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Filed Pursuant to Rule 424(b)(5)
Registration No. 333-228975

PROSPECTUS SUPPLEMENT
(To Prospectus dated February 13, 2019)

Molecular Templates, Inc.



6,000,000 Shares of Common Stock

250 Shares of Series A Convertible Preferred Stock

We are offering 6,000,000 shares of our common stock and 250 shares of our Series A Convertible Preferred Stock, which we refer to as our Series A Preferred Stock, with an aggregate public offering price of \$50,000,000. Our common stock is listed on The Nasdaq Capital Market under the symbol "MTEM." On November 20, 2019, the last reported sale price for our common stock on The Nasdaq Capital Market was \$8.27 per share. We do not intend to list our Series A Preferred Stock on any securities exchange or trading system.

Each share of Series A Preferred Stock is convertible into 1,000 shares of our common stock at any time at the option of the holder, provided that the holder will be prohibited from converting the Series A Preferred Stock into shares of our common stock if, as a result of such conversion, the holder, together with its affiliates, would own more than 9.99% of the total number of shares of our common stock then issued and outstanding. In the event of our liquidation, dissolution, or winding up, holders of our Series A Preferred Stock will receive a payment equal to \$0.001 per share of Series A Preferred Stock before any proceeds are distributed to the holders of our common stock. The Series A Preferred Stock has no voting rights, except as required by law and except that the consent of the Series A Preferred Stock holders will be required to amend the terms of the Series A Preferred Stock.

Investing in our common stock and our Series A Preferred Stock involves a high degree of risk. Please read "[Risk Factors](#)" on page S-7 of this prospectus supplement and under similar headings in the documents incorporated by reference into this prospectus supplement.

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

	<i>Per Share of Common Stock</i>	<i>Per Share of Series A Preferred Stock</i>	<i>Total</i>
Public offering price	\$ 8.00	\$ 8,000.00	\$ 50,000,000
Underwriting discounts and commissions(1)	\$ 0.48	\$ 480.00	\$ 3,000,000
Proceeds, before expenses, to us	\$ 7.52	\$ 7,520.00	\$ 47,000,000

(1) We have agreed to reimburse the underwriters for certain expenses. See "Underwriting."

Certain of our existing stockholders and their affiliated entities, including affiliates of our directors, have indicated an interest in purchasing up to an aggregate of approximately \$15.0 million of our shares in this offering at the public offering price. However, because indications of interest are not binding agreements or commitments to purchase, the underwriters could determine to sell more, less or no shares of common stock to any of these existing stockholders and their affiliated entities, and any of these existing stockholders and affiliated entities could determine to purchase more, less or no shares of common stock in this offering.

We have granted the underwriters an option for a period of 30 days from the date of this prospectus supplement to purchase up to an additional 900,000 shares of our common stock at the public offering price, less the underwriting discounts and commissions. See "Underwriting" for more information.

The underwriters expect to deliver the securities to investors on or about November 25, 2019.

Joint Book-Running Managers

Cowen

Barclays

Stifel

Lead Manager

Oppenheimer & Co.

Co-Manager

Ladenburg Thalmann

The date of this prospectus supplement is November 20, 2019.

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[Table of Contents](#)**ABOUT THIS PROSPECTUS SUPPLEMENT**

This prospectus supplement and the accompanying prospectus relate to an offering of shares of our common stock and Series A Preferred Stock. Before buying any shares of our common stock and Series A Preferred Stock that we are offering, we urge you to carefully read this prospectus supplement and the accompanying prospectus, together with the information incorporated by reference as described under the headings “Where You Can Find Additional Information” and “Incorporation of Certain Information by Reference” in this prospectus supplement. These documents contain important information that you should consider when making your investment decision.

Unless the context otherwise requires, “Molecular Templates,” “Molecular,” “MTEM,” “the Company,” “we,” “us,” “our” and similar terms refer to Molecular Templates, Inc., a company incorporated under the laws of Delaware, together with its subsidiaries.

This document contains two parts. The first part is this prospectus supplement, which describes the terms of this offering of shares of our common stock and Series A Preferred Stock and also adds to, updates and changes information contained in the accompanying prospectus and the documents incorporated by reference. The second part is the accompanying prospectus, which gives more general information. To the extent the information contained in this prospectus supplement differs from or conflicts with the information contained in the accompanying prospectus or any document incorporated by reference, the information in this prospectus supplement will control. If any statement in one of these documents is inconsistent with a statement in another document having a later date—for example, a document incorporated by reference into the accompanying prospectus—the statement in the document having the later date modifies or supersedes the earlier statement.

This prospectus supplement is part of a registration statement that we filed with the Securities and Exchange Commission, or SEC, using a “shelf” registration process. Under the shelf registration process, we may from time to time offer and sell any combination of the securities described in the accompanying prospectus up to a total dollar amount of \$200.0 million, of which this offering is a part.

We are responsible for the information contained in or incorporated by reference in this prospectus supplement and the accompanying prospectus and in any free writing prospectus we prepare or authorize. We have not, and the underwriters have not, authorized anyone to provide you with information different from that which is contained in or incorporated by reference in this prospectus supplement, the accompanying prospectus and in any free writing prospectus that we have authorized for use in connection with this offering and we take no responsibility for any other information others may give you. We are not, and the underwriters are not, making an offer to sell these securities in any jurisdiction where the offer or sale is not permitted. You should assume that the information contained in this prospectus supplement is accurate as of the date on the front cover of this prospectus supplement only and that any information we have incorporated by reference or included in the accompanying prospectus is accurate only as of the date given in the document incorporated by reference or as of the date of the prospectus, as applicable, regardless of the time of delivery of this prospectus supplement, the accompanying prospectus, any related free writing prospectus, or any sale of shares of our common stock or Series A Preferred Stock. Our business, financial condition, results of operations and prospects may have changed since that date.

For investors outside the United States: Neither we, nor the underwriters, have done anything that would permit this offering or possession or distribution of this prospectus supplement or the accompanying prospectus in any jurisdiction where action for that purpose is required, other than in the United States. You are required to inform yourselves about, and to observe any restrictions relating to, this offering and the distribution of this prospectus supplement and the accompanying prospectus.

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

This prospectus supplement, the accompanying prospectus and the information incorporated herein and therein by reference include trademarks, service marks and trade names owned by us or other companies. All trademarks, service marks and trade names included or incorporated by reference into this prospectus are the property of their respective owners.

Information contained on, or that can be accessed through, our website does not constitute part of this prospectus supplement, the accompanying prospectus or any related free writing prospectus.

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus supplement, the prospectus and the documents we have filed with the SEC that are incorporated by reference contain “forward-looking statements” within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Exchange Act of 1934, as amended, or the Exchange Act, that involve substantial risks and uncertainties. In some cases, forward-looking statements are identified by the words “anticipate,” “believe,” “continue,” “could,” “estimate,” “expect,” “future,” “goals,” “intend,” “likely,” “may,” “might,” “ongoing,” “objective,” “plan,” “potential,” “predict,” “project,” “seek,” “should,” “strategy,” “will” and “would” or the negative of these terms, or other comparable terminology intended to identify statements about the future. These statements involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to be materially different from the information expressed or implied by these forward-looking statements.

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

- ? the implementation of our business strategies, including our ability to pursue development pathways and regulatory strategies for MT-3724 and other engineered toxin body, or ETB, product candidates;
- ? the timing and our ability to advance the development of our product candidates;
- ? our plans to pursue discussions with regulatory authorities, and the anticipated timing, scope and outcome of related regulatory actions or guidance;
- ? our ability to establish and maintain potential new partnering or collaboration arrangements for the development and commercialization of ETB product candidates;
- ? our financial condition, including our ability to obtain the funding necessary to advance the development of our product candidates;
- ? the anticipated progress of our product candidate development programs, including whether our ongoing and potential future clinical trials will achieve clinically relevant results;
- ? our ability to generate data and conduct analyses to support the regulatory approval of our product candidates;
- ? our ability to establish and maintain intellectual property rights for our product candidates;
- ? whether any product candidates that we are able to commercialize are safer or more effective than other marketed products, treatments or therapies;
- ? our ability to discover and develop additional product candidates suitable for clinical testing;
- ? our ability to identify, in-license or otherwise acquire additional product candidates and development programs;
- ? our anticipated research and development activities and projected expenditures;
- ? our ability to complete preclinical and clinical testing successfully for new product candidates that we may develop or license; and
- ? the sufficiency of our cash resources.

You should refer to the section titled “Risk Factors” of this prospectus supplement and in our other filings with the SEC, including our Annual Report on Form 10-K for the year ended December 31, 2018 and our subsequent Quarterly Reports on Form 10-Q, for a discussion of important factors that may cause our actual results to differ materially from those expressed or implied by our forward-looking statements. As a result of these factors, we cannot assure that the forward-looking statements in this

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prospectus supplement or the documents we have filed with the SEC that are incorporated by reference will prove to be accurate. Furthermore, if our forward-looking statements prove to be inaccurate, the inaccuracy may be material. In light of the significant uncertainties in these forward-looking statements, these statements should not be regarded as representations or warranties by us or any other person that we will achieve our objectives and plans in any specified time frame, or at all. We undertake no obligation to publicly update any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by law.

In addition, statements that “we believe” and similar statements reflect our beliefs and opinions on the relevant subject. These statements are based upon information available to us as of the date of this prospectus supplement, and while we believe such information forms a reasonable basis for such statements, such information may be limited or incomplete, and our statements should not be read to indicate that we have conducted an exhaustive inquiry into, or review of, all potentially available relevant information. These statements are inherently uncertain and investors are cautioned not to unduly rely upon these statements as predictions of future events.

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

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[Table of Contents](#)**PROSPECTUS SUPPLEMENT SUMMARY**

This summary highlights selected information contained elsewhere or incorporated by reference in this prospectus supplement and the accompanying prospectus. This summary does not contain all the information you should consider before investing in our common stock and Series A Preferred Stock. You should read and consider carefully the more detailed information in this prospectus supplement and the accompanying prospectus, including the factors described under the heading "Risk Factors" in this prospectus supplement and the financial and other information incorporated by reference in this prospectus supplement and the accompanying prospectus, as well as the information included in any free writing prospectus that we have authorized for use in connection with this offering, before making an investment decision.

Overview

We are a clinical-stage biopharmaceutical company focused on the discovery and development of differentiated, targeted, biologic therapeutics for cancer. We utilize our proprietary biologic drug platform to design and generate ETBs, which we believe provides a differentiated mechanism of action that may be beneficial in patients resistant to currently available cancer therapeutics. ETBs use a genetically engineered version of the Shiga-like Toxin A subunit, or SLTA, a ribosome inactivating bacterial protein. In its wild-type form, SLTA is thought to induce its own entry into a cell when proximal to the cell surface membrane, self-route to the cytosol, and enzymatically and irreversibly shut down protein synthesis via ribosome inactivation. SLTA is normally coupled to its cognate Shiga-like Toxin B subunit, or SLTB, to target the CD77 cell surface marker, a non-internalizing glycosphingolipid. In our scaffold, a genetically engineered SLTA subunit with no cognate SLTB component is genetically fused to antibody domains or fragments specific to a cancer target, resulting in a biologic therapeutic that can identify the particular target and specifically kill the cancer cell. The antibody domains may be substituted with other antibody domains having different specificities to potentially allow for the rapid development of new drugs to selected targets in cancer.

ETBs combine the specificity of an antibody with SLTA's potent mechanism of cell destruction. Based on the disease setting, we have created ETBs that have reduced immunogenicity and are capable of delivering additional payloads into a target cell. Immunogenicity is the ability of a foreign substance to provoke an immune response in a host. ETBs have relatively predictable pharmacokinetic, or PK, and absorption, distribution, metabolism and excretion, or ADME, profiles and can be rapidly screened for desired activity in robust cell-based and animal-model assays. Because SLTA can induce internalization against non- and poorly-internalizing receptors, the universe of targets for ETBs should be substantially larger than that seen with antibody drug conjugates, or ADCs, which are not likely to be effective if the target does not readily internalize the ADC payload.

ETBs have a differentiated mechanism of cell-kill in cancer therapeutics (the inhibition of protein synthesis via ribosome destruction), and we have preclinical and clinical data demonstrating the utility of these molecules in chemotherapy-refractory cancers. ETBs have shown good tolerability in multiple animal models as well as in our clinical studies to date. We believe the target specificity of ETBs, their ability to self-internalize, their potent and differentiated mechanism of cell kill and their tolerability profile provide opportunities for the clinical development of these agents to address multiple cancer types.

Our initial approach to drug development in oncology involves the selection of lead compounds to validated targets in cancer. We have developed ETBs for various targets, including CD20, CD38, HER2, and PD-L1. CD20 is central to B cell malignancies and is clinically validated as a target for the treatment of lymphomas and autoimmune disease. CD38 has been validated as a meaningful clinical

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target in the treatment of multiple myeloma. PD-L1 is central to immune checkpoint pathways and is a target expressed in a variety of solid tumor cancers.

Our lead compound, MT-3724, is an ETB that recognizes CD20, a B cell marker and is currently in multiple Phase II studies. The dose escalation portion of our first Phase I clinical trial has been completed for MT-3724 and was followed by the initiation of a Phase Ib expansion cohort, which was initiated in the fourth quarter of 2017. Results of the Phase I/Ib study are scheduled to be presented at the American Society of Hematology (ASH) Annual Meeting, December 7-10, 2019 in Orlando, FL.

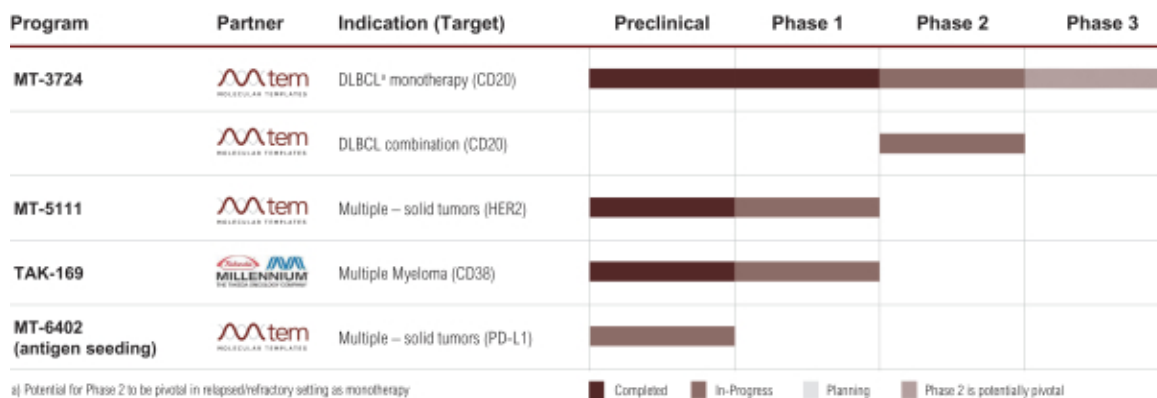
In the first quarter of 2019, we initiated a Phase II monotherapy study with MT-3724, which has the potential to be a pivotal study. We have also initiated a Phase II combination study with MT-3724 and chemotherapy (gemcitabine and oxaliplatin) in earlier lines of relapsed and refractory diffuse large B-cell lymphoma, or DLBCL, and a second Phase II combination study with MT-3724 and Revlimid® (lenalidomide) in earlier lines of DLBCL. We expect to provide an update on all three Phase II studies of MT-3724 in the fourth quarter of 2019.

We filed an IND for MT-5111, our ETB targeting HER2, in March 2019 and the IND was accepted in April 2019. We began dosing patients in a Phase I study of MT-5111 in the fourth quarter of 2019. We anticipate providing an update on this study in the fourth quarter of 2019. Takeda filed an IND for TAK-169, our jointly discovered ETB targeting CD38, in May 2019 and the IND was accepted in June 2019. Phase I dosing for TAK-169 is expected to start in the second half of 2019. We anticipate starting a Phase I study for our ETB targeting PD-L1 in 2020.

We have built up multiple core competencies around the creation and development of ETBs. We developed the ETB technology in-house and continue to make iterative improvements in the scaffold and identify new uses of the technology. We also developed the proprietary process for manufacturing ETBs under Good Manufacturing Process, or GMP standards and continue to make improvements to its manufacturing processes.

We have conducted multiple GMP manufacturing runs with our lead compound and believe this process is robust and could support commercial production with gross margins that are similar to those seen with antibodies.

Molecular's Oncology Pipeline With Novel MOAs Driven by ETB Platform



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On November 18, 2019, we entered into a Master Collaboration Agreement, or the Collaboration Agreement, with Vertex Pharmaceuticals Incorporated, or Vertex, pursuant to which the parties agreed to enter into a strategic research collaboration to leverage our ETB technology platform to discover and develop novel targeted biologic therapies for applications outside of oncology.

Pursuant to the terms of the Collaboration Agreement, we granted Vertex an exclusive option to obtain an exclusive license under our licensed technology to exploit one or more ETB products that are discovered by us against up to two designated targets. Vertex has selected an initial target and has the option to designate one additional target within specified time limits.

Pursuant to the Collaboration Agreement, Vertex has paid us an upfront payment of \$38.0 million, consisting of \$23.0 million in cash and a \$15.0 million equity investment pursuant to a share purchase agreement described further below. In addition to the upfront payments, we may also receive an additional \$22.0 million through the exercise of the options to license ETB products or to add an additional target. We shall provide, and Vertex will reimburse us for, certain mutually agreed manufacturing technology transfer activities.

We may, for each target under the Collaboration Agreement, receive up to an additional \$180.0 million in milestone payments upon the achievement of certain development and regulatory milestone events and up to an additional \$70.0 million in milestone payments upon the achievement of certain sales milestone events. We will also be entitled to receive, subject to certain reductions, tiered mid-single digit royalties as percentages of calendar year net sales, if any, on any licensed product.

We will be responsible for conducting the research activities through the designation, if any, of one or more development candidates. Upon the exercise by Vertex of its option for a development candidate, Vertex will be responsible for all development, manufacturing, regulatory and commercialization activities with respect to that development candidate.

Unless earlier terminated, the Collaboration Agreement will expire (i) on a country-by-country basis and licensed product-by-licensed product basis on the date of expiration of all payment obligations under the Collaboration Agreement with respect to such licensed product in such country and (ii) in its entirety upon the expiration of all payment obligations thereunder with respect to all licensed products in all countries or upon Vertex's decision not to exercise any option on or prior to the applicable deadlines. Vertex has the right to terminate the Collaboration Agreement for convenience upon prior written notice to us. Either party has the right to terminate the Collaboration Agreement (a) for the insolvency of the other party or (b) subject to specified cure periods, in the event of the other party's uncured material breach.

In connection with the Collaboration Agreement, we and Vertex entered into the share purchase agreement, dated November 18, 2019, pursuant to which Vertex purchased 1,666,666 shares of our common stock at a price per share of \$9.00.

Updated Cash Runway Statement

Including the upfront payment from our entry into the Collaboration Agreement described above and the related equity investment, we expect that our existing cash, cash equivalents and marketable securities are sufficient to fund our operating expenses and capital expenditure requirements through approximately the first half of 2021.

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We were originally incorporated in the State of Delaware in October 2001 under the name “Threshold Pharmaceuticals, Inc.” On August 1, 2017, Molecular Templates, Inc., formerly known as Threshold Pharmaceuticals, Inc. (Nasdaq: THLD), or Threshold, completed its business combination with then-private Molecular Templates, Inc., or Private Molecular, formerly D5 Pharma Inc., in accordance with the terms of the Agreement and Plan of Merger and Reorganization, dated as of March 16, 2017, by and among Threshold, Trojan Merger Sub, Inc., or Merger Sub, and Private Molecular, or the “Merger Agreement, pursuant to which Merger Sub merged with and into Private Molecular, with Private Molecular surviving as a wholly owned subsidiary of Threshold, or the Merger. On August 1, 2017, in connection with, and prior to the completion of, the Merger, Threshold effected a 11:1 reverse stock split of its common stock and on August 1, 2017, immediately after completion of the Merger, Threshold changed its name to “Molecular Templates, Inc.” (Nasdaq: MTEM).

Our corporate headquarters are located at 9301 Amberglen Boulevard, Suite 100, Austin, Texas 78729 and our telephone number is (512) 869-1555. We maintain a website at www.mtem.com, to which we regularly post copies of our press releases as well as additional information about us. The information contained on, or that can be accessed through, our website is not a part of this prospectus. We have included our website address in this prospectus solely as an inactive textual reference.

All brand names or trademarks appearing in this prospectus are the property of their respective holders. Use or display by us of other parties' trademarks, trade dress, or products in this prospectus is not intended to, and does not, imply a relationship with, or endorsements or sponsorship of, us by the trademark or trade dress owners. As used herein, the words “Molecular Templates,” “Molecular,” “MTEM,” the “Company,” “we,” “us,” and “our” refer to Molecular Templates, Inc. and our subsidiaries. Our subsidiary Molecular Templates OpCo, Inc. was incorporated in Delaware in February 2009.

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The Offering

Common Stock

Common stock offered by us	6,000,000 shares
Underwriters' option to purchase additional shares	We have granted the underwriters an option for a period of up to 30 days from the date of this prospectus supplement to purchase up to an additional 900,000 shares of common stock at the public offering price less the underwriting discounts and commissions.
Common stock to be outstanding immediately after this offering	42,954,510 shares (or 43,854,510 shares if the underwriters exercise their option to purchase additional shares in full).

Series A Preferred Stock

Series A Preferred Stock offered by us	250 shares
Conversion	Each share of our Series A Preferred Stock is convertible into 1,000 shares of our common stock at any time at the option of the holder, provided that the holder will be prohibited from converting Series A Preferred Stock into shares of our common stock if, as a result of such conversion, the holder, together with its affiliates, would own more than 9.99% of the total number of shares of our common stock then issued and outstanding.
Liquidation Preference	In the event of our liquidation, dissolution, or winding up, holders of our Series A Preferred Stock will receive a payment equal to \$0.001 per share of Series A Preferred Stock before any proceeds are distributed to the holders of our common stock.
Voting Rights	Shares of Series A Preferred Stock will generally have no voting rights, except as required by law and except that the consent of the holders of the outstanding Series A Preferred Stock will be required to amend the terms of the Series A Preferred Stock.
Use of proceeds	We intend to use the net proceeds from this offering, together with our existing cash, cash equivalents and marketable securities, to fund: our ongoing Phase II clinical studies for MT-3724; our ongoing

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	Phase I clinical study of MT-5111; our share of development expenses in our CD38 collaboration with Takeda; our program PD-L1 (including our anticipated upcoming Phase I clinical study for PD-L1); further preclinical development and drug discovery activities in our other programs; and for working capital and general corporate purposes. See “Use of Proceeds.”
Risk factors	An investment in our securities involves a high degree of risk. See the information contained in or incorporated by reference under “Risk Factors” on page S-7 of this prospectus supplement and under similar headings in the other documents that are incorporated by reference herein and therein.
Nasdaq Capital Market Symbol	Our common stock is listed on The Nasdaq Capital Market under the symbol “MTEM.”

The number of shares of common stock expected to be outstanding after this offering and, unless otherwise indicated, the information in this prospectus supplement are based on 36,954,510 shares of common stock outstanding as of September 30, 2019, and excludes:

- ? 4,599,243 shares issuable upon the exercise of outstanding stock options issued pursuant to our 2018 Equity Incentive Plan, or the 2018 Plan, at a weighted average exercise price of \$6.09 per share, as of September 30, 2019;
- ? 8,636 shares of common stock reserved for issuance under the Amended and Restated 2004 Employee Stock Purchase Plan as of September 30, 2019;
- ? 962,394 shares of common stock reserved for issuance under the 2018 Plan as of September 30, 2019;
- ? 3,521,731 shares of common stock issuable upon the exercise of warrants outstanding as of September 30, 2019; and
- ? 1,666,666 shares of common stock issued to Vertex on November 18, 2019 pursuant to its equity investment in MTEM as part of our collaboration.

Except as otherwise indicated, we have presented the information in this prospectus supplement assuming:

- ? no exercise by the underwriters in this offering of their option to purchase additional shares; and
- ? no exercise of outstanding options described above.

Certain of our existing stockholders and their affiliated entities, including affiliates of our directors, have indicated an interest in purchasing up to an aggregate of approximately \$15.0 million of our shares of common stock in this offering at the public offering price. However, because indications of interest are not binding agreements or commitments to purchase, the underwriters could determine to sell more, less or no shares of common stock to any of these existing stockholders and their affiliated entities, and any of these existing stockholders and affiliated entities could determine to purchase more, less or no shares of common stock in this offering.

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RISK FACTORS

Investing in our securities involves a high degree of risk. Our business, prospects, financial condition or operating results could be materially adversely affected by the risks identified below, as well as other risks not currently known to us or that we currently consider immaterial. The trading price of our common stock could decline due to any of these risks, and you may lose all or part of your investment. Before deciding whether to invest in our securities, you should consider carefully the risk factors discussed below and those contained in our most recent annual report on Form 10-K and our quarterly reports on Form 10-Q which are on file with the SEC and are incorporated herein by reference, and which may be amended, supplemented or superseded from time to time by other reports we file with the SEC in the future.

Risks Related to this Offering

Management will have broad discretion as to the use of the net proceeds from this offering, and we may not use the proceeds effectively.

Our management will have broad discretion in the application of the net proceeds from this offering and could spend the proceeds in ways that do not improve our results of operations or enhance the value of our common stock. Our failure to apply these funds effectively could have a material adverse effect on our business, delay the development of our product candidates and cause the price of our common stock to decline.

If certain of our existing stockholders participate in this offering, the available public float for our common stock will be reduced and the liquidity of our common stock may be adversely affected.

Certain of our existing stockholders and their affiliated entities, including affiliates of our directors, have indicated an interest in purchasing up to an aggregate of approximately \$15.0 million of our shares of common stock in this offering at the initial public offering price. However, because indications of interest are not binding agreements or commitments to purchase, the underwriters could determine to sell more, less or no shares of common stock to any of these existing stockholders and their affiliated entities, and any of these existing stockholders and affiliated entities could determine to purchase more, less or no shares of common stock in this offering. Any shares of our common stock purchased by these entities in this offering will reduce the available public float for our common stock, and certain of such shares of our common stock may be subject to a 90-day lock-up agreement with the underwriters. As a result, any purchase of shares by these entities in this offering may reduce the liquidity of our shares of common stock relative to what it would have been had these shares been purchased by other investors or not subject to lock-up agreements.

If you purchase securities in this offering, you will suffer immediate and substantial dilution.

If you purchase securities in this offering, you will incur immediate and substantial dilution in the as adjusted net tangible book value of the common stock that you purchase, or that is issuable upon conversion of the Series A Preferred Stock, of \$5.82 per share as of September 30, 2019, based on the public offering price of \$8.00 per share, because the price that you pay will be substantially greater than the net tangible book value per share of the shares you acquire. You will experience additional dilution upon the exercise of options, including those options currently outstanding and those granted in the future, and the issuance of restricted stock or other equity awards under our stock incentive plans.

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

In order to raise additional capital, we may in the future offer additional shares of common stock or other securities convertible into or exchangeable for our shares of common stock at prices that may not be the same as the prices per share in this offering. We may sell shares or other securities in any other

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offering at a price per share that is less than the price per share paid by investors in this offering, and investors purchasing shares or other securities in the future could have rights superior to existing shareholders. The price per share at which we sell additional shares of common stock, or securities convertible or exchangeable into shares of common stock, in future transactions may be higher or lower than the price per share of common stock paid by investors in this offering.

Because we do not anticipate paying any cash dividends on our capital stock in the foreseeable future, capital appreciation, if any, will be your sole source of gain.

We have never paid or declared any cash dividends on our capital stock. We currently intend to retain earnings, if any, to finance the growth and development of our business and we do not anticipate paying any cash dividends in the foreseeable future. As a result, only appreciation of the price of our common stock will provide a return to our stockholders.

Sales of a substantial number of our common stock by our existing shareholders in the public market could cause our stock price to fall.

If our existing shareholders sell, or indicate an intention to sell, substantial amounts of our common stock in the public market, the trading price of our common stock could decline. In addition, a substantial number of shares of common stock are subject to outstanding options or will become eligible for sale in the public market to the extent permitted by the provisions of various vesting schedules. If these additional shares of common stock are sold, or if it is perceived that they will be sold, in the public market, the trading price of our common stock could decline.

We, our executive officers and directors and certain of our existing shareholders have agreed that, subject to certain exceptions, during the period ending 90 days after the date of this prospectus supplement, we and they will not offer, sell, contract to sell, pledge or otherwise dispose of, directly or indirectly, any of our common stock or securities convertible into or exchangeable or exercisable for any of our common stock, enter into a transaction that would have the same effect, or enter into any swap, hedge or other arrangement that transfers, in whole or in part, any of the economic consequences of ownership of our common stock, whether any of these transactions are to be settled by delivery of our common stock or other securities, in cash or otherwise, or publicly disclose the intention to make any offer, sale, pledge or disposition, or to enter into any transaction, swap, hedge or other arrangement, without, in each case, the prior written consent of Cowen and Company, LLC, Barclays Capital Inc. and Stifel, Nicolaus & Company, Incorporated, who may release any of the securities subject to these lock-up agreements at any time without notice. Exceptions to the lock-up restrictions are described in more detail in this prospectus supplement under the caption "Underwriting."

Anti-takeover provisions in our charter documents and under Delaware law could make an acquisition of us, which may be beneficial to our stockholders, more difficult and may prevent attempts by our stockholders to replace or remove our current management.

Provisions in our amended and restated certificate of incorporation, as amended, and amended and restated bylaws may delay or prevent an acquisition of us or a change in our management. These provisions include:

- ? authorizing the issuance of "blank check" preferred stock, the terms of which may be established and shares of which may be issued without stockholder approval;
- ? creating a staggered board of directors;
- ? prohibiting stockholder action by written consent, thereby requiring all stockholder actions to be taken at a meeting of our stockholders; and
- ? establishing advance notice requirements for nominations for election to the board of directors or for proposing matters that can be acted upon at stockholder meetings.

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In addition, because we are incorporated in Delaware, we are governed by the provisions of Section 203 of the Delaware General Corporation Law, which limits the ability of stockholders owning in excess of 15% of our outstanding voting stock to merge or combine with us. Although we believe these provisions collectively provide for an opportunity to obtain greater value for stockholders by requiring potential acquirers to negotiate with our board of directors, they would apply even if an offer rejected by our board were considered beneficial by some stockholders. In addition, these provisions may frustrate or prevent any attempts by our stockholders to replace or remove our current management by making it more difficult for stockholders to replace members of our board of directors, which is responsible for appointing the members of our management.

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USE OF PROCEEDS

We estimate that we will receive net proceeds of approximately \$46.6 million (or approximately \$53.3 million if the underwriters' option to purchase additional shares is exercised in full) from the sale of the shares of common stock and Series A preferred stock offered by us in this offering, after deducting the underwriting discounts and commissions and estimated offering expenses payable by us.

We intend to use the net proceeds from this offering, together with our existing cash, cash equivalents and marketable securities, to fund the following:

- ? our ongoing Phase II clinical studies for MT-3724;
- ? our ongoing Phase I clinical study of MT-5111;
- ? our share of development expenses in our CD38 collaboration with Takeda;
- ? our program PD-L1 (including our anticipated upcoming Phase I clinical study for PD-L1);
- ? further preclinical development and drug discovery activities in our other programs; and
- ? for working capital and general corporate purposes.

We believe opportunities may exist from time to time to expand our current business through acquisitions or in-licensing of complementary companies, medicines or technologies. While we have no current agreements, commitments or understandings for any specific acquisitions or in-licensing at this time, we may use a portion of the net proceeds for these purposes.

Our expected use of the net proceeds from this offering represents our current intentions based upon our present plans and business conditions. Although we currently anticipate that we will use the net proceeds from this offering as described above, there may be circumstances where a reallocation of funds is necessary. Due to the uncertainties inherent in the product development process, it is difficult to estimate with certainty the exact amounts of the net proceeds from this offering that may be used for the above purposes. The amounts and timing of our actual expenditures will depend upon numerous factors, including the factors described in "Risk Factors." Accordingly, our management will have broad discretion in applying the net proceeds from this offering. An investor will not have the opportunity to evaluate the economic, financial or other information on which we base our decisions on how to use the proceeds.

Based on our current plans, we believe that our existing cash, cash equivalents and marketable securities, together with the net proceeds from this offering, will be sufficient to enable us to fund our operating expenses and capital expenditure requirements into the beginning of 2022.

We have based this estimate on assumptions that may prove to be wrong, and we could use our available capital resources sooner than we currently expect. We do not expect the net proceeds from this offering and our existing cash and cash equivalents to be sufficient to fund the development of our product candidates through regulatory approval and commercialization. We will need to raise substantial additional funds for further development and before we can expect to commercialize any products, if approved. We may satisfy our future cash needs through the sale of equity securities, debt financings, working capital lines of credit, corporate collaborations or license agreements, grant funding, interest income earned on invested cash balances or a combination of one or more of these sources.

Pending these uses, we intend to invest the net proceeds in high quality, investment grade instruments, certificates of deposit or direct or guaranteed obligations of the U.S. government, or hold such proceeds as cash.

[Table of Contents](#)**CAPITALIZATION**

The following table sets forth our cash and cash equivalents and capitalization as of September 30, 2019:

- ? on an actual basis; and
- ? on an as adjusted basis, giving effect to the sale of 6,000,000 shares of common stock by us in this offering and our sale of 250 shares of Series A Preferred Stock by us in this offering for aggregate net proceeds of approximately \$46.6 million, after deducting underwriting discounts and commissions and estimated offering expenses payable by us.

	As of September 30, 2019	
	Actual	As Adjusted
	(\$ in thousands, except share and per share data)	
Cash and cash equivalents	\$ 15,268	\$ 61,838
Short-term marketable securities	\$ 36,147	\$ 36,147
Long term debt, including current portion	\$ 3,602	\$ 3,602
Shareholders' equity:		
Common stock, \$0.001 par value per share; 150,000,000 authorized; 36,954,510 issued and outstanding, actual; 42,954,510 shares issued and outstanding, as adjusted	37	43
Preferred stock, \$0.001 par value per share, 2,000,000 authorized; none issued and outstanding, actual; 250 shares issued and outstanding, as adjusted	—	—
Additional paid-in-capital	201,203	247,767
Accumulated other comprehensive income	20	20
Accumulated deficit	(148,244)	(148,244)
Total shareholders' equity	53,016	99,586
Total capitalization	\$ 56,618	\$ 103,188

The table above excludes:

- ? 4,599,243 shares issuable upon the exercise of outstanding stock options issued pursuant to our 2018 Equity Incentive Plan, or the 2018 Plan, at a weighted average exercise price of \$6.09 per share, as of September 30, 2019;
- ? 8,636 shares of common stock reserved for issuance under the Amended and Restated 2004 Employee Stock Purchase Plan as of September 30, 2019;
- ? 962,394 shares of common stock reserved for issuance under the 2018 Plan as of September 30, 2019;
- ? 3,521,731 shares of common stock issuable upon the exercise of warrants outstanding as of September 30, 2019; and
- ? 1,666,666 shares of common stock issued to Vertex on November 18, 2019, pursuant to its equity investment in MTEM as part of our collaboration and \$38.0 million of upfront payments from Vertex to us, consisting of the \$15.0 million in proceeds from this equity investment and a \$23.0 million upfront cash payment.

The above also assumes the following:

- ? no exercise by the underwriters in this offering of their option to purchase additional shares; and
- ? no exercise of outstanding options described above.

[Table of Contents](#)**DILUTION**

If you invest in our securities in this offering, your ownership interest will be diluted to the extent of the difference between the price per share you pay in this offering and the net tangible book value per share of our common stock immediately after this offering. The net tangible book value of our common stock as of September 30, 2019 was approximately \$47.3 million, or approximately \$1.28 per share of common stock based upon 36,954,510 shares outstanding as of September 30, 2019. Net tangible book value per share is equal to our total tangible assets, less our total liabilities, divided by the total number of shares outstanding. This discussion assumes that all purchasers in this offering elect to purchase common stock or to convert their shares of Series A Preferred Stock into common stock.

After giving effect to the sale by us of 6,000,000 shares of common stock at the public offering price of \$8.00 per share and 250 shares of Series A Preferred Stock at the public offering price of \$8,000.00 per share, and after deducting underwriting discounts and commissions and estimated offering expenses payable by us, our net tangible book value as of September 30, 2019 would have been approximately \$93.8 million, or \$2.18 per share of common stock. This amount represents an immediate increase in net tangible book value of \$0.90 per share to existing stockholders and an immediate dilution of \$5.82 per share to purchasers in this offering. The following table illustrates the dilution:

Public offering price per share of common stock	\$ 8.00
Public offering price per share of preferred stock	\$ 8,000.00
Net tangible book value per share as of September 30, 2019	\$ 1.28
Increase per share attributable to new investors	<u>\$ 0.90</u>
As adjusted net tangible book value per share as of September 30, 2019, after giving effect to this offering	<u>\$ 2.18</u>
Dilution per share to new investors purchasing shares in this offering	<u><u>\$ 5.82</u></u>

The number of shares of common stock expected to be outstanding after this offering and, unless otherwise indicated, the information in this prospectus supplement are based on 36,954,510 shares of common stock outstanding as of September 30, 2019, and excludes:

- ? 4,599,243 shares issuable upon the exercise of outstanding stock options issued pursuant to our 2018 Equity Incentive Plan, or the 2018 Plan, at a weighted average exercise price of \$6.09 per share, as of September 30, 2019;
- ? 8,636 shares of common stock reserved for issuance under the Amended and Restated 2004 Employee Stock Purchase Plan as of September 30, 2019;
- ? 962,394 shares of common stock reserved for issuance under the 2018 Plan as of September 30, 2019;
- ? 3,521,731 shares of common stock issuable upon the exercise of warrants outstanding as of September 30, 2019; and
- ? 1,666,666 shares of common stock issued to Vertex on November 18, 2019, pursuant to its equity investment in MTEM as part of our collaboration and \$38.0 million of upfront payments from Vertex to us, consisting of the \$15.0 million in proceeds from this equity investment and a \$23.0 million upfront cash payment.

The above also assumes the following:

- ? no exercise by the underwriters in this offering of their option to purchase additional shares; and
- ? no exercise of outstanding options described above.

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If the underwriters exercise their option to purchase 900,000 shares of common stock in full, the as adjusted net tangible book value after this offering would be approximately \$2.29 per share, representing an increase in net tangible book value of approximately \$1.01 per share to existing stockholders and immediate dilution in net tangible book value of approximately \$5.71 per share to investors purchasing our common stock in this offering at the public offering price.

Certain of our existing stockholders and their affiliated entities, including affiliates of our directors, have indicated an interest in purchasing up to an aggregate of approximately \$15.0 million of our shares of common stock in this offering at the public offering price. However, because indications of interest are not binding agreements or commitments to purchase, the underwriters could determine to sell more, less or no shares of common stock to any of these existing stockholders and their affiliated entities, and any of these existing stockholders and affiliated entities could determine to purchase more, less or no shares of common stock in this offering.

[Table of Contents](#)**DESCRIPTION OF SERIES A PREFERRED STOCK*****Series A Preferred Stock***

General. Our board of directors has designated 250 of the 2,000,000 authorized shares of preferred stock as Series A Convertible Preferred Stock, or the Series A Preferred Stock.

Rank. The shares of Series A Preferred Stock rank:

- ? senior to all of our common stock;
- ? senior to any class or series of our capital stock hereafter created specifically ranking by its terms junior to the Series A Preferred Stock;
- ? on parity to any class or series of our capital stock hereafter created specifically ranking by its terms on parity with the Series A Preferred Stock; and
- ? junior to any class or series of our capital stock hereafter created specifically ranking by its terms senior to the Series A Preferred Stock;

in each case, as to distributions of assets upon our liquidation, dissolution or winding up whether voluntarily or involuntarily and/or the right to receive dividends.

Conversion. Each share of the Series A Preferred Stock is convertible into 1,000 shares of our common stock (subject to adjustment as provided in the certificate of designation for our Series A Preferred Stock, or the Series A Certificate of Designation) at any time at the option of the holder, provided that the holder is prohibited from converting Series A Preferred Stock into shares of our common stock if, as a result of such conversion, the holder, together with its affiliates and any other persons whose beneficial ownership of our common stock would be aggregated with such holder's for purposes of Section 13(d) or Section 16 of the Exchange Act, and the applicable regulations of the SEC, would own more than 9.99% of the total number of shares of our common stock then issued and outstanding. The holder of such shares of Series A Preferred Stock can, upon 61 days' notice to us, change this requirement to a higher or lower percentage, not to exceed 9.99% of the number of shares of our common stock outstanding immediately after giving effect to such conversion. At any time following notice of a Fundamental Transaction (as defined in the Series A Certificate of Designation), the holder of such shares of Series A Preferred Stock may waive and/or change the 9.99% ownership limitation effective immediately upon written notice to us.

Liquidation Preference. Each holder of shares of Series A Preferred Stock is entitled to receive, in preference to any distributions of any of the assets or surplus funds of the Company to the holders of our common stock and any of our securities that by their terms are junior to the Series A Preferred Stock and pari passu with any distribution to the holders of any securities having (by their terms) parity with the Series A Preferred Stock, an amount equal to \$0.001 per share of Series A Preferred Stock, plus an additional amount equal to any dividends declared but unpaid on such shares, before any payments shall be made or any assets distributed to holders of any class of common stock or any of our securities that by their terms are junior to the Series A Preferred Stock. If, upon any such liquidation, dissolution or winding up of the Company, the assets of the Company shall be insufficient to pay the holders of shares of the Series A Preferred Stock the amount required under the preceding sentence, then all remaining assets of the Company shall be distributed ratably to holders of the shares of the Series A Preferred Stock and any securities having (by their terms) parity with the Series A Preferred Stock. After such preferential payment, each holder of shares of Series A Preferred Stock shall be entitled to participate pari passu with the holders of common stock (on an as-converted basis, without regard to the 9.99% beneficial ownership limitation) and any securities having (by their terms) parity with the Series A Preferred Stock, in the remaining distribution of the net assets of the Company available for distribution.

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Voting Rights. Shares of Series A Preferred Stock generally have no voting rights, except as required by law and except that the consent of the holders of the outstanding Series A Preferred Stock is required to amend the terms of the Series A Preferred Stock.

Dividends. Shares of Series A Preferred Stock are entitled to receive any dividends payable to holders of our common stock.

Redemption. We are not obligated to redeem or repurchase any shares of Series A Preferred Stock. Shares of Series A Preferred Stock are not entitled to any redemption rights or mandatory sinking fund or analogous fund provisions.

Listing. Our Series A Preferred Stock is not currently listed on any securities exchange or other trading system. We expect the common stock issuable upon conversion of the Series A Preferred Stock to be listed on The Nasdaq Capital Market.

[Table of Contents](#)**MATERIAL U.S. FEDERAL TAX CONSIDERATIONS FOR NON-U.S. HOLDERS**

The following discussion is a summary of the material U.S. federal income tax considerations applicable to non-U.S. holders (as defined below) with respect to their ownership and disposition of shares of our common stock or Series A Preferred Stock issued pursuant to this offering. For purposes of this discussion, a non-U.S. holder means a beneficial owner of our common stock that is for U.S. federal income tax purposes:

- ? a non-resident alien individual;
- ? a foreign corporation or any other foreign organization taxable as a corporation for U.S. federal income tax purposes;
- ? a foreign estate, the income of which is not subject to U.S. federal income tax on a net income basis; or
- ? a trust, (A) that does not have a valid election in effect under applicable U.S. Treasury regulations to be treated as a United States Person, and (B) either (i) which is not subject to the primary supervision of a court within the United States, or (ii) for which one or more United States persons do not have the authority to control all substantial decisions.

This discussion does not address the tax treatment of partnerships or other entities that are pass-through entities for U.S. federal income tax purposes or persons that hold their common stock through partnerships or other pass-through entities. A partner in a partnership or other pass-through entity that will hold our common stock or Series A Preferred Stock should consult his, her or its own tax advisor regarding the tax consequences of acquiring, holding and disposing of our common stock through a partnership or other pass-through entity, as applicable.

This discussion is based on current provisions of the U.S. Internal Revenue Code of 1986, as amended, which we refer to as the Code, existing and proposed U.S. Treasury Regulations promulgated thereunder, current administrative rulings and judicial decisions, all as in effect as of the date of this prospectus and, all of which are subject to change or to differing interpretation, possibly with retroactive effect. Any such change or differing interpretation could alter the tax consequences to non-U.S. holders described in this prospectus. There can be no assurance that the Internal Revenue Service, which we refer to as the IRS, will not challenge one or more of the tax consequences described herein. We assume in this discussion that a non-U.S. holder holds shares of our common stock or Series A Preferred Stock as a capital asset, generally held for investment purposes.

This discussion does not address all aspects of U.S. federal income that may be relevant to a particular non-U.S. holder in light of that non-U.S. holder's individual circumstances nor does it address any aspects of any U.S. state, local or non-U.S. taxes, the alternative minimum tax, any tax considerations resulting from a non-U.S. holder having a functional currency other than the U.S. dollar, the Medicare tax on net investment income; or any other U.S. federal tax other than the income tax. This discussion also does not consider any specific facts or circumstances that may apply to a non-U.S. holder and does not address the special tax rules applicable to particular non-U.S. holders, such as:

- ? insurance companies;
- ? tax exempt or governmental organizations;
- ? financial institutions;
- ? brokers or dealers in securities;
- ? regulated investment companies;
- ? pension plans;

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- ? “controlled foreign corporations,” “passive foreign investment companies,” and corporations that accumulate earnings to avoid U.S. federal income tax;
- ? “qualified foreign pension funds,” or entities wholly owned by a “qualified foreign pension fund”;
- ? persons deemed to sell our common stock or Series A Preferred Stock under the constructive sale provisions of the Code;
- ? persons that hold our common stock or Series A Preferred Stock as part of a straddle, hedge, conversion transaction, synthetic security or other integrated investment;
- ? persons who hold or receive our common stock or Series A Preferred Stock pursuant to the exercise of any employee stock option or otherwise as compensation
- ? persons for whom common stock or Series A Preferred Stock constitutes “qualified small business stock” within the meaning of Section 1202 of the Code; and
- ? certain U.S. expatriates.

This discussion is for general information only and is not tax advice. Accordingly, all prospective non-U.S. holders of our common stock or Series A Preferred Stock should consult their own tax advisors with respect to the U.S. federal, state, local and non-U.S. tax consequences of the purchase, ownership and disposition of our common stock or Series A Preferred Stock.

Distributions on Our Common Stock or Series A Preferred Stock

Distributions, if any, on our common stock or Series A Preferred Stock generally will constitute dividends for U.S. federal income tax purposes to the extent paid from our current or accumulated earnings and profits, as determined under U.S. federal income tax principles. If a distribution exceeds our current and accumulated earnings and profits, the excess will be treated as a tax-free return of the non-U.S. holder’s investment, up to such holder’s tax basis in the common stock or Series A Preferred Stock. Any remaining excess will be treated as capital gain, subject to the tax treatment described below in “Gain on sale, or other taxable disposition of our common stock or Series A Preferred Stock.” Any such distributions will also be subject to the discussion below under the section titled “Withholding and Information Reporting Requirements—FATCA.”

Subject to the discussion in the following two paragraphs in this section, dividends paid to a non-U.S. holder generally will be subject to withholding of U.S. federal income tax at a 30% rate or such lower rate as may be specified by an applicable income tax treaty between the United States and such holder’s country of residence.

Dividends that are treated as effectively connected with a trade or business conducted by a non-U.S. holder within the United States and, if an applicable income tax treaty so provides, that are attributable to a permanent establishment or a fixed base maintained by the non-U.S. holder within the United States, are generally exempt from the 30% withholding tax if the non-U.S. holder satisfies applicable certification and disclosure requirements. However, such U.S. effectively connected income, net of specified deductions and credits, is taxed at the same graduated U.S. federal income tax rates applicable to United States persons (as defined in the Code). Any U.S. effectively connected income received by a non-U.S. holder that is a corporation may also, under certain circumstances, be subject to an additional “branch profits tax” at a 30% rate or such lower rate as may be specified by an applicable income tax treaty between the United States and such holder’s country of residence.

A non-U.S. holder of our common stock or Series A Preferred Stock who claims the benefit of an applicable income tax treaty between the United States and such holder’s country of residence generally will be required to provide a properly executed IRS Form W-8BEN or W-8BEN-E (or successor form) and satisfy applicable certification and other requirements. Non-U.S. holders are urged to consult their tax advisors regarding their entitlement to benefits under a relevant income tax treaty. A non-U.S. holder that is eligible for a reduced rate of U.S. withholding tax under an income tax

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treaty may obtain a refund or credit of any excess amounts withheld by timely filing a U.S. tax return with the IRS.

Gain on Sale or Other Taxable Disposition of Our Common Stock or Series A Preferred Stock

Subject to the discussion below under “Backup Withholding and Information Reporting” and “Withholding and Information Reporting Requirements—FATCA,” a non-U.S. holder generally will not be subject to any U.S. federal income or withholding tax on any gain realized upon such holder’s sale or other taxable disposition of shares of our common stock or Series A Preferred Stock unless:

- ? the gain is effectively connected with the non-U.S. holder’s conduct of a U.S. trade or business and, if an applicable income tax treaty so provides, is attributable to a permanent establishment or a fixed-base maintained by such non-U.S. holder in the United States, in which case the non-U.S. holder generally will be taxed on a net income basis at the graduated U.S. federal income tax rates applicable to United States persons (as defined in the Code) and, if the non-U.S. holder is a foreign corporation, the branch profits tax described above in “Distributions on Our Common Stock or Series A Preferred Stock” also may apply;
- ? the non-U.S. holder is a nonresident alien individual who is present in the United States for 183 days or more in the taxable year of the disposition and certain other conditions are met, in which case the non-U.S. holder will be subject to a 30% tax (or such lower rate as may be specified by an applicable income tax treaty between the United States and such holder’s country of residence) on the net gain derived from the disposition, which may be offset by certain U.S. source capital losses of the non-U.S. holder, if any (even though the individual is not considered a resident of the United States), provided that the non-U.S. holder has timely filed U.S. federal income tax returns with respect to such losses; or
- ? our common stock or Series A Preferred Stock constitutes a U.S. real property interest by reason of our status as a “U.S. real property holding corporation,” or a USRPHC, for U.S. federal income tax purposes, at any time within the shorter of the five-year period preceding the disposition or the Non-U.S. Holder’s holding period for our common stock. We believe we are not currently and do not anticipate becoming a USRPHC. However, because the determination of whether we are a USRPHC depends on the fair market value of our U.S. real property interests relative to the fair market value of our other business assets, there can be no assurance that we will not become a USRPHC in the future. Even if we become a USRPHC, however, gain arising from the sale or other taxable disposition by a Non-U.S. Holder of our common stock or Series A Preferred Stock will not be subject to U.S. federal income tax as long as our common stock is “regularly traded”, as defined by applicable Treasury Regulations, on an established securities market and such Non-U.S. Holder does not, actually or constructively, hold more than five percent of our common stock at any time during the applicable period that is specified in the Code. If the foregoing exception does not apply, then if we are or were to become a USRPHC a purchaser may be required to withhold 15% of the proceeds payable to a Non-U.S. Holder from a sale of our common stock and such Non-U.S. Holder generally will be subject to U.S. federal income tax on its net gain derived from the disposition at the graduated U.S. federal income tax rates applicable to United States persons (as defined in the Code).

Backup Withholding and Information Reporting

We must report annually to the IRS and to each non-U.S. holder the gross amount of the distributions on our common stock paid to such holder and the tax withheld, if any, with respect to such distributions. Non-U.S. holders may have to comply with specific certification procedures to establish that the holder is not a United States person (as defined in the Code) in order to avoid backup withholding at the applicable rate, currently 24%, with respect to dividends on our common stock. Dividends paid to non-U.S. holders subject to withholding of U.S. federal income tax, as described

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above in “Distributions on Our Common Stock or Series A Preferred Stock,” generally will be exempt from U.S. backup withholding.

Information reporting and backup withholding will generally apply to the proceeds of a disposition of our common stock by a non-U.S. holder effected by or through the U.S. office of any broker, U.S. or foreign, unless the holder certifies its status as a non-U.S. holder and satisfies certain other requirements, or otherwise establishes an exemption. Generally, information reporting and backup withholding will not apply to a payment of disposition proceeds to a non-U.S. holder where the transaction is effected outside the United States through a non-U.S. office of a broker. However, for information reporting purposes, dispositions effected through a non-U.S. office of a broker with substantial U.S. ownership or operations generally will be treated in a manner similar to dispositions effected through a U.S. office of a broker. Non-U.S. holders should consult their own tax advisors regarding the application of the information reporting and backup withholding rules to them. Copies of information returns may be made available to the tax authorities of the country in which the non-U.S. holder resides or is incorporated under the provisions of a specific treaty or agreement. Backup withholding is not an additional tax. Any amounts withheld under the backup withholding rules from a payment to a non-U.S. holder can be refunded or credited against the non-U.S. holder’s U.S. federal income tax liability, if any, provided that an appropriate claim is filed with the IRS in a timely manner.

Withholding and Information Reporting Requirements—FATCA

The Foreign Account Tax Compliance Act, or FATCA, generally imposes a U.S. federal withholding tax at a rate of 30% on certain payments made to a foreign entity unless (i) if the foreign entity is a “foreign financial institution,” such foreign entity undertakes certain due diligence, reporting, withholding, and certification obligations, (ii) if the foreign entity is not a “foreign financial institution,” such foreign entity identifies certain of its U.S. investors, if any, or (iii) the foreign entity is otherwise exempt under FATCA.

FATCA currently applies to dividends paid on our common stock or Series A Preferred Stock. The U.S. Treasury Department recently released proposed regulations under FATCA providing for the elimination of the federal withholding tax of 30% applicable to gross proceeds of a sale or other disposition of our common stock or Series A Preferred Stock. Under these proposed U.S. Treasury Regulations (which may be relied upon by taxpayers prior to finalization), FATCA will not apply to gross proceeds from sales or other dispositions of our common stock or Series A Preferred Stock.

Non-U.S. holders should consult their tax advisors regarding the possible implications of this legislation on their investment in our securities and the entities through which they hold our securities, including, without limitation, the process and deadlines for meeting the applicable requirements to prevent the imposition of the 30% withholding tax under FATCA.

THE PRECEDING DISCUSSION OF U.S. FEDERAL TAX CONSIDERATIONS IS FOR GENERAL INFORMATION ONLY. IT IS NOT TAX ADVICE. EACH PROSPECTIVE INVESTOR SHOULD CONSULT ITS OWN TAX ADVISOR REGARDING THE PARTICULAR U.S. FEDERAL, STATE, LOCAL AND FOREIGN TAX CONSEQUENCES OF PURCHASING, HOLDING AND DISPOSING OF OUR SECURITIES, INCLUDING THE CONSEQUENCES OF ANY PROPOSED CHANGE IN APPLICABLE LAWS.

[Table of Contents](#)**UNDERWRITING**

We and the underwriters for the offering named below have entered into an underwriting agreement with respect to the common stock and Series A Preferred Stock being offered. Subject to the terms and conditions of the underwriting agreement, each underwriter has severally agreed to purchase from us the number of shares of our common stock and our Series A Preferred Stock set forth opposite its name below. Cowen and Company, LLC, Barclays Capital Inc. and Stifel, Nicolaus & Company, Incorporated are acting as the representatives of the underwriters.

Underwriter	Number of Shares of Common Stock	Number of Shares of Series A Preferred Stock
Cowen and Company, LLC	2,250,000	94
Barclays Capital Inc.	1,500,000	63
Stifel, Nicolaus & Company, Incorporated	1,500,000	63
Oppenheimer & Co. Inc.	450,000	18
Ladenburg Thalmann & Co. Inc.	300,000	12
Total	<u>6,000,000</u>	<u>250</u>

The underwriting agreement provides that the obligations of the underwriters are subject to certain conditions precedent and that the underwriters have agreed, severally and not jointly, to purchase all of the shares sold under the underwriting agreement if any of these shares are purchased, other than those shares covered by the overallotment option described below. If an underwriter defaults, the underwriting agreement provides that the purchase commitments of the non-defaulting underwriters may be increased or the underwriting agreement may be terminated.

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

The underwriters are offering the shares, subject to prior sale, when, as and if issued to and accepted by them, subject to approval of legal matters by their counsel and other conditions specified in the underwriting agreement. The underwriters reserve the right to withdraw, cancel or modify offers to the public and to reject orders in whole or in part.

Overallotment Option to Purchase Additional Shares. We have granted to the underwriters an option to purchase up to additional shares of common stock at the public offering price, less the underwriting discount. This option is exercisable for a period of 30 days. The underwriters may exercise this option solely for the purpose of covering overallotments, if any, made in connection with the sale of common stock offered hereby. To the extent that the underwriters exercise this option, the underwriters will purchase additional shares from us in approximately the same proportion as shown in the table above.

Discounts and Commissions. The following table shows the public offering price, underwriting discount and proceeds, before expenses to us. These amounts are shown assuming both no exercise and full exercise of the underwriters' option to purchase additional shares.

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We estimate that the total expenses of the offering, excluding the underwriting discount, will be approximately \$430,000, which includes \$30,000 that we have agreed to reimburse the underwriters for certain of their expenses incurred in connection with the offering.

	Per Share of Common Stock	Per Share of Series A Preferred Stock	Total	
			Without Over- Allotment	With Over Allotment
Public offering price	\$ 8.00	\$ 8,000.00	\$ 50,000,000.00	\$ 57,200,000.00
Underwriting discount	\$ 0.48	\$ 480.00	\$ 3,000,000.00	\$ 3,432,000.00
Proceeds, before expenses, to us	\$ 7.52	\$ 7,520.00	\$ 47,000,000.00	\$ 53,768,000.00

The underwriters propose to offer the shares of common stock and Series A Preferred Stock to the public at the public offering price set forth on the cover of this prospectus. The underwriters may offer the shares of common stock and Series A Preferred Stock to securities dealers at the public offering price less a concession not in excess of \$0.288 per share. If all of the shares are not sold at the public offering price, the underwriters may change the offering price and other selling terms.

Laidlaw & Company (UK) Ltd., or Laidlaw, is acting as financial advisor in connection with the offering. Laidlaw is not acting as an underwriter in connection with this offering, and accordingly, Laidlaw is neither purchasing shares nor offering shares to the public in connection with this offering. Laidlaw will receive a fee of \$25,000 for their services in connection with this offering. The fees to Laidlaw are included in our calculation of the estimated expenses payable by us in connection with this offering.

Discretionary Accounts. The underwriters do not intend to confirm sales of the shares to any accounts over which they have discretionary authority.

Stabilization. In connection with this offering, the underwriters may engage in stabilizing transactions, over-allotment transactions, syndicate covering transactions, penalty bids and purchases to cover positions created by short sales.

- ? Stabilizing transactions permit bids to purchase shares of common stock so long as the stabilizing bids do not exceed a specified maximum, and are engaged in for the purpose of preventing or retarding a decline in the market price of the common stock while the offering is in progress.
- ? Over-allotment transactions involve sales by the underwriters of shares of common stock in excess of the number of shares the underwriters are obligated to purchase. This creates a syndicate short position which may be either a covered short position or a naked short position. In a covered short position, the number of shares over-allotted by the underwriters is not greater than the number of shares that they may purchase in the over-allotment option. In a naked short position, the number of shares involved is greater than the number of shares in the over-allotment option. The underwriters may close out any short position by exercising their over-allotment option and/or purchasing shares in the open market.
- ? Syndicate covering transactions involve purchases of common stock in the open market after the distribution has been completed in order to cover syndicate short positions. In determining the source of shares to close out the short position, the underwriters will consider, among other things, the price of shares available for purchase in the open market as compared with the price at which they may purchase shares through exercise of the over-allotment option. If the underwriters sell more shares than could be covered by exercise of the over-allotment option and, therefore, have a naked short position, the position can be closed out only by buying shares in the open market. A naked short position is more likely to be created if the underwriters are concerned that after pricing there could be downward pressure on the price of the shares in the open market that could adversely affect investors who purchase in the offering.

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- ? Penalty bids permit the representatives to reclaim a selling concession from a syndicate member when the common stock originally sold by that syndicate member is purchased in stabilizing or syndicate covering transactions to cover syndicate short positions.

These stabilizing transactions, syndicate covering transactions and penalty bids may have the effect of raising or maintaining the market price of our common stock or preventing or retarding a decline in the market price of our common stock. As a result, the price of our common stock in the open market may be higher than it would otherwise be in the absence of these transactions. Neither we nor the underwriters make any representation or prediction as to the effect that the transactions described above may have on the price of our common stock. These transactions may be effected on the Nasdaq Stock Market, in the over-the-counter market or otherwise and, if commenced, may be discontinued at any time.

Passive Market Making. In connection with this offering, underwriters and selling group members may engage in passive market making transactions in our common stock on the Nasdaq Stock Market in accordance with Rule 103 of Regulation M under the Securities Exchange Act of 1934, as amended, during a period before the commencement of offers or sales of common stock and extending through the completion of the distribution. A passive market maker must display its bid at a price not in excess of the highest independent bid of that security. However, if all independent bids are lowered below the passive market maker's bid, such bid must then be lowered when specified purchase limits are exceeded.

Lock-Up Agreements. Pursuant to certain "lock-up" agreements, we and our executive officers, directors and certain of our other stockholders, have agreed, subject to certain exceptions, not to offer, sell, assign, transfer, pledge, contract to sell, or otherwise dispose of or announce the intention to otherwise dispose of, or enter into any swap, hedge or similar agreement or arrangement that transfers, in whole or in part, the economic consequence of ownership of, directly or indirectly, or make any demand or request or exercise any right with respect to the registration of, or file with the SEC a registration statement under the Securities Act relating to, any common stock or securities convertible into or exchangeable or exercisable for any common stock without the prior written consent of the representatives, for a period of 90 days after the date of the pricing of the offering.

The representatives, in their sole discretion, may release our common stock and other securities subject to the lock-up agreements described above in whole or in part at any time. When determining whether or not to release our common stock and other securities from lock-up agreements, the representatives will consider, among other factors, the holder's reasons for requesting the release, the number of shares for which the release is being requested and market conditions at the time of the request.

Canada. The common stock may be sold only to purchasers purchasing, or deemed to be purchasing, as principal that are accredited investors, as defined in National Instrument 45-106 *Prospectus Exemptions* or subsection 73.3(1) of the *Securities Act* (Ontario), and are permitted clients, as defined in National Instrument 31-103 *Registration Requirements, Exemptions and Ongoing Registrant Obligations*. Any resale of the common stock must be made in accordance with an exemption from, or in a transaction not subject to, the prospectus requirements of applicable securities laws.

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

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

United Kingdom. Each of the underwriters has represented and agreed that:

- ? it has not made or will not make an offer of the securities to the public in the United Kingdom within the meaning of section 102B of the Financial Services and Markets Act 2000 (as amended) (FSMA) except to legal entities which are authorized or regulated to operate in the financial markets or, if not so authorized or regulated, whose corporate purpose is solely to invest in securities or otherwise in circumstances which do not require the publication by us of a prospectus pursuant to the Prospectus Rules of the Financial Services Authority (FSA);
- ? it has only communicated or caused to be communicated and will only communicate or cause to be communicated an invitation or inducement to engage in investment activity (within the meaning of section 21 of FSMA) to persons who have professional experience in matters relating to investments falling within Article 19(5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005 or in circumstances in which section 21 of FSMA does not apply to us; and
- ? it has complied with and will comply with all applicable provisions of FSMA with respect to anything done by it in relation to the securities in, from or otherwise involving the United Kingdom.

Switzerland. The securities will not be offered, directly or indirectly, to the public in Switzerland and this prospectus does not constitute a public offering prospectus as that term is understood pursuant to article 652a or 1156 of the Swiss Federal Code of Obligations.

European Economic Area. In relation to each Member State of the European Economic Area (“Member State”), no offer of shares may be made to the public in that Member State other than:

- (a) to any legal entity which is a qualified investor as defined in the Prospectus Regulation;
- (b) to fewer than 150 natural or legal persons (other than qualified investors as defined in the Prospectus Regulation), subject to obtaining the prior consent of the representatives; or
- (c) in any other circumstances falling within Article 1(4) of the Prospectus Regulation,

provided that no such offer of shares shall require us or any underwriter to publish a prospectus pursuant to Article 3 of the Prospectus Regulation or supplement a prospectus pursuant to Article 23 of the Prospectus Regulation and each person who initially acquires any shares or to whom any offer is made will be deemed to have represented, acknowledged and agreed to and with each of the underwriters and with us that it is a “qualified investor” as defined in the Prospectus Regulation.

In the case of any shares being offered to a financial intermediary as that term is used in Article 5 of the Prospectus Regulation, each such financial intermediary will be deemed to have represented, acknowledged and agreed that the shares acquired by it in the offer have not been acquired on a nondiscretionary basis on behalf of, nor have they been acquired with a view to their offer or resale to, persons in circumstances which may give rise to an offer of any shares to the public other than their offer or resale in a Member State to qualified investors as so defined or in circumstances in which the prior consent of the underwriters has been obtained to each such proposed offer or resale.

For the purposes of this provision, the expression an “offer of shares to the public” in relation to the any shares in any Member State means the communication in any form and by means of sufficient information on the terms of the offer and the shares to be offered so as to enable an investor to decide to purchase shares, and the expression “Prospectus Regulation” means Regulation (EU) 2017/1129 (as amended).

Israel. In the State of Israel this prospectus shall not be regarded as an offer to the public to purchase shares of common stock under the Israeli Securities Law, 5728—1968, which requires a

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

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

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

Electronic Offer, Sale and Distribution of Shares. A prospectus in electronic format may be made available on the websites maintained by one or more of the underwriters or selling group members, if any, participating in this offering and one or more of the underwriters participating in this offering may distribute prospectuses electronically. The representatives may agree to allocate a number of shares to underwriters and selling group members for sale to their online brokerage account holders. Internet distributions will be allocated by the underwriters and selling group members that will make internet distributions on the same basis as other allocations. Other than the prospectus in electronic format, the information on these websites is not part of this prospectus or the registration statement of which this prospectus forms a part, has not been approved or endorsed by us or any underwriter in its capacity as underwriter, and should not be relied upon by investors.

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LEGAL MATTERS

The validity of the securities being offered hereby will be passed upon by Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., Boston, Massachusetts. Goodwin Procter LLP, New York, New York is acting as counsel for the underwriters in connection with certain legal matters related to this offering.

EXPERTS

Ernst & Young LLP, independent registered public accounting firm, has audited our consolidated financial statements included in our Annual Report on Form 10-K for the years ended December 31, 2018 and 2017, as set forth in their report, which is incorporated by reference in this prospectus and elsewhere in the registration statement. Our financial statements are incorporated by reference in reliance on Ernst & Young LLP's report, given on their authority as experts in accounting and auditing.

WHERE YOU CAN FIND ADDITIONAL INFORMATION

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

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

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

INCORPORATION OF CERTAIN INFORMATION BY REFERENCE

The SEC allows us to "incorporate by reference" information that we file with them. Incorporation by reference allows us to disclose important information to you by referring you to those other documents. The information incorporated by reference is an important part of this prospectus supplement and the accompanying prospectus, and information that we file later with the SEC will automatically update and supersede this information. We filed a registration statement on Form S-3 under the Securities Act, with the SEC with respect to the securities being offered pursuant to this prospectus supplement and the accompanying prospectus. This prospectus supplement and the accompanying prospectus omit certain information contained in the registration statement, as permitted by the SEC. You should refer to the registration statement, including the exhibits, for further information about us and the securities being offered pursuant to this prospectus supplement and the accompanying prospectus. Statements in this prospectus supplement and the accompanying prospectus regarding the provisions of certain documents filed with, or incorporated by reference in, the registration statement are not necessarily complete and each statement is qualified in all respects by that reference. Copies of all or any part of the registration statement, including the documents

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incorporated by reference or the exhibits, may be obtained from the SEC's website at <http://www.sec.gov>. The documents we are incorporating by reference are:

- ? our Annual Report on [Form 10-K](#) for the year ended December 31, 2018, filed with the SEC on March 29, 2019;
- ? the information specifically incorporated by reference into our Annual Report on Form 10-K for the fiscal year ended December 31, 2018 from our Definitive [Proxy Statement](#) on Schedule 14A, filed with the SEC on April 26, 2019;
- ? our Quarterly Reports on Form 10-Q for the quarters ended (i) [March 31, 2019](#), filed with the SEC on May 13, 2019, (ii) [June 30, 2019](#), filed with the SEC on August 12, 2019, and (iii) [September 30, 2019](#), filed with the SEC on November 12, 2019;
- ? our Current Reports on Form 8-K, filed with the SEC on [January 29, 2019](#), [May 29, 2019](#) and [November 18, 2019](#);
- ? the description of our common stock contained in our registration statement on [Form 8-A](#) as filed with the SEC on August 9, 2006, as updated or amended in any amendment or report filed for such purpose; and
- ? all reports and other documents subsequently filed by us pursuant to Sections 13(a), 13(c), 14 and 15(d) of the Exchange Act after the date of this prospectus supplement and prior to the termination or completion of the offering of securities under this prospectus supplement shall be deemed to be incorporated by reference in this prospectus supplement and to be a part hereof from the date of filing such reports and other documents.

The SEC file number for each of the documents listed above is 001-32979.

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

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

Molecular Templates, Inc.
9301 Amberglen Blvd
Suite 100
Austin, TX 78729
Attn: Investor Relations
Telephone: +1 (512) 869-1555

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

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

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PROSPECTUS



Molecular Templates, Inc.

\$200,000,000

**COMMON STOCK
PREFERRED STOCK
DEBT SECURITIES
WARRANTS
RIGHTS
UNITS**

This prospectus will allow us to issue, from time to time at prices and on terms to be determined at or prior to the time of the offering, up to \$200,000,000 of any combination of the securities described in this prospectus, either individually or in units. We may also offer common stock or preferred stock upon conversion of or exchange for the debt securities; common stock upon conversion of or exchange for preferred stock; or common stock, preferred stock or debt securities upon the exercise of warrants or rights.

This prospectus describes the general terms of these securities and the general manner in which these securities will be offered. We will provide you with the specific terms of any offering in one or more supplements to this prospectus. The prospectus supplements will also describe the specific manner in which these securities will be offered and may also supplement, update or amend information contained in this document. You should read this prospectus and any prospectus supplement, as well as any documents incorporated by reference into this prospectus or any prospectus supplement, carefully before you invest.

Our securities may be sold directly by us to you, through agents designated from time to time or to or through underwriters or dealers. For additional information on the methods of sale, you should refer to the section entitled "Plan of Distribution" in this prospectus and in the applicable prospectus supplement. If any underwriters or agents are involved in the sale of our securities with respect to which this prospectus is being delivered, the names of such underwriters or agents and any applicable fees, commissions or discounts and over-allotment options will be set forth in a prospectus supplement. The price to the public of such securities and the net proceeds that we expect to receive from such sale will also be set forth in a prospectus supplement.

Our common stock is listed on The Nasdaq Capital Market under the symbol "MTEM." On December 19, 2018, the last reported sale price of our common stock was \$4.00 per share. The applicable prospectus supplement will contain information, where applicable, as to any other listing, if any, on The Nasdaq Capital Market or any securities market or other securities exchange of the securities covered by the prospectus supplement. Prospective purchasers of our securities are urged to obtain current information as to the market prices of our securities, where applicable.

Investing in our securities involves a high degree of risk. See "[Risk Factors](#)" included in any accompanying prospectus supplement and in the documents incorporated by reference in this prospectus for a discussion of the factors you should carefully consider before deciding to purchase these securities.

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

The date of this prospectus is February 13, 2019.

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ABOUT THIS PROSPECTUS

This prospectus is part of a registration statement that we filed with the Securities and Exchange Commission, or SEC, utilizing a “shelf” registration process. Under this shelf registration process, we may offer shares of our common stock and preferred stock, various series of debt securities and/or warrants or rights to purchase any such securities, either individually or in units, in one or more offerings, with a total value of up to \$200,000,000. This prospectus provides you with a general description of the securities we may offer. Each time we offer a type or series of securities under this prospectus, we will provide a prospectus supplement that will contain specific information about the terms of that offering.

This prospectus does not contain all of the information included in the registration statement. For a more complete understanding of the offering of the securities, you should refer to the registration statement, including its exhibits. The prospectus supplement may also add, update or change information contained or incorporated by reference in this prospectus. However, no prospectus supplement will offer a security that is not registered and described in this prospectus at the time of its effectiveness. This prospectus, together with the applicable prospectus supplements and the documents incorporated by reference into this prospectus, includes all material information relating to the offering of securities under this prospectus. You should carefully read this prospectus, the applicable prospectus supplement, the information and documents incorporated herein by reference and the additional information under the heading “Where You Can Find More Information” before making an investment decision.

You should rely only on the information we have provided or incorporated by reference in this prospectus or any prospectus supplement. We have not authorized anyone to provide you with information different from that contained or incorporated by reference in this prospectus. No dealer, salesperson or other person is authorized to give any information or to represent anything not contained or incorporated by reference in this prospectus. You must not rely on any unauthorized information or representation. This prospectus is an offer to sell only the securities offered hereby, but only under circumstances and in jurisdictions where it is lawful to do so. You should assume that the information in this prospectus or any prospectus supplement is accurate only as of the date on the front of the document and that any information we have incorporated herein by reference is accurate only as of the date of the document incorporated by reference, regardless of the time of delivery of this prospectus or any sale of a security.

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

This prospectus may not be used to consummate sales of our securities, unless it is accompanied by a prospectus supplement. To the extent there are inconsistencies between any prospectus supplement, this prospectus and any documents incorporated by reference, the document with the most recent date will control.

Unless the context otherwise requires, “Molecular,” “MTEM,” “the Company,” “we,” “us,” “our” and similar terms refer to Molecular Templates, Inc. and our subsidiaries.

[Table of Contents](#)**PROSPECTUS SUMMARY**

The following is a summary of what we believe to be the most important aspects of our business and the offering of our securities under this prospectus. We urge you to read this entire prospectus, including the more detailed consolidated financial statements, notes to the consolidated financial statements and other information incorporated by reference from our other filings with the SEC or included in any applicable prospectus supplement. Investing in our securities involves risks. Therefore, carefully consider the risk factors set forth in any prospectus supplements and in our most recent annual and quarterly filings with the SEC, as well as other information in this prospectus and any prospectus supplements and the documents incorporated by reference herein or therein, before purchasing our securities. Each of the risk factors could adversely affect our business, operating results and financial condition, as well as adversely affect the value of an investment in our securities.

About Molecular Templates, Inc.

We are a clinical-stage oncology company focused on the discovery and development of differentiated, targeted, biologic therapeutics for cancer. We utilize our proprietary biologic drug platform to design and generate engineered toxin bodies, or ETBs, which we believe provide a differentiated mechanism of action that may be beneficial in patients resistant to currently available cancer therapeutics. ETBs use a genetically engineered version of the Shiga-like Toxin A subunit, or SLTA. In its wild-type form, SLT is thought to induce its own entry into a cell when proximal to the cell surface membrane, self-route to the cytosol, and enzymatically and irreversibly shut down protein synthesis via ribosome inactivation. SLTA is normally coupled to its cognate Shiga-like Toxin B subunit, or SLTB, to target the CD77 cell surface marker, a non-internalizing glycosphingolipid. In our scaffold, a genetically engineered SLTA subunit with no cognate SLTB component is genetically fused to antibody domains or fragments specific to a cancer target, resulting in a biologic product candidate designed to identify the particular target and specifically kill the cancer cell. The antibody domains may be substituted with other antibody domains having different specificities to allow for the rapid development of new drugs to selected targets in cancer.

ETBs combine the specificity of an antibody with SLTA's mechanism of cell destruction. Based on the disease setting, we have created ETBs that have reduced immunogenicity and are capable of delivering additional payloads into a target cell. Immunogenicity is the ability of a foreign substance to provoke an immune response in a host. ETBs have relatively predictable pharmacokinetic, or PK, and absorption, distribution, metabolism and excretion, or ADME, profiles and can be rapidly screened for desired activity in robust cell-based and animal-model assays. Because SLTA can induce internalization against non- and poorly-internalizing receptors, the universe of targets for ETBs should be substantially larger than that seen with antibody drug conjugates, or ADCs, which are not likely to be effective if the target does not readily internalize the ADC payload.

ETBs have a differentiated mechanism of cell-kill in cancer therapeutics (the inhibition of protein synthesis via ribosome destruction), and we have preclinical and clinical data demonstrating the utility of these molecules in chemotherapy-refractory cancers. ETBs have shown good tolerability data in multiple animal models as well as in our clinical studies to date. We believe the target specificity of ETBs, their ability to self-internalize, their differentiated mechanism of cell kill and their tolerability profile provide opportunities for the clinical development of these agents to address multiple cancer types.

Our initial approach to drug development in oncology involves the selection of lead compounds to validated targets in cancer. We have developed ETBs for various targets, including CD20, CD38, HER2, and PD-L1. CD20 is central to B cell malignancies and is clinically validated as a target for the treatment of lymphomas and autoimmune disease. CD38 has been validated as a meaningful clinical target in the treatment of multiple myeloma. PD-L1 is central to immune checkpoint pathways and is a target expressed in a variety of solid tumor cancers. Our lead compound, MT-3724, is an ETB that recognizes CD20, a B cell marker and is currently in Phase I study.

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We have built up multiple core competencies around the creation and development of ETBs. We developed the ETB technology in-house and continue to make iterative improvements in the scaffold and identify new uses of the technology. We also developed the proprietary process for manufacturing ETBs under Good Manufacturing Process, or GMP, standards and continue to make improvements to our manufacturing processes.

We have conducted multiple GMP manufacturing runs with our lead compound and believe this process is robust and could support commercial production with gross margins that are similar to those seen with antibodies.

Additional Information

For additional information related to our business and operations, please refer to the reports incorporated herein by reference, as described under the caption “Incorporation of Documents by Reference” on page 30 of this prospectus.

Our Corporate Information

We were originally incorporated in the State of Delaware in October 2001 under the name “Threshold Pharmaceuticals, Inc.” On August 1, 2017, Molecular Templates, Inc., formerly known as Threshold Pharmaceuticals, Inc. (NASDAQ: THLD) (“Threshold”), completed its business combination with then-private Molecular Templates, Inc. (“Private Molecular” formerly D5 Pharma Inc.) in accordance with the terms of the Agreement and Plan of Merger and Reorganization, dated as of March 16, 2017, by and among Threshold, Trojan Merger Sub, Inc. (“Merger Sub”), and Private Molecular (the “Merger Agreement”), pursuant to which Merger Sub merged with and into Private Molecular, with Private Molecular surviving as a wholly owned subsidiary of Threshold (the “Merger”). On August 1, 2017, in connection with, and prior to the completion of, the Merger, Threshold effected a 11:1 reverse stock split of its common stock and on August 1, 2017, immediately after completion of the Merger, Threshold changed its name to “Molecular Templates, Inc.” (NASDAQ: MTEM).

Our corporate headquarters are located at 9301 Amberglen Boulevard, Suite 100, Austin, Texas 78729 and our telephone number is (512) 869-1555. We maintain a website at www.mtem.com, to which we regularly post copies of our press releases as well as additional information about us. The information contained on, or that can be accessed through, our website is not a part of this prospectus. We have included our website address in this prospectus solely as an inactive textual reference.

All brand names or trademarks appearing in this prospectus are the property of their respective holders. Use or display by us of other parties’ trademarks, trade dress, or products in this prospectus is not intended to, and does not, imply a relationship with, or endorsements or sponsorship of, us by the trademark or trade dress owners. As used herein, the words “Molecular Templates,” “Molecular,” “MTEM,” the “Company,” “we,” “us,” and “our” refer to Molecular Templates, Inc. and our subsidiaries. Our subsidiary Molecular Templates OpCo, Inc. was incorporated in Delaware in February 2009.

Offerings Under This Prospectus

Under this prospectus, we may offer shares of our common stock and preferred stock, various series of debt securities and/or warrants or rights to purchase any of such securities, either individually or in units, with a total value of up to \$200,000,000, from time to time at prices and on terms to be determined by market conditions at the time of the offering. This prospectus provides you with a general description of the securities we may offer. Each time we offer a type or series of securities under this prospectus, we will provide a prospectus supplement

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that will describe the specific amounts, prices and other important terms of the securities, including, to the extent applicable:

- designation or classification;
- aggregate principal amount or aggregate offering price;
- maturity, if applicable;
- rates and times of payment of interest or dividends, if any;
- redemption, conversion or sinking fund terms, if any;
- voting or other rights, if any; and
- conversion or exercise prices, if any.

The prospectus supplement also may add, update or change information contained in this prospectus or in documents we have incorporated by reference into this prospectus. However, no prospectus supplement will fundamentally change the terms that are set forth in this prospectus or offer a security that is not registered and described in this prospectus at the time of its effectiveness.

We may sell the securities directly to investors or to or through agents, underwriters or dealers. We, and our agents or underwriters, reserve the right to accept or reject all or part of any proposed purchase of securities. If we offer securities through agents or underwriters, we will include in the applicable prospectus supplement:

- the names of those agents or underwriters;
- applicable fees, discounts and commissions to be paid to them;
- details regarding over-allotment options, if any; and
- the net proceeds to us.

This prospectus may not be used to consummate a sale of any securities unless it is accompanied by a prospectus supplement.

[Table of Contents](#)**RISK FACTORS**

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

[Table of Contents](#)**SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS**

This prospectus and the documents incorporated by reference in this prospectus include forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act, that relate to future events or our future financial performance and involve known and unknown risks, uncertainties and other factors that may cause our actual results, levels of activity, performance or achievements to differ materially from any future results, levels of activity, performance or achievements expressed or implied by these forward-looking statements. Words such as, but not limited to, “believe,” “expect,” “anticipate,” “estimate,” “intend,” “may,” “plan,” “potential,” “predict,” “project,” “targets,” “likely,” “will,” “would,” “could,” “should,” “continue,” and similar expressions or phrases, or the negative of those expressions or phrases, are intended to identify forward-looking statements, although not all forward-looking statements contain these identifying words. Although we believe that we have a reasonable basis for each forward-looking statement contained in this prospectus and incorporated by reference in this prospectus, we caution you that these statements are based on our projections of the future that are subject to known and unknown risks and uncertainties and other factors that may cause our actual results, level of activity, performance or achievements expressed or implied by these forward-looking statements, to differ. The sections in our periodic reports, including our most recent Annual Report on Form 10-K for the fiscal year ended December 31, 2017, as supplemented by our subsequent Quarterly Reports on Form 10-Q and our Current Reports on Form 8-K, entitled “Business,” “Risk Factors,” and “Management’s Discussion and Analysis of Financial Condition and Results of Operations,” as well as other sections in this prospectus and the other documents or reports incorporated by reference in this prospectus, discuss some of the factors that could contribute to these differences. These forward-looking statements include, among other things, statements about:

- our intended use of the net proceeds from offerings of our securities under this prospectus and any prospectus supplements;
- the implementation of our business strategies, including our ability to pursue development pathways and regulatory strategies for MT-3724 and other engineered toxin body, or ETB, product candidates;
- the timing and our ability to advance the development of our product candidates;
- our plans to pursue discussions with regulatory authorities, and the anticipated timing, scope and outcome of related regulatory actions or guidance;
- our ability to establish and maintain potential new partnering or collaboration arrangements for the development and commercialization of ETB product candidates;
- our financial condition, including our ability to obtain the funding necessary to advance the development of our product candidates;
- the anticipated progress of our product candidate development programs, including whether our ongoing and potential future clinical trials will achieve clinically relevant results;
- our ability to generate data and conduct analyses to support the regulatory approval of our product candidates;
- our ability to establish and maintain intellectual property rights for our product candidates;
- whether any product candidates that we are able to commercialize are safer or more effective than other marketed products, treatments or therapies;
- our ability to discover and develop additional product candidates suitable for clinical testing;
- our ability to identify, in-license or otherwise acquire additional product candidates and development programs;
- our anticipated research and development activities and projected expenditures;
- our ability to complete preclinical and clinical testing successfully for new product candidates that we may develop or license;

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- our ability to have manufactured active pharmaceutical ingredient, or API, and drug product that meet required release and stability specifications;
- our ability to have manufactured sufficient supplies of drug product for clinical testing and commercialization;
- our ability to obtain licenses to any necessary third-party intellectual property; and
- our ability to retain and hire necessary employees and appropriately staff our development programs.

We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements we make. We have included important cautionary statements in this prospectus or in the documents incorporated by reference in this prospectus, particularly in the “Risk Factors” section, that we believe could cause actual results or events to differ materially from the forward-looking statements that we make. For a summary of such factors, please refer to the section entitled “Risk Factors” in this prospectus, as updated and supplemented by the discussion of risks and uncertainties under “Risk Factors” contained in any supplements to this prospectus and in our most recent Annual Report on Form 10-K, as revised or supplemented by our subsequent Quarterly Reports on Form 10-Q or our Current Reports on Form 8-K, as well as any amendments thereto, as filed with the SEC and which are incorporated herein by reference. The information contained in this document is believed to be current as of the date of this document. We do not intend to update any of the forward-looking statements after the date of this document to conform these statements to actual results or to changes in our expectations, except as required by law.

In light of these assumptions, risks and uncertainties, the results and events discussed in the forward-looking statements contained in this prospectus or in any document incorporated herein by reference might not occur. Investors are cautioned not to place undue reliance on the forward-looking statements, which speak only as of the date of this prospectus or the date of the document incorporated by reference in this prospectus. We are not under any obligation, and we expressly disclaim any obligation, to update or alter any forward-looking statements, whether as a result of new information, future events or otherwise. All subsequent forward-looking statements attributable to us or to any person acting on our behalf are expressly qualified in their entirety by the cautionary statements contained or referred to in this section.

[Table of Contents](#)**USE OF PROCEEDS**

Unless otherwise indicated in the applicable prospectus supplement, we intend to use any net proceeds from the sale of securities under this prospectus for general corporate purposes, including, but not limited to, clinical trials, research and development activities, working capital, capital expenditures, investments, acquisitions, should we choose to pursue any, and collaborations. We have not determined the amounts we plan to spend on any of the areas listed above or the timing of these expenditures. As a result, our management will have broad discretion to allocate the net proceeds, if any, we receive in connection with securities offered pursuant to this prospectus for any purpose. Pending application of the net proceeds as described above, we may initially invest the net proceeds in short-term, investment-grade, or interest-bearing securities.

[Table of Contents](#)**PLAN OF DISTRIBUTION**

We may offer securities under this prospectus from time to time pursuant to underwritten public offerings, negotiated transactions, block trades or a combination of these methods. We may sell the securities (1) through underwriters or dealers, (2) through agents or (3) directly to one or more purchasers, or through a combination of such methods. We may distribute the securities from time to time in one or more transactions at:

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

We may directly solicit offers to purchase the securities being offered by this prospectus. We may also designate agents to solicit offers to purchase the securities from time to time, and may enter into arrangements for “at-the-market,” equity line or similar transactions. We will name in a prospectus supplement any underwriter or agent involved in the offer or sale of the securities.

If we utilize a dealer in the sale of the securities being offered by this prospectus, we will sell the securities to the dealer, as principal. The dealer may then resell the securities to the public at varying prices to be determined by the dealer at the time of resale.

If we utilize an underwriter in the sale of the securities being offered by this prospectus, we will execute an underwriting agreement with the underwriter at the time of sale, and we will provide the name of any underwriter in the prospectus supplement which the underwriter will use to make resales of the securities to the public. In connection with the sale of the securities, we, or the purchasers of the securities for whom the underwriter may act as agent, may compensate the underwriter in the form of underwriting discounts or commissions. The underwriter may sell the securities to or through dealers, and the underwriter may compensate those dealers in the form of discounts, concessions or commissions.

With respect to underwritten public offerings, negotiated transactions and block trades, we will provide in the applicable prospectus supplement information regarding any compensation we pay to underwriters, dealers or agents in connection with the offering of the securities, and any discounts, concessions or commissions allowed by underwriters to participating dealers. Underwriters, dealers and agents participating in the distribution of the securities may be deemed to be underwriters within the meaning of the Securities Act, and any discounts and commissions received by them and any profit realized by them on resale of the securities may be deemed to be underwriting discounts and commissions. We may enter into agreements to indemnify underwriters, dealers and agents against civil liabilities, including liabilities under the Securities Act, or to contribute to payments they may be required to make in respect thereof.

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

- the purchase by an institution of the securities covered under that contract shall not at the time of delivery be prohibited under the laws of the jurisdiction to which that institution is subject; and

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- if the securities are also being sold to underwriters acting as principals for their own account, the underwriters shall have purchased such securities not sold for delayed delivery. The underwriters and other persons acting as our agents will not have any responsibility in respect of the validity or performance of delayed delivery contracts.

One or more firms, referred to as “remarketing firms,” may also offer or sell the securities, if a prospectus supplement so indicates, in connection with a remarketing arrangement upon their purchase. Remarketing firms will act as principals for their own accounts or as our agents. These remarketing firms will offer or sell the securities in accordance with the terms of the securities. Each prospectus supplement will identify and describe any remarketing firm and the terms of its agreement, if any, with us and will describe the remarketing firm’s compensation. Remarketing firms may be deemed to be underwriters in connection with the securities they remarket. Remarketing firms may be entitled under agreements that may be entered into with us to indemnification by us against certain civil liabilities, including liabilities under the Securities Act, and may be customers of, engage in transactions with or perform services for us in the ordinary course of business.

Certain underwriters may use this prospectus and any accompanying prospectus supplement for offers and sales related to market-making transactions in the securities. These underwriters may act as principal or agent in these transactions, and the sales will be made at prices related to prevailing market prices at the time of sale. Any underwriters involved in the sale of the securities may qualify as “underwriters” within the meaning of Section 2(a)(11) of the Securities Act. In addition, the underwriters’ commissions, discounts or concessions may qualify as underwriters’ compensation under the Securities Act and the rules of the Financial Industry Regulatory Authority, Inc., or FINRA.

Shares of our common stock sold pursuant to the registration statement of which this prospectus is a part will be authorized for listing and trading on The Nasdaq Capital Market. The applicable prospectus supplement will contain information, where applicable, as to any other listing, if any, on The Nasdaq Capital Market or any securities market or other securities exchange of the securities covered by the prospectus supplement. Underwriters may make a market in our common stock, but will not be obligated to do so and may discontinue any market making at any time without notice. We can make no assurance as to the liquidity of or the existence, development or maintenance of trading markets for any of the securities.

In order to facilitate the offering of the securities, certain persons participating in the offering may engage in transactions that stabilize, maintain or otherwise affect the price of the securities. This may include over-allotments or short sales of the securities, which involve the sale by persons participating in the offering of more securities than we sold to them. In these circumstances, these persons would cover such over-allotments or short positions by making purchases in the open market or by exercising their over-allotment option. In addition, these persons may stabilize or maintain the price of the securities by bidding for or purchasing the applicable security in the open market or by imposing penalty bids, whereby selling concessions allowed to dealers participating in the offering may be reclaimed if the securities sold by them are repurchased in connection with stabilization transactions. The effect of these transactions may be to stabilize or maintain the market price of the securities at a level above that which might otherwise prevail in the open market. These transactions may be discontinued at any time.

The underwriters, dealers and agents may engage in other transactions with us, or perform other services for us, in the ordinary course of their business.

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DESCRIPTION OF COMMON STOCK

We are authorized to issue 150,000,000 shares of common stock, par value \$0.001 per share. As of December 19, 2018, we had 36,736,012 shares of common stock outstanding and approximately 61 stockholders of record.

The following summary of certain provisions of our common stock does not purport to be complete. You should refer to the section of this prospectus entitled “Certain Provisions of Delaware Law and of our Certificate of Incorporation and Bylaws” and our amended and restated certificate of incorporation and our amended and restated bylaws, both of which are included as exhibits to the registration statement of which this prospectus is a part. The summary below is also qualified by provisions of applicable law.

General

We are authorized to issue one class of common stock. Holders of our common stock are entitled to one vote for each share of common stock held of record for the election of directors and on all matters submitted to a vote of stockholders, except matters that relate only to one or more of the series of our preferred stock, and no holder has cumulative voting rights. Accordingly, the holders of a majority of the shares of common stock entitled to vote in any election of directors can elect all of the directors standing for election, if they so choose. Subject to preferences that may be applicable to any then outstanding preferred stock, holders of our common stock are entitled to receive dividends ratably, if any, as may be declared by our board of directors out of legally available funds, subject to any preferential dividend rights of any preferred stock then outstanding. Upon our dissolution, liquidation or winding up, holders of our common stock are entitled to share ratably in our net assets legally available after the payment of all our debts and other liabilities, subject to the preferential rights of any preferred stock then outstanding. Holders of our common stock have no preemptive, subscription, redemption or conversion rights. The rights, preferences and privileges of holders of common stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of preferred stock that are currently designated and issued or that we may designate and issue in the future. Except as described under “Certain Provisions of Delaware Law and of the Company’s Certificate of Incorporation and Bylaws—Anti-Takeover Provisions” below, a majority vote of the holders of common stock is generally required to take action under our amended and restated certificate of incorporation and amended and restated bylaws.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is Computershare, Trust Company, N.A., P.O. Box 30170, College Station, TX 77842. The transfer agent for any series of preferred stock that we may offer under this prospectus will be named and described in the applicable prospectus supplement for that series.

Stock Exchange Listing

Our common stock is listed for quotation on The Nasdaq Capital Market under the symbol “MTEM.”

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DESCRIPTION OF PREFERRED STOCK

The following description of our preferred stock and the description of the terms of any particular series of preferred stock that we choose to issue hereunder are not complete. These descriptions are qualified in their entirety by reference to our amended and restated certificate of incorporation and the certificate of designation relating to any series of preferred stock issued by us. The rights, preferences, privileges and restrictions of the preferred stock of each series will be fixed by the certificate of designation relating to that series.

Our board of directors is authorized, without action by the stockholders, to designate and issue up to an aggregate of 2,000,000 shares of preferred stock, par value \$0.001 per share, in one or more series. Our board of directors can designate the rights, preferences and privileges of the shares of each series and any of its qualifications, limitations or restrictions. Our board of directors may authorize the issuance of preferred stock with voting or conversion rights that could adversely affect the voting power or other rights of the holders of common stock. The issuance of preferred stock, while providing flexibility in connection with possible future financings and acquisitions and other corporate purposes could, under certain circumstances, have the effect of restricting dividends on our common stock, diluting the voting power of our common stock, impairing the liquidation rights of our common stock, or delaying, deferring or preventing a change in control of our company, which might harm the market price of our common stock. See also “Certain Provisions of Delaware Law and of the Company’s Certificate of Incorporation and Bylaws—Anti-Takeover Provisions.” Our board of directors will make any determination to issue such shares based on its judgment as to our Company’s best interests and the best interests of our stockholders.

If we offer a specific series of preferred stock under this prospectus, we will describe the terms of the preferred stock in the prospectus supplement for such offering and will file a copy of the amended and restated certificate establishing the terms of the preferred stock with the SEC. To the extent required, this description will include:

- the maximum number of shares;
- the designation of the shares;
- the annual dividend rate, if any, whether the dividend rate is fixed or variable, the date or dates on which dividends will accrue, the dividend payment dates, and whether dividends will be cumulative;
- the price and the terms and conditions for redemption, if any, including redemption at the option of Molecular or at the option of the holders, including the time period for redemption, and any accumulated dividends or premiums;
- the liquidation preference, if any, and any accumulated dividends upon the liquidation, dissolution or winding up of Molecular’s affairs;
- any sinking fund or similar provision, and, if so, the terms and provisions relating to the purpose and operation of the fund;
- the terms and conditions, if any, for conversion or exchange of shares of any other class or classes of Molecular’s capital stock or any series of any other class or classes, or of any other series of the same class, or any other securities or assets, including the price or the rate of conversion or exchange and the method, if any, of adjustment;
- the voting rights;
- any or all other preferences and relative, participating, optional or other special rights, privileges or qualifications, limitations or restrictions; and
- any preferred stock issued will be fully paid and nonassessable upon issuance.

Transfer Agent and Registrar

The transfer agent and registrar for any series of preferred stock that is designated by our board of directors will be set forth in the applicable prospectus supplement.

[Table of Contents](#)**DESCRIPTION OF DEBT SECURITIES**

The following description, together with the additional information we include in any applicable prospectus supplements, summarizes the material terms and provisions of the debt securities that we may offer under this prospectus. While the terms we have summarized below will apply generally to any future debt securities we may offer pursuant to this prospectus, we will describe the particular terms of any debt securities that we may offer in more detail in the applicable prospectus supplement. If we so indicate in a prospectus supplement, the terms of any debt securities offered under such prospectus supplement may differ from the terms we describe below, and to the extent the terms set forth in a prospectus supplement differ from the terms described below, the terms set forth in the prospectus supplement shall control.

We may sell from time to time, in one or more offerings under this prospectus, debt securities, which may be senior or subordinated. We will issue any such senior debt securities under a senior indenture that we will enter into with a trustee to be named in the senior indenture. We will issue any such subordinated debt securities under a subordinated indenture, which we will enter into with a trustee to be named in the subordinated indenture. We have filed forms of these documents as exhibits to the registration statement, of which this prospectus is a part. We use the term “indentures” to refer to either the senior indenture or the subordinated indenture, as applicable. The indentures will be qualified under the Trust Indenture Act of 1939, as in effect on the date of the indenture. We use the term “debenture trustee” to refer to either the trustee under the senior indenture or the trustee under the subordinated indenture, as applicable.

The following summaries of material provisions of the senior debt securities, the subordinated debt securities and the indentures are subject to, and qualified in their entirety by reference to, all the provisions of the indenture applicable to a particular series of debt securities.

General

Each indenture provides that debt securities may be issued from time to time in one or more series and may be denominated and payable in foreign currencies or units based on or relating to foreign currencies. Neither indenture limits the amount of debt securities that may be issued thereunder, and each indenture provides that the specific terms of any series of debt securities shall be set forth in, or determined pursuant to, an authorizing resolution and/or a supplemental indenture, if any, relating to such series.

We will describe in each prospectus supplement the following terms relating to a series of debt securities:

- the title or designation;
- the aggregate principal amount and any limit on the amount that may be issued;
- the currency or units based on or relating to currencies in which debt securities of such series are denominated and the currency or units in which principal or interest or both will or may be payable;
- whether we will issue the series of debt securities in global form, the terms of any global securities and who the depository will be;
- the maturity date and the date or dates on which principal will be payable;
- the interest rate, which may be fixed or variable, or the method for determining the rate and the date interest will begin to accrue, the date or dates interest will be payable and the record dates for interest payment dates or the method for determining such dates;
- whether or not the debt securities will be secured or unsecured, and the terms of any secured debt;
- the terms of the subordination of any series of subordinated debt;
- the place or places where payments will be payable;

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- our right, if any, to defer payment of interest and the maximum length of any such deferral period;
- the date, if any, after which, and the price at which, we may, at our option, redeem the series of debt securities pursuant to any optional redemption provisions;
- the date, if any, on which, and the price at which we are obligated, pursuant to any mandatory sinking fund provisions or otherwise, to redeem, or at the holder's option to purchase, the series of debt securities;
- whether the indenture will restrict our ability to pay dividends, or will require us to maintain any asset ratios or reserves;
- whether we will be restricted from incurring any additional indebtedness;
- a discussion of any material or special U.S. federal income tax considerations applicable to a series of debt securities;
- the denominations in which we will issue the series of debt securities, if other than denominations of \$1,000 and any integral multiple thereof; and
- any other specific terms, preferences, rights or limitations of, or restrictions on, the debt securities.

We may issue debt securities that provide for an amount less than their stated principal amount to be due and payable upon declaration of acceleration of their maturity pursuant to the terms of the indenture. We will provide you with information on the federal income tax considerations and other special considerations applicable to any of these debt securities in the applicable prospectus supplement.

Conversion or Exchange Rights

We will set forth in the prospectus supplement the terms, if any, on which a series of debt securities may be convertible into or exchangeable for our common stock or our other securities. We will include provisions as to whether conversion or exchange is mandatory, at the option of the holder or at our option. We may include provisions pursuant to which the number of shares of our common stock or our other securities that the holders of the series of debt securities receive would be subject to adjustment.

Consolidation, Merger or Sale; No Protection in Event of a Change of Control or Highly Leveraged Transaction

The indentures do not contain any covenant that restricts our ability to merge or consolidate, or sell, convey, transfer or otherwise dispose of all or substantially all of our assets. However, any successor to or acquirer of such assets must assume all of our obligations under the indentures or the debt securities, as appropriate.

Unless we state otherwise in the applicable prospectus supplement, the debt securities will not contain any provisions that may afford holders of the debt securities protection in the event we have a change of control or in the event of a highly leveraged transaction (whether or not such transaction results in a change of control), which could adversely affect holders of debt securities.

Events of Default Under the Indenture

The following are events of default under the indentures with respect to any series of debt securities that we may issue:

- if we fail to pay interest when due and our failure continues for 90 days and the time for payment has not been extended or deferred;
- if we fail to pay the principal, or premium, if any, when due and the time for payment has not been extended or delayed;

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- if we fail to observe or perform any other covenant set forth in the debt securities of such series or the applicable indentures, other than a covenant specifically relating to and for the benefit of holders of another series of debt securities, and our failure continues for 90 days after we receive written notice from the debenture trustee or holders of not less than a majority in aggregate principal amount of the outstanding debt securities of the applicable series; and
- if specified events of bankruptcy, insolvency or reorganization occur as to us.

No event of default with respect to a particular series of debt securities (except as to certain events of bankruptcy, insolvency or reorganization) necessarily constitutes an event of default with respect to any other series of debt securities. The occurrence of an event of default may constitute an event of default under any bank credit agreements we may have in existence from time to time. In addition, the occurrence of certain events of default or an acceleration under the indenture may constitute an event of default under certain of our other indebtedness outstanding from time to time.

If an event of default with respect to debt securities of any series at the time outstanding occurs and is continuing, then the trustee or the holders of not less than a majority in principal amount of the outstanding debt securities of that series may, by a notice in writing to us (and to the debenture trustee if given by the holders), declare to be due and payable immediately the principal (or, if the debt securities of that series are discount securities, that portion of the principal amount as may be specified in the terms of that series) of and premium and accrued and unpaid interest, if any, on all debt securities of that series. Before a judgment or decree for payment of the money due has been obtained with respect to debt securities of any series, the holders of a majority in principal amount of the outstanding debt securities of that series (or, at a meeting of holders of such series at which a quorum is present, the holders of a majority in principal amount of the debt securities of such series represented at such meeting) may rescind and annul the acceleration if all events of default, other than the non-payment of accelerated principal, premium, if any, and interest, if any, with respect to debt securities of that series, have been cured or waived as provided in the applicable indenture (including payments or deposits in respect of principal, premium or interest that had become due other than as a result of such acceleration). We refer you to the prospectus supplement relating to any series of debt securities that are discount securities for the particular provisions relating to acceleration of a portion of the principal amount of such discount securities upon the occurrence of an event of default.

Subject to the terms of the indentures, if an event of default under an indenture shall occur and be continuing, the debenture trustee will be under no obligation to exercise any of its rights or powers under such indenture at the request or direction of any of the holders of the applicable series of debt securities, unless such holders have offered the debenture trustee reasonable indemnity. The holders of a majority in principal amount of the outstanding debt securities of any series will have the right to direct the time, method and place of conducting any proceeding for any remedy available to the debenture trustee, or exercising any trust or power conferred on the debenture trustee, with respect to the debt securities of that series, provided that:

- the direction so given by the holder is not in conflict with any law or the applicable indenture; and
- subject to its duties under the Trust Indenture Act, the debenture trustee need not take any action that might involve it in personal liability or might be unduly prejudicial to the holders not involved in the proceeding.

A holder of the debt securities of any series will only have the right to institute a proceeding under the indentures or to appoint a receiver or trustee, or to seek other remedies if:

- the holder previously has given written notice to the debenture trustee of a continuing event of default with respect to that series;
- the holders of at least a majority in aggregate principal amount of the outstanding debt securities of that series have made written request, and such holders have offered reasonable indemnity to the debenture trustee to institute the proceeding as trustee; and

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- the debenture trustee does not institute the proceeding, and does not receive from the holders of a majority in aggregate principal amount of the outstanding debt securities of that series (or at a meeting of holders of such series at which a quorum is present, the holders of a majority in principal amount of the debt securities of such series represented at such meeting) other conflicting directions within 60 days after the notice, request and offer.

These limitations do not apply to a suit instituted by a holder of debt securities if we default in the payment of the principal, premium, if any, or interest on, the debt securities.

We will periodically file statements with the applicable debenture trustee regarding our compliance with specified covenants in the applicable indenture.

Modification of Indenture; Waiver

The debenture trustee and we may change the applicable indenture without the consent of any holders with respect to specific matters, including:

- to fix any ambiguity, defect or inconsistency in the indenture; and
- to change anything that does not materially adversely affect the interests of any holder of debt securities of any series issued pursuant to such indenture.

In addition, under the indentures, the rights of holders of a series of debt securities may be changed by us and the debenture trustee with the written consent of the holders of at least a majority in aggregate principal amount of the outstanding debt securities of each series (or, at a meeting of holders of such series at which a quorum is present, the holders of a majority in principal amount of the debt securities of such series represented at such meeting) that is affected. However, the debenture trustee and we may make the following changes only with the consent of each holder of any outstanding debt securities affected:

- extending the fixed maturity of the series of debt securities;
- reducing the principal amount, reducing the rate of or extending the time of payment of interest, or any premium payable upon the redemption of any debt securities;
- reducing the principal amount of discount securities payable upon acceleration of maturity;
- making the principal of or premium or interest on any debt security payable in currency other than that stated in the debt security; or
- reducing the percentage of debt securities, the holders of which are required to consent to any amendment or waiver.

Except for certain specified provisions, the holders of at least a majority in principal amount of the outstanding debt securities of any series (or, at a meeting of holders of such series at which a quorum is present, the holders of a majority in principal amount of the debt securities of such series represented at such meeting) may on behalf of the holders of all debt securities of that series waive our compliance with provisions of the indenture. The holders of a majority in principal amount of the outstanding debt securities of any series may on behalf of the holders of all the debt securities of such series waive any past default under the indenture with respect to that series and its consequences, except a default in the payment of the principal of, premium or any interest on any debt security of that series or in respect of a covenant or provision, which cannot be modified or amended without the consent of the holder of each outstanding debt security of the series affected; *provided, however*, that the holders of a majority in principal amount of the outstanding debt securities of any series may rescind an acceleration and its consequences, including any related payment default that resulted from the acceleration.

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Discharge

Each indenture provides that we can elect to be discharged from our obligations with respect to one or more series of debt securities, except for obligations to:

- the transfer or exchange of debt securities of the series;
- replace stolen, lost or mutilated debt securities of the series;
- maintain paying agencies;
- hold monies for payment in trust;
- compensate and indemnify the trustee; and
- appoint any successor trustee.

In order to exercise our rights to be discharged with respect to a series, we must deposit with the trustee money or government obligations sufficient to pay all the principal of, the premium, if any, and interest on, the debt securities of the series on the dates payments are due.

Form, Exchange, and Transfer

We will issue the debt securities of each series only in fully registered form without coupons and, unless we otherwise specify in the applicable prospectus supplement, in denominations of \$1,000 and any integral multiple thereof. The indentures provide that we may issue debt securities of a series in temporary or permanent global form and as book-entry securities that will be deposited with, or on behalf of, The Depository Trust Company or another depository named by us and identified in a prospectus supplement with respect to that series.

At the option of the holder, subject to the terms of the indentures and the limitations applicable to global securities described in the applicable prospectus supplement, the holder of the debt securities of any series can exchange the debt securities for other debt securities of the same series, in any authorized denomination and of like tenor and aggregate principal amount.

Subject to the terms of the indentures and the limitations applicable to global securities set forth in the applicable prospectus supplement, holders of the debt securities may present the debt securities for exchange or for registration of transfer, duly endorsed or with the form of transfer endorsed thereon duly executed if so required by us or the security registrar, at the office of the security registrar or at the office of any transfer agent designated by us for this purpose. Unless otherwise provided in the debt securities that the holder presents for transfer or exchange or in the applicable indenture, we will make no service charge for any registration of transfer or exchange, but we may require payment of any taxes or other governmental charges.

We will name in the applicable prospectus supplement the security registrar, and any transfer agent in addition to the security registrar, that we initially designate for any debt securities. We may at any time designate additional transfer agents or rescind the designation of any transfer agent or approve a change in the office through which any transfer agent acts, except that we will be required to maintain a transfer agent in each place of payment for the debt securities of each series.

If we elect to redeem the debt securities of any series, we will not be required to:

- issue, register the transfer of, or exchange any debt securities of that series during a period beginning at the opening of business 15 days before the day of mailing of a notice of redemption of any debt securities that may be selected for redemption and ending at the close of business on the day of the mailing; or
- register the transfer of or exchange any debt securities so selected for redemption, in whole or in part, except the unredeemed portion of any debt securities we are redeeming in part.

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Information Concerning the Debenture Trustee

The debenture trustee, other than during the occurrence and continuance of an event of default under the applicable indenture, undertakes to perform only those duties as are specifically set forth in the applicable indenture. Upon an event of default under an indenture, the debenture trustee under such indenture must use the same degree of care as a prudent person would exercise or use in the conduct of his or her own affairs. Subject to this provision, the debenture trustee is under no obligation to exercise any of the powers given it by the indentures at the request of any holder of debt securities unless it is offered reasonable security and indemnity against the costs, expenses and liabilities that it might incur.

Payment and Paying Agents

Unless we otherwise indicate in the applicable prospectus supplement, we will make payment of the interest on any debt securities on any interest payment date to the person in whose name the debt securities, or one or more predecessor securities, are registered at the close of business on the regular record date for the interest.

We will pay principal of and any premium and interest on the debt securities of a particular series at the office of the paying agents designated by us, except that unless we otherwise indicate in the applicable prospectus supplement, we will make interest payments by check which we will mail to the holder. Unless we otherwise indicate in a prospectus supplement, we will designate the corporate trust office of the debenture trustee in the City of New York as our sole paying agent for payments with respect to debt securities of each series. We will name in the applicable prospectus supplement any other paying agents that we initially designate for the debt securities of a particular series. We will maintain a paying agent in each place of payment for the debt securities of a particular series.

All money we pay to a paying agent or the debenture trustee for the payment of the principal of or any premium or interest on any debt securities which remains unclaimed at the end of two years after such principal, premium or interest has become due and payable will be repaid to us, and the holder of the security thereafter may look only to us for payment thereof.

Governing Law

The indentures and the debt securities will be governed by and construed in accordance with the laws of the State of New York, except to the extent that the Trust Indenture Act is applicable.

Subordination of Subordinated Debt Securities

Our obligations pursuant to any subordinated debt securities will be unsecured and will be subordinate and junior in priority of payment to certain of our other indebtedness to the extent described in a prospectus supplement. The subordinated indenture does not limit the amount of senior indebtedness we may incur. It also does not limit us from issuing any other secured or unsecured debt.

[Table of Contents](#)**DESCRIPTION OF WARRANTS*****General***

We may issue warrants to purchase shares of our common stock, preferred stock and/or debt securities in one or more series together with other securities or separately, as described in the applicable prospectus supplement. As of December 19, 2018, we had warrants to purchase 3,521,735 shares of common stock outstanding.

Below is a description of certain general terms and provisions of the warrants that we may offer. Particular terms of the warrants will be described in the warrant agreements and the prospectus supplement relating to the warrants.

The applicable prospectus supplement will contain, where applicable, the following terms of and other information relating to the warrants:

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

Transfer Agent and Registrar

The transfer agent and registrar for any warrants will be set forth in the applicable prospectus supplement.

[Table of Contents](#)**DESCRIPTION OF RIGHTS*****General***

We may issue rights to our stockholders to purchase shares of our common stock, preferred stock or the other securities described in this prospectus. We may offer rights separately or together with one or more additional rights, debt securities, preferred stock, common stock or warrants, or any combination of those securities in the form of units, as described in the applicable prospectus supplement. Each series of rights will be issued under a separate rights agreement to be entered into between us and a bank or trust company, as rights agent. The rights agent will act solely as our agent in connection with the certificates relating to the rights of the series of certificates and will not assume any obligation or relationship of agency or trust for or with any holders of rights certificates or beneficial owners of rights. The following description sets forth certain general terms and provisions of the rights to which any prospectus supplement may relate. The particular terms of the rights to which any prospectus supplement may relate and the extent, if any, to which the general provisions may apply to the rights so offered will be described in the applicable prospectus supplement. To the extent that any particular terms of the rights, rights agreement or rights certificates described in a prospectus supplement differ from any of the terms described below, then the terms described below will be deemed to have been superseded by that prospectus supplement. We encourage you to read the applicable rights agreement and rights certificate for additional information before you decide whether to purchase any of our rights. We will provide in a prospectus supplement the following terms of the rights being issued:

- the date of determining the stockholders entitled to the rights distribution;
- the aggregate number of shares of common stock, preferred stock or other securities purchasable upon exercise of the rights;
- the exercise price;
- the aggregate number of rights issued;
- whether the rights are transferrable and the date, if any, on and after which the rights may be separately transferred;
- the date on which the right to exercise the rights will commence, and the date on which the right to exercise the rights will expire;
- the method by which holders of rights will be entitled to exercise;
- the conditions to the completion of the offering, if any;
- the withdrawal, termination and cancellation rights, if any;
- whether there are any backstop or standby purchaser or purchasers and the terms of their commitment, if any;
- whether stockholders are entitled to oversubscription rights, if any;
- any applicable material U.S. federal income tax considerations; and
- any other terms of the rights, including terms, procedures and limitations relating to the distribution, exchange and exercise of the rights, as applicable.

Each right will entitle the holder of rights to purchase for cash the principal amount of shares of common stock, preferred stock or other securities at the exercise price provided in the applicable prospectus supplement. Rights may be exercised at any time up to the close of business on the expiration date for the rights provided in the applicable prospectus supplement.

Holders may exercise rights as described in the applicable prospectus supplement. Upon receipt of payment and the rights certificate properly completed and duly executed at the corporate trust office of the rights agent or

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any other office indicated in the prospectus supplement, we will, as soon as practicable, forward the shares of common stock, preferred stock or other securities, as applicable, purchasable upon exercise of the rights. If less than all of the rights issued in any rights offering are exercised, we may offer any unsubscribed securities directly to persons other than stockholders, to or through agents, underwriters or dealers or through a combination of such methods, including pursuant to standby arrangements, as described in the applicable prospectus supplement.

Rights Agent

The rights agent for any rights we offer will be set forth in the applicable prospectus supplement.

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DESCRIPTION OF UNITS

The following description, together with the additional information that we include in any applicable prospectus supplements summarizes the material terms and provisions of the units that we may offer under this prospectus. While the terms we have summarized below will apply generally to any units that we may offer under this prospectus, we will describe the particular terms of any series of units in more detail in the applicable prospectus supplement. The terms of any units offered under a prospectus supplement may differ from the terms described below.

We will incorporate by reference from reports that we file with the SEC, the form of unit agreement that describes the terms of the series of units we are offering, and any supplemental agreements, before the issuance of the related series of units. The following summaries of material terms and provisions of the units are subject to, and qualified in their entirety by reference to, all the provisions of the unit agreement and any supplemental agreements applicable to a particular series of units. We urge you to read the applicable prospectus supplements related to the particular series of units that we may offer under this prospectus, as well as any related free writing prospectuses and the complete unit agreement and any supplemental agreements that contain the terms of the units.

General

We may issue units consisting of common stock, preferred stock, one or more debt securities, warrants or rights for the purchase of common stock, preferred stock and/or debt securities in one or more series, in any combination. Each unit will be issued so that the holder of the unit is also the holder of each security included in the unit. Thus, the holder of a unit will have the rights and obligations of a holder of each security included in the unit. The unit agreement under which a unit is issued may provide that the securities included in the unit may not be held or transferred separately, at any time or at any time before a specified date.

We will describe in the applicable prospectus supplement the terms of the series of units being offered, including:

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

The provisions described in this section, as well as those set forth in any prospectus supplement or as described under “Description of Common Stock,” “Description of Preferred Stock,” “Description of Debt Securities,” “Description of Warrants,” and “Description of Rights” will apply to each unit, as applicable, and to any common stock, preferred stock, debt security, warrant or right included in each unit, as applicable.

Unit Agent

The name and address of the unit agent, if any, for any units we offer will be set forth in the applicable prospectus supplement.

Issuance in Series

We may issue units in such amounts and in such numerous distinct series as we determine.

[Table of Contents](#)***Enforceability of Rights by Holders of Units***

Each unit agent will act solely as our agent under the applicable unit agreement and will not assume any obligation or relationship of agency or trust with any holder of any unit. A single bank or trust company may act as unit agent for more than one series of units. A unit agent will have no duty or responsibility in case of any default by us under the applicable unit agreement or unit, including any duty or responsibility to initiate any proceedings at law or otherwise, or to make any demand upon us. Any holder of a unit may, without the consent of the related unit agent or the holder of any other unit, enforce by appropriate legal action its rights as holder under any security included in the unit.

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**CERTAIN PROVISIONS OF DELAWARE LAW AND
OF THE COMPANY'S CERTIFICATE OF INCORPORATION AND BYLAWS**

Anti-Takeover Provisions*Charter Documents Delaware Law*

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

In accordance with our amended and restated certificate of incorporation, other than those who may be elected by the holders of any series of Preferred Stock under specified circumstances, our board is divided into three classes, with one class being elected each year. At each annual meeting of stockholders, directors elected to succeed those directors whose terms expire shall be elected for a term of office to expire at the third succeeding annual meeting of stockholders after their election, with each director to hold office until his or her successor shall have been duly elected and qualified. The provision for a classified board could prevent a party who acquires control of a majority of our outstanding voting stock from obtaining control of the our board of directors until the second annual stockholders meeting following the date the acquirer obtains the controlling stock interest. Our classified board provision could also discourage a potential acquirer from making a tender offer or otherwise attempting to obtain control of Molecular and could increase the likelihood that incumbent directors will retain their positions.

Any vacancy on our board of directors, however occurring, including a vacancy resulting from an increase in the size of our board, may only be filled by the affirmative vote of a majority of our directors then in office, even if less than a quorum.

As required by the Delaware General Corporation Law, any amendment of our amended and restated certificate of incorporation must first be approved by a majority of our board of directors and, if required by law or our amended and restated certificate of incorporation, thereafter be approved by a majority of all of the outstanding shares entitled to vote thereon, voting together as a class, and a majority of the outstanding shares of each class entitled to vote thereon, voting separately. As provided in our amended and restated certificate of incorporation, notwithstanding the fact that approval by a lesser vote may be permitted by law, any amendment related to provisions of our amended and restated certificate of incorporation related to stockholder action, calling of special meetings, director number and nominations, amendment of our amended and restated bylaws, must be approved by not less than 66 2/3% of the then-outstanding shares of capital stock, voting together as a single class. Our amended and restated bylaws may be amended by the affirmative vote of a majority of the directors then in office, subject to any limitations set forth in our amended and restated bylaws, including that, notwithstanding any provision of law which might otherwise permit a lesser vote or no vote, but in addition to any affirmative vote of the holders of any particular class or series of the capital stock of Molecular required by law, our amended and restated bylaws or any preferred stock, the affirmative vote of the holders of at least 66 2/3% percent of the voting power of all of the then-outstanding shares entitled to vote generally in the election of directors, voting together as a single class, shall be required to adopt, amend or repeal any provision of our amended and restated bylaws. These provisions could discourage a potential acquirer from making a tender offer or otherwise attempting to obtain control of Molecular and could delay changes in management.

Our amended and restated bylaws establish advance notice procedures with regard to stockholder proposals relating to the nomination of candidates for election as directors or new business to be brought before meetings

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of our stockholders. These procedures provide that notice of stockholder proposals must be timely given in writing to our corporate secretary prior to the meeting at which the action is to be taken. Generally, (i) with respect to nominations of directors or other business at an annual meeting, to be timely, notice must be received at our principal executive offices not less than 120 days or more than 150 days prior to the first anniversary date of the annual meeting for the preceding year, and (ii) with respect to nominations of directors at a special meeting, to be timely, notice must be received at our principal executive offices not later than the close of business on the later of the 90th day prior to such special meeting or the 10th day following the day on which public announcement is first made of the date of the special meeting and of the nominees proposed by the Board of Directors to be elected at such meeting. The notice must contain certain information specified in our amended and restated bylaws. These provisions may have the effect of precluding the conduct of certain business at a meeting if the proper procedures are not followed. These provisions may also discourage or deter a potential acquirer from conducting a solicitation of proxies to elect the acquirer's own slate of directors or otherwise attempting to obtain control of our company.

Our amended and restated bylaws provide that only the chairman of the board of directors, our president or a majority of the members of our board of directors then in office may call special meetings of stockholders and only those matters set forth in the notice of the special meeting may be considered or acted upon at a special meeting of stockholders. Our amended and restated bylaws limit the business that may be conducted at an annual meeting of stockholders to those matters properly brought before the meeting. The restriction on the ability of our stockholders to call a special meeting means that a proposal to replace one or more directors on our board of directors also could be delayed until the next annual meeting.

Our amended and restated certificate of incorporation also provides that all stockholder actions are required to be taken by a vote of the stockholders at an annual or special meeting, and that stockholders may not take any action by written consent in lieu of a meeting. Without the availability of stockholder action by written consent, a holder controlling a majority of our capital stock would not be able to amend Molecular's amended and restated bylaws or remove directors without a stockholders' meeting.

Limitation of Liability and Indemnification

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. Pursuant to our amended and restated certificate of incorporation, a director shall not be personally liable to Molecular or its stockholders for monetary damages for breach of fiduciary duty as a director, except for liability (i) for any breach of the director's duty of loyalty to Molecular or its stockholders, (ii) for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, (iii) under Section 174 of the Delaware General Corporation Law, or (iv) for any transaction from which the director derived an improper personal benefit. If the Delaware General Corporation Law is amended to authorize corporate action further eliminating or limiting the personal liability of directors, then the liability of a director of Molecular shall be eliminated or limited to the fullest extent permitted by the Delaware General Corporation Law, as so amended.

Our amended and restated bylaws provide for indemnification, of our directors and executive officers involved in any action, suit or proceeding, whether civil, criminal, administrative or investigative, by reason of the fact that he or she is or was a director or an officer or is or was serving at our request as a director or officer, employee or agent of another corporation or of a partnership, joint venture, trust or other enterprise, including service with respect to an employee benefit plan, whether the basis of such proceeding is alleged action in an official capacity as a director, officer, employee or agent or in any other capacity while serving as a director, officer, employee or agent to the maximum extent permitted by the Delaware General Corporation Law, including as such law may be amended (but, in the case of any such amendment, only to the extent that such amendment permits us to provide broader indemnification rights than such law permitted us to provide prior to such amendment); provided, however, that, subject to certain limitations with respect to proceedings to enforce rights to indemnification, we will indemnify any such indemnitee in connection with a proceeding (or part

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thereof) initiated by such indemnitee only if such proceeding (or part thereof) was authorized by our board of directors.

Pursuant to our amended and restated bylaws, we will also pay the expenses (including attorney's fees) incurred in defending any such proceeding in advance of its final disposition; provided, however, that, if the Delaware General Corporation Law requires, we will only make an advancement of expenses incurred by an indemnitee in his or her capacity as a director or officer upon delivery to us of an undertaking, by or on behalf of such indemnitee, to repay all amounts so advanced if it is ultimately determined by final judicial decision from which there is no further right to appeal that such indemnitee is not entitled to be indemnified for such expenses.

In addition, we have entered into indemnification agreements with each of our current directors and executive officers and we intend to enter into new indemnification agreements with certain of our current directors and each 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.

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.

[Table of Contents](#)**LEGAL MATTERS**

Mintz, Levin, Cohn, Ferris, Glovsky and Popeo, P.C., Boston, Massachusetts, will pass upon the validity of the issuance of the securities to be offered by this prospectus.

[Table of Contents](#)**EXPERTS**

Ernst & Young LLP, independent registered public accounting firm, has audited our consolidated financial statements included in our Annual Report on Form 10-K for the year ended December 31, 2017, as set forth in their report, which is incorporated by reference in this prospectus and elsewhere in the registration statement. Our financial statements are incorporated by reference in reliance on Ernst & Young LLP's report, given on their authority as experts in accounting and auditing.

The financial statements as of December 31, 2016, and for the year then ended, have been incorporated by reference in this prospectus and in the registration statement in reliance on the report of BDO USA, LLP, independent registered public accounting firm (the report on the financial statements contains an explanatory paragraph regarding the Company's ability to continue as a going concern), incorporated by reference herein, given on the authority of BDO USA, LLP as experts in accounting and auditing.

[Table of Contents](#)**WHERE YOU CAN FIND MORE INFORMATION**

We are subject to the reporting requirements of the Securities Exchange Act of 1934, as amended, and file annual, quarterly and current reports, proxy statements and other information with the SEC. You may read and copy these reports, proxy statements and other information at the SEC's public reference facilities at 100 F Street, N.E., Washington, D.C. 20549. You can request copies of these documents by writing to the SEC and paying a fee for the copying cost. Please call the SEC at 1-800-SEC-0330 for more information about the operation of the public reference facilities. SEC filings are also available at the SEC's web site at <http://www.sec.gov>. This prospectus is only part of a registration statement on Form S-3 that we have filed with the SEC under the Securities Act of 1933, as amended, and therefore omits certain information contained in the registration statement. We have also filed exhibits and schedules with the registration statement that are excluded from this prospectus, and you should refer to the applicable exhibit or schedule for a complete description of any statement referring to any contract or other document. You may inspect a copy of the registration statement, including the exhibits and schedules, without charge, at the public reference room or obtain a copy from the SEC upon payment of the fees prescribed by the SEC.

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

[Table of Contents](#)**INCORPORATION OF DOCUMENTS BY REFERENCE**

The SEC allows us to “incorporate by reference” information that we file with them. Incorporation by reference allows us to disclose important information to you by referring you to those other documents. The information incorporated by reference is an important part of this prospectus, and information that we file later with the SEC will automatically update and supersede this information. We filed a registration statement on Form S-3 under the Securities Act of 1933, as amended, with the SEC with respect to the securities we may offer pursuant to this prospectus. This prospectus omits certain information contained in the registration statement, as permitted by the SEC. You should refer to the registration statement, including the exhibits, for further information about us and the securities we may offer pursuant to this prospectus. Statements in this prospectus regarding the provisions of certain documents filed with, or incorporated by reference in, the registration statement are not necessarily complete and each statement is qualified in all respects by that reference. Copies of all or any part of the registration statement, including the documents incorporated by reference or the exhibits, may be obtained upon payment of the prescribed rates at the offices of the SEC listed above in “Where You Can Find More Information.” The documents we are incorporating by reference are:

- our Annual Report on [Form 10-K](#) for the fiscal year ended December 31, 2017, filed with the SEC on March 30, 2018;
- the information incorporated by reference into our Annual Report on Form 10-K for the year ended December 31, 2017 from our definitive [Proxy Statement](#) for our 2018 Annual Meeting of Stockholders, filed with the SEC on April 30, 2018;
- our Quarterly Reports on Form 10-Q for the fiscal quarters ended [March 31, 2018](#), [June 30, 2018](#) and [September 30, 2018](#), filed with the SEC on May 14, 2018, August 9, 2018 and November 13, 2018, respectively;
- our Current Reports on Form 8-K, filed with the SEC on [January 5, 2018](#), [March 2, 2018](#), [March 15, 2018](#), [May 16, 2018](#), [June 1, 2018](#), [June 4, 2018](#), [June 21, 2018](#), [June 22, 2018](#), [September 19, 2018](#), [September 24, 2018](#), and [November 9, 2018](#) (except for the information furnished under Items 2.02 or 7.01 and the exhibits furnished therewith);
- the description of our common stock contained in our Registration Statement on [Form 8-A](#) initially filed on August 9, 2006, including any amendment or report filed for the purpose of updating such description; and
- all reports and other documents subsequently filed by us pursuant to Sections 13(a), 13(c), 14 and 15(d) of the Exchange Act after the date of this prospectus and prior to the termination or completion of the offering of securities under this prospectus shall be deemed to be incorporated by reference in this prospectus and to be a part hereof from the date of filing such reports and other documents.

The SEC file number for each of the documents listed above is 001-32979.

In addition, all reports and other documents filed by us pursuant to the Exchange Act after the date of the initial registration statement and prior to effectiveness of the registration statement shall be deemed to be incorporated by reference into this prospectus.

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

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

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

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

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Molecular Templates, Inc.



6,000,000 Shares of Common Stock

250 Shares of Series A Convertible Preferred Stock

PROSPECTUS SUPPLEMENT

Joint Book-Running Managers

Cowen

Barclays

Stifel

Lead Manager

Oppenheimer & Co.

Co-Manager

Ladenburg Thalmann

November 20, 2019.

