michael Broxson</u> Michael Broxson	Director	September 15, 2017
<u>/s/ David Hirsch, MD, Ph.D.</u> David Hirsch, MD, Ph.D.	Director	September 15, 2017
<u>/s/ David Hoffmann</u> David Hoffmann	Director	September 15, 2017
<u>/s/ Kevin Lalande</u> Kevin Lalande	Director	September 15, 2017
<u>/s/ Scott Morenstein</u> Scott Morenstein	Director	September 15, 2017

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23.2*	Consent of Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C (contained in Exhibit 5.1 hereto).
24.1*	Powers of Attorney (included in the signature page of this registration statement).

* Filed herewith.

MINTZ LEVIN

One Financial Center
Boston, MA 02111
617-542-6000
617-542-2241 fax
www.mintz.com

September 15, 2017

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

Ladies and Gentlemen:

We have acted as legal counsel to Molecular Templates, Inc., a Delaware corporation (the "Company"), in connection with the preparation and filing with the Securities and Exchange Commission (the "Commission") of a Registration Statement on Form S-3 (the "Registration Statement") under the Securities Act of 1933, as amended (the "Securities Act"). 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 11,612,582 shares of the Company's common stock, \$0.001 par value per share ("Common Stock"), consisting of (i) 8,716,056 shares of Common Stock issued to the Selling Stockholders on August 1, 2017 (the "Shares") and (ii) 2,896,526 shares of Common Stock issuable upon the exercise of certain outstanding warrants (the "Warrants") issued by the Company to the Selling Stockholders on August 1, 2017 (the "Warrant Shares"). 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 and relied upon the Certificate of Incorporation and Bylaws of the Company, each as restated and/or amended to date, and such other documents as we have deemed necessary for purposes of rendering the opinions hereinafter set forth.

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.

Our opinion is limited to the General Corporation Law of the State of Delaware and we express no opinion with respect to the laws of any other jurisdiction. No opinion is expressed herein with respect to the qualification of the Shares or the Warrant Shares under the securities or blue sky laws of any state or any foreign jurisdiction.

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.

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

BOSTON | LONDON | LOS ANGELES | NEW YORK | SAN DIEGO | SAN FRANCISCO | STAMFORD | WASHINGTON

Based upon the foregoing, we are of the opinion that (i) the Shares are validly issued, fully paid and non-assessable and (ii) the Warrant Shares, when issued and delivered upon the exercise of the Warrants in accordance with their terms, will be validly issued, fully paid and non-assessable.

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.

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 (Form S-3) and related Prospectus of Molecular Templates, Inc. for the registration of 11,612,582 shares of its common stock and to the incorporation by reference therein of our report dated March 27, 2017, with respect to the consolidated financial statements of Threshold Pharmaceuticals, Inc. included in its Annual Report (Form 10-K) for the year ended December 31, 2016, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

Austin, Texas
September 15, 2017