

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

Amendment No. 1 to
FORM S-1
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933

Moleculin Biotech, Inc.

(Exact Name of Registrant as Specified in Its Charter)

Delaware
(State or Other Jurisdiction of
Incorporation or Organization)

2834
(Primary Standard Industrial
Classification Code Number)

47-4671997
(I.R.S. Employer
Identification Number)

5300 Memorial Drive, Suite 950
Houston, Texas 77007
(713) 300-5160

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

Mr. Walter Klemp, Chief Executive Officer
5300 Memorial Drive, Suite 950
Houston, Texas 77007
(713) 300-5160

(Name, Address, Including Zip Code, and Telephone Number, Including Area Code, of Agent For Service)

Copies to:
Cavas S. Pavri
Schiff Hardin LLP
100 N. 18th, Suite 300
Philadelphia, PA 19103
Telephone: (202) 724-6847
Fax: (202) 778-6460

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

If any of the securities being registered on this form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, check the following box.

If this form is filed to register additional securities for an offering pursuant to Rule 462(b) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

If this form is a post-effective amendment filed pursuant to Rule 462(c) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

If this form is a post-effective amendment filed pursuant to Rule 462(d) under the Securities Act, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer," "smaller reporting company," and "emerging growth company" in Rule 12b-2 of the Securities Exchange Act of 1934. (Check one):

Large accelerated filer

Accelerated filer

Non-accelerated filer

Smaller reporting company

Emerging growth company

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

The Registrant hereby amends this Registration Statement on such date or dates as may be necessary to delay its effective date until the Registrant shall file a further amendment which specifically states that this Registration Statement shall thereafter

become effective in accordance with Section 8(a) of the Securities Act of 1933 or until the Registration Statement shall become effective on such date as the Commission, acting pursuant to said Section 8(a), may determine.

EXPLANATORY NOTE

This Amendment No. 1 ("Amendment") to the Registration Statement on Form S-1 (File No. 333-227845) of Moleculin Biotech, Inc. ("Registration Statement") is being filed solely for the purpose of filing Exhibit 5 as indicated in Part II of this Amendment. This Amendment does not modify any provision of the prospectus that forms a part of the Registration Statement. Accordingly, a preliminary prospectus has been omitted.

PART II

INFORMATION NOT REQUIRED IN PROSPECTUS

Item 13. Other Expenses of Issuance and Distribution.

The following table sets forth the estimated costs and expenses to be incurred in connection with the issuance and distribution of the securities of Moleculin Biotech, Inc. (the “Registrant”) which are registered under this Registration Statement on Form S-1 (this “Registration Statement”). All amounts are estimates except the Securities and Exchange Commission registration fee and the Financial Industry Regulatory Authority, Inc. filing fee.

The following expenses will be borne solely by the Registrant:

	<u>Amount to be Paid</u>
SEC Registration fee	\$ 1,133.88
Legal fees and expenses	15,000
Accounting fees and expenses	15,000
Miscellaneous fees and expenses	5,000
Total	<u>\$ 36,133.88</u>

Item 14. Indemnification of Directors and Officers.

Pursuant to Section 145 of the Delaware General Corporation Law (the “DGCL”), a corporation shall have the power to indemnify any person who was or is a party or is threatened to be made a party to any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative (other than a derivative action by or in the right of such corporation) by reason of the fact that such person is or was a director, officer, employee or agent of such corporation, or serving at the request of such corporation in such capacity for another corporation, partnership, joint venture, trust or other enterprise, against expenses (including attorneys’ fees), judgments, fines and amounts paid in settlement actually and reasonably incurred in connection with such action, suit or proceeding, if such person acted in good faith and in a manner he or she reasonably believed to be in or not opposed to the best interests of such corporation, and, with respect to any criminal action or proceeding, had no reasonable cause to believe his or her conduct was unlawful.

The DGCL also permits indemnification by a corporation under similar circumstances for expenses (including attorneys’ fees) actually and reasonably incurred by such persons in connection with the defense or settlement of a derivative action or suit, except that no indemnification shall be made in respect of any claim, issue or matter as to which such person shall have been adjudged to be liable to such corporation unless the Delaware Court of Chancery or the court in which such action or suit was brought shall determine upon application that such person is fairly and reasonably entitled to indemnity for such expenses which such court shall deem proper.

To the extent a present or former director or officer is successful in the defense of such an action, suit or proceeding referenced above, or in defense of any claim, issue or matter therein, a corporation is required by the DGCL to indemnify such person for actual and reasonable expenses incurred in connection therewith. Expenses (including attorneys’ fees) incurred by such persons in defending any action, suit or proceeding may be paid in advance of the final disposition of such action, suit or proceeding upon in the case of a current officer or director, receipt of an undertaking by or on behalf of such person to repay such amount if it is ultimately determined that such person is not entitled to be so indemnified.

The DGCL provides that the indemnification described above shall not be deemed exclusive of other indemnification that may be granted by a corporation pursuant to its bylaws, disinterested directors’ vote, stockholders’ vote and agreement or otherwise.

Section 102(b)(7) of the DGCL enables a corporation, in its certificate of incorporation or an amendment thereto, to eliminate or limit the personal liability of a director to the corporation or its stockholders for monetary damages for violations of the directors' fiduciary duty, except (i) for any breach of the director's duty of loyalty to the corporation or its stockholders, (ii) for acts or omissions not in good faith or which involve intentional misconduct or a knowing violation of law, (iii) pursuant to Section 174 of the DGCL (providing for liability of directors for unlawful payment of dividends or unlawful stock purchases or redemptions) or (iv) for any transaction from which a director derived an improper personal benefit. The Registrant's certificate of incorporation provides for such limitations on liability for its directors.

The DGCL also provides corporations with the power to purchase and maintain insurance on behalf of any person who is or was a director, officer, employee or agent of such corporation, or is or was serving at the request of such corporation in a similar capacity for another corporation, partnership, joint venture, trust or other enterprise, against any liability asserted against him or her in any such capacity or arising out of his or her status as such, whether or not the corporation would have the power to indemnify him or her against such liability as described above. In connection with this offering, the Registrant will obtain liability insurance for its directors and officers. Such insurance would be available to its directors and officers in accordance with its terms.

The Registrant's certificate of incorporation requires the Registrant to indemnify and hold harmless, to the fullest extent permitted by applicable law as it presently exists or may hereafter be amended, any person (a "covered person") who was or is made or is threatened to be made a party or is otherwise involved in any threatened, pending or completed action, suit or proceeding, whether civil, criminal, administrative or investigative (a "proceeding") by reason of the fact that he or she is or was a director, officer or member of a committee of the Registrant, or, while a director or officer of the Registrant, is or was serving at the request of the Registrant as a director or officer, employee or agent of another corporation, partnership, joint venture, trust or other enterprise or non-profit entity, including service with respect to employee benefit plans, against all liability and loss suffered and expenses (including attorneys' fees), judgment, fines and amounts paid in settlement actually and reasonably incurred by such person in connection with a proceeding.

In addition, under the Registrant's certificate of incorporation, in certain circumstances, the Registrant shall pay the expenses (including attorneys' fees) incurred by a covered person in defending a proceeding in advance of the final disposition of such proceeding; provided, however, that the Registrant shall not be required to advance any expenses to a person against whom the Registrant directly brings an action, suit or proceeding alleging that such person (1) committed an act or omission not in good faith or (2) committed an act of intentional misconduct or a knowing violation of law. Additionally, an advancement of expenses incurred by a covered person shall be made only upon delivery to the Registrant of an undertaking, by or on behalf of such covered person, to repay all amounts so advanced if it shall ultimately be determined by final judicial decision from which there is no further right to appeal or otherwise in accordance with Delaware law that such covered person is not entitled to be indemnified for such expenses.

In addition, the Registrant has entered into indemnification agreements with its directors and executive officers that provide for additional indemnification protections, which form of agreement has been filed as an exhibit to this registration statement.

Item 15. Recent Sales of Unregistered Securities.

Except as set forth below, in the three years preceding the filing of this Registration Statement, the Registrant has not issued any securities that were not registered under the Securities Act:

In August 2015, Messrs. Klemp, Picker and Priebe purchased 1,100,000 shares, 500,000 shares and 3,000,000 shares of our common stock, respectively, at a purchase price of \$0.001 per share.

In August 2015, in exchange for the issuance of 630,000 shares of common stock, we acquired the rights to the license agreement with MD Anderson covering our WP1122 Portfolio held by IntertechBio Corporation, a company affiliated with Messrs. Priebe and Picker. In August 2015, in exchange for the issuance of 1,431,000 shares of common stock, we acquired the rights to the Annamycin IND and all data related to the Annamycin IND or the development of Annamycin held by AnnaMed, Inc., a company affiliated with Mr. Klemp.

In May 2016, Moleculin, LLC, a Texas limited liability company, was merged with and into MBI, which survived the merger. As a result of the merger, we issued the equity interests holders of Moleculin, LLC (including the convertible noteholders of Moleculin, LLC) an aggregate of 999,931 shares of our common stock. Messrs. Klemp, Picker and Priebe are members of Moleculin, LLC and received shares of our common stock as a result of the merger.

In August and September 2015, the Registrant issued two 8% convertible notes in an aggregate of \$250,000 in principal amount of convertible notes to one investor, which principal and accrued interest automatically converted into shares of common stock upon the closing of the Company's initial public offering at a conversion rate of \$0.1299 per share. In October 2015, the Registrant issued two 8% convertible notes in an aggregate of \$200,000 in principal amount of convertible notes to two investors, which principal and accrued interest automatically converted into shares of common stock upon the closing of the Company's initial public offering at a conversion rate of \$0.20 per share. At the time of such purchase in October 2015, the convertible note investors and the Registrant agreed that the investors would fund the Registrant up to the filing of its initial non-confidential registration statement an additional \$165,000 on the same terms as in the October financing. Pursuant to such agreement, such amounts were received in January 2016.

Between January and May 2016, the Registrant sold 225,963 shares of common stock for a total purchase price of \$677,889 to 19 investors.

On June 20, 2016, the Registrant agreed to issue 24,000 shares of common stock to an investor relations firm for services provided.

In January 2017, the Registrant agreed to issue 79,167 shares of common stock to a third-party in settlement of \$237,500 in past due amounts.

In July 2017, the Registrant agreed to issue two warrants to purchase 100,000 and 50,000 shares of common stock at exercise prices of \$2.41 and \$3.00 per share, respectively, to a consultant, subject to approval by Nasdaq of a listing of additional shares application, which was received in August 2017.

In February, 2018, the Registrant entered into a Securities Purchase Agreement (the "Purchase Agreement") with certain institutional investors (the "Investors") for the sale of shares of common stock and, concurrently with such sale, the Registrant also sold warrants to purchase 2,145,000 shares of common stock. Subject to certain beneficial ownership limitations, the warrants will be initially exercisable on the six-month anniversary of the issuance date at an exercise price equal to \$2.80 per share of common stock, subject to adjustments as provided under the terms of the warrants. The warrants are exercisable for five years from the initial exercise date. The warrants and the shares issuable upon exercise of the warrants were sold without registration under the Securities Act in reliance on the exemptions provided by Section 4(a)(2) of the Securities Act as transactions not involving a public offering as sales to accredited investors, and in reliance on similar exemptions under applicable state laws. The Registrant also entered into a placement agent agreement (the "Placement Agency Agreement") with Roth Capital Partners, LLC ("Roth"), pursuant to which Roth agreed to serve as exclusive placement agent for the issuance and sale of the shares and warrants. Pursuant to the Placement Agency Agreement, the Registrant agreed to grant to Roth or its designees warrants to purchase up to 3% of the aggregate number of shares of common stock sold in the transactions (the "Roth Warrants"). The Roth Warrants have substantially the same terms as the warrants described above, except that the Roth Warrants will expire on February 15, 2023. The Roth Warrants and the shares issuable upon exercise of the Roth Warrants will be issued in reliance on the exemption from registration provided by Section 4(a)(2) of the Securities Act as transactions not involving a public offering and in reliance on similar exemptions under applicable state laws.

In May 2018, the Registrant agreed to issue a warrant to purchase 100,000 shares of common stock at an exercise price of \$3.00 per share to a consultant, subject to NASDAQ listing of additional shares approval. The consultant is an accredited investor.

In June 2018, the Registrant entered into a Securities Purchase Agreement (the "Purchase Agreement") with certain institutional investors (the "Investors") for the sale of shares of common stock and, concurrently with such sale, the Registrant also sold warrants to purchase 710,212 shares of common stock. Subject to certain beneficial ownership limitations, the warrants will be initially exercisable on the six-month anniversary of the issuance date at an exercise price equal to \$2.02 per share of common stock, subject to adjustments as provided under the terms of the warrants. The warrants are exercisable for five years from the initial exercise date. The warrants and the shares issuable upon exercise of the warrants were sold without registration under the Securities Act in reliance on the exemptions provided by Section 4(a)(2) of the Securities Act as transactions not involving a public offering as sales to accredited investors, and in reliance on similar exemptions under applicable state laws. The Registrant also entered into a placement agent agreement (the "Placement Agency Agreement") with Roth Capital Partners, LLC ("Roth"), pursuant to which Roth agreed to serve as exclusive placement agent for the issuance and sale of the shares and warrants. Pursuant to the Placement Agency Agreement, the Registrant agreed to grant to Roth or its designees warrants to purchase up to 3% of the aggregate number of shares of common stock sold in the transactions (the "Roth Warrants"). The Roth Warrants have substantially the same terms as the warrants described above, except that the Roth Warrants will expire on June 22, 2023. The Roth Warrants and the shares issuable upon exercise of the Roth Warrants will be issued in reliance on the exemption from registration provided by Section 4(a)(2) of the Securities Act as transactions not involving a public offering and in reliance on similar exemptions under applicable state laws.

In October 2018, the Registrant entered into a Purchase Agreement with Lincoln Park Capital Fund, LLC, or Lincoln Park, which provides that, upon the terms and subject to the conditions and limitations set forth in the agreement, Lincoln Park is committed to purchase up to an aggregate of \$20.0 million shares of the Registrant's common stock over the 36-month term of the agreement. The Registrant issued 243,013 shares of its common stock to Lincoln Park in consideration for entering into the agreement.

None of these transactions involved a public offering. We believe that each of the above issuances was exempt from registration under the Securities Act in reliance on Section 4(a)(2) of the Securities Act regarding transactions not involving a public offering.

Item 16. Exhibits and Financial Statement Schedules.

(a) *Exhibits*: Reference is made to the Exhibit Index following the signature pages hereto, which Exhibit Index is hereby incorporated into this Item.

(b) *Financial Statement Schedules*: All schedules are omitted because the required information is inapplicable or the information is presented in the financial statements and the related notes.

Item 17. Undertakings

(a) The undersigned Registrant hereby undertakes:

(1) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:

(i) To include any prospectus required by Section 10(a)(3) of the Securities Act of 1933;

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

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

Provided, however, that Paragraphs (a)(1)(i), (a)(1)(ii) and (a)(1)(iii) of this section do not apply if the registration statement is on Form S-1 and the information required to be included in a post-effective amendment by those paragraphs is contained in reports filed with or furnished to the Commission by the Registrant pursuant to Section 13 or Section 15(d) of the Securities Exchange Act of 1934 that are incorporated by reference in the registration statement.

(2) That, for the purpose of determining any liability under the Securities Act of 1933, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

(3) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.

(4) That, for the purpose of determining liability under the Securities Act to any purchaser:

(i) Each prospectus filed pursuant to Rule 424(b) as part of a registration statement relating to an offering, other than registration statements relying on Rule 430B or other than prospectuses filed in reliance on Rule 430A, shall be deemed to be part of and included in the registration statement as of the date it is first used after effectiveness. Provided, however, that no statement made in a registration statement or prospectus that is part of the registration statement or made in a document incorporated or deemed incorporated by reference into the registration statement or prospectus that is part of the registration statement will, as to a purchaser with a time of contract of sale prior to such first use, supersede or modify any statement that was made in the registration statement or prospectus that was part of the registration statement or made in any such document immediately prior to such date of first use.

(b) The undersigned registrant hereby undertakes that, for purposes of determining any liability under the Securities Act of 1933, each filing of the registrant's annual report pursuant to section 13(a) or section 15(d) of the Securities Exchange Act of 1934 (and, where applicable, each filing of an employee benefit plan's annual report pursuant to section 15(d) of the Securities Exchange Act of 1934) that is incorporated by reference in the registration statement shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.

(c) Insofar as indemnification for liabilities arising under the Securities Act of 1933 may be permitted to directors, officers and controlling persons of the registrant pursuant to the provisions referenced in Item 14 of this Registration Statement, or otherwise, the Registrant has been advised that in the opinion of the Securities and Exchange Commission such indemnification is against public policy as expressed in the Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the registrant of expenses incurred or paid by a director, officer, or controlling person of the registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered hereunder, the registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question of whether such indemnification by it is against public policy as expressed in the Act and will be governed by the final adjudication of such issue.

SIGNATURES

Pursuant to the requirements of the Securities Act, the registrant has duly caused this Registration Statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the city of Houston, Texas, on October 24, 2018.

MOLECULIN BIOTECH, INC.
(Registrant)

By: /s/ Walter V. Klemp
Walter V. Klemp
Director and Chief Executive Officer

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

<u>SIGNATURE</u>	<u>TITLE</u>	<u>DATE</u>
<u>/s/ Walter V. Klemp</u> Walter V. Klemp	Chief Executive Officer, President and Director (Principal Executive Officer)	October 24, 2018
<u>/s/ Jonathan P. Foster</u> Jonathan P. Foster	Chief Financial Officer and Executive Vice President (Principal Financial Officer and Principal Accounting Officer)	October 24, 2018
* <u>Robert George</u>	Director	October 24, 2018
* <u>Michael Cannon</u>	Director	October 24, 2018
* <u>John Climaco</u>	Director	October 24, 2018
* By: <u>/s/ Jonathan P. Foster</u> Attorney-in-fact		

EXHIBIT INDEX

Exhibit Number	Description
<u>3.1</u>	<u>Amended and Restated Certificate of Incorporation of Moleculin Biotech, Inc. (incorporated by reference to exhibit 3.1 of the Form S-1/A filed March 21, 2016)</u>
<u>3.2</u>	<u>Amended and Restated Bylaws of Moleculin Biotech, Inc. (incorporated by reference to exhibit 3.2 of the Form S-1/A filed March 21, 2016)</u>
<u>4.1</u>	<u>Form of Series A/B/C Warrant Agreement issued in February 2017 offering (incorporated by reference to Exhibit 4.1 of the Form 8-K filed February 9, 2017)</u>
<u>4.3</u>	<u>Form of Warrant Agreement issued in June 2018 offering (incorporated by reference to Exhibit 4.1 of the Form 8-K filed June 21, 2018)</u>
<u>5 *</u>	<u>Opinion of Schiff Hardin LLP as to legality of the securities being registered</u>
<u>10.1 **</u>	<u>Moleculin Biotech, Inc. Amended and Restated 2015 Stock Plan (incorporated by reference to Annex B to the definitive proxy statement filed April 27, 2018)</u>
<u>10.2</u>	<u>Rights Transfer Agreement between Moleculin Biotech, Inc. and AnnaMed, Inc. (incorporated by reference to exhibit 10.2 of the Form S-1/A filed March 21, 2016)</u>
<u>10.3</u>	<u>Patent and Technology License Agreement dated June 21, 2010 by and between The Board of Regents of the University of Texas System and Moleculin, LLC (incorporated by reference to exhibit 10.3 of the Form S-1/A filed March 21, 2016)</u>
<u>10.4</u>	<u>Amendment No. 1 to the Patent and Technology License Agreement dated June 21, 2010 by and between The Board of Regents of the University of Texas System and Moleculin, LLC (incorporated by reference to exhibit 10.4 of the Form S-1/A filed March 21, 2016)</u>
<u>10.5</u>	<u>Patent and Technology License Agreement dated April 2, 2012 by and between The Board of Regents of the University of Texas System and IntertechBio Corporation (incorporated by reference to exhibit 10.5 of the Form S-1/A filed March 21, 2016)</u>
<u>10.6</u>	<u>Amendment No. 1 to the Patent and Technology License Agreement dated June 21, 2010 by and between The Board of Regents of the University of Texas System and IntertechBio Corporation (incorporated by reference to exhibit 10.6 of the Form S-1/A filed March 21, 2016)</u>
<u>10.7</u>	<u>Patent and Technology Development and License Agreement June 28, 2012 by and between Annamed, Inc. and Dermin Sp. z.o.o (incorporated by reference to exhibit 10.7 of the Form S-1/A filed April 15, 2016)</u>
<u>10.8</u>	<u>Patent and Technology Development and License Agreement dated April 15, 2011 by and between IntertechBio Corporation and Dermin Sp. z.o.o (incorporated by reference to exhibit 10.8 of the Form S-1/A filed March 21, 2016)</u>
<u>10.9</u>	<u>Patent and Technology Development and License Agreement dated October 27, 2010 by and between Moleculin, LLC and Dermin Sp. z.o.o (incorporated by reference to exhibit 10.9 of the Form S-1/A filed March 21, 2016)</u>
<u>10.10</u>	<u>Rights Transfer Agreement dated between Moleculin Biotech, Inc. and IntertechBio Corporation dated August 11, 2015 (incorporated by reference to exhibit 10.10 of the Form S-1/A filed March 21, 2016)</u>
<u>10.11</u>	<u>Agreement and Plan of Merger between Moleculin Biotech, Inc. and Moleculin, LLC (incorporated by reference to exhibit 10.11 of the Form S-1/A filed March 21, 2016)</u>
<u>10.12</u>	<u>Technology Rights and Development License Agreement to be entered into by Moleculin Biotech, Inc. and Houston Pharmaceuticals, Inc. (incorporated by reference to exhibit 10.13 of the Form S-1/A filed April 15, 2016)</u>
<u>10.13 **</u>	<u>Employment Agreement between Moleculin Biotech, Inc. and Jonathan P. Foster dated August 19, 2016 (incorporated by reference to Exhibit 10.1 of the Form 8-K filed August 25, 2016)</u>
<u>10.14 **</u>	<u>Executive Employment Agreement between Moleculin Biotech, Inc. and Walter Klemp dated October 13, 2016 (incorporated by reference to Exhibit 10.1 of the Form 8-K filed October 13, 2016)</u>
<u>10.15 **</u>	<u>General Release and Separation Agreement between Moleculin Biotech, Inc. and Louis Ploth dated October 7, 2016 (incorporated by reference to Exhibit 10.2 of the Form 8-K filed October 13, 2016)</u>

- 10.16 [Development Collaboration Agreement between Moleculin Biotech, Inc. and Dermin Sp. Z o. o. dated September 30, 2016 \(incorporated by reference to Exhibit 10.4 of the Form 10-Q filed November 21, 2016\)](#)
- 10.17 [Lease Agreement for 5300 Memorial \(incorporated by reference to Exhibit 10.1 of the Form 10-Q filed May 14, 2018\)](#)
- 10.18 ± [Patent And Technology License Agreement dated February 12, 2018 by and between The Board of Regents of The University Of Texas System on behalf of The University Of Texas M. D. Anderson Cancer Center and Moleculin Biotech, Inc. \(incorporated by reference to Exhibit 10.2 of the Form 10-Q filed May 14, 2018\)](#)
- 10.19 [Purchase Agreement, dated as of October 4, 2018, by and between the Company and Lincoln Park Capital Fund, LLC \(incorporated by reference to Exhibit 10.1 of the Form 8-K filed October 5, 2018\)](#)
- 10.20 [Registration Rights Agreement, dated as of October 4, 2018, by and between the Company and Lincoln Park Capital Fund, LLC \(incorporated by reference to Exhibit 10.2 of the Form 8-K filed October 5, 2018\)](#)
- 21 [Subsidiaries of the Registrant \(incorporated by reference to exhibit 21 of the Form S-1/A filed April 15, 2016\)](#)
- 23.1 [Consent of Grant Thornton LLP \(previously filed\)](#)
- 24.1 [Power of Attorney \(previously filed\)](#)
- * Filed herewith.
- ** Denotes a management contract or compensatory plan or arrangement.
- ± Confidential treatment has been granted as to certain portions of this exhibit pursuant to Rule 24b-2 of the Securities Exchange Act of 1934, as amended.
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October 24, 2018

Board of Directors
Moleculin Biotech, Inc.
5300 Memorial Drive
Suite 950
Houston TX 77007

Re: Registration Statement on Form S-1

Ladies and Gentlemen:

We have acted as counsel to Moleculin Biotech, Inc., a Delaware corporation (the "**Company**"), in connection with the Registration Statement on Form S-1 (the "**Registration Statement**"), filed by the Company with the Securities and Exchange Commission (the "**Commission**") under the Securities Act of 1933, as amended (the "**Securities Act**"). The Registration Statement relates to the resale of up to 6,730,526 shares of common stock, par value \$0.001 per share (the "**Shares**"), which may be offered for sale from time to time by the selling stockholder (the "**Selling Stockholder**") identified in the Registration Statement. The Shares consist of: (i) 243,013 shares (the "**Commitment Shares**") have been issued to the Selling Stockholder in a private placement prior to the date hereof, (ii) up to 121,507 additional commitment shares (the "**Additional Commitment Shares**") that may be issued to the Selling Stockholder pursuant to an exemption from the registration provisions of the Securities Act from time to time by the Company pursuant to a purchase agreement dated as of October 4, 2018 (the "**Purchase Agreement**"), by and between the Company and the Selling Stockholder, and (iii) up to 6,366,006 shares (the "**Agreement Shares**") that may be issued and sold to the Selling Stockholder pursuant to an exemption from the registration provisions of the Securities Act from time to time by the Company pursuant to the Purchase Agreement.

In connection with our opinion, we have examined the Registration Statement, including the exhibits thereto, the Purchase Agreement, and such other documents, corporate records and instruments, and have examined such laws and regulations, as we have deemed necessary for the purposes of this opinion. In making our examination, we have assumed the genuineness of all signatures, the authenticity of all documents submitted to us as originals, the conformity with the originals of all documents submitted to us as copies and the legal capacity of all natural persons. As to matters of fact material to our opinions in this letter, we have relied on certificates and statements from officers and other employees of the Company, public officials and other appropriate persons. We have assumed (a) that, upon the issuance of the Additional Commitment Shares and the Agreement Shares, the total number of shares of common stock issued and outstanding and committed to be issued will not exceed the total number of shares of common stock that the Company is authorized to issue under its certificate of incorporation as it is then in effect, (b) that the proceeds from any sale of Agreement Shares are equal to at least the par value of those shares and any Additional Commitment Shares being issued in connection therewith, and (iii) that the Company's Board of Directors or a duly authorized committee thereof has approved the specific issuance of the Agreement Shares.

Based upon the foregoing, and in reliance thereon, and subject to the assumptions, limitations, qualifications and exceptions set forth herein, we are of the opinion that: (i) the Commitment Shares are validly issued, fully paid and non-assessable; (ii) the Additional Commitment Shares, when issued by the Company in accordance with the Purchase Agreement and duly registered in the name or on behalf of the Selling Stockholder, will be validly issued, fully paid and non-assessable and (iii) the Agreement Shares, when issued by the Company against payment therefor in accordance with the Purchase Agreement and duly registered in the name or on behalf of the Selling Stockholder, will be validly issued, fully paid and non-assessable.

The foregoing opinions are limited to the General Corporation Law of Delaware, and we express no opinion as to the laws of any other jurisdiction.

The opinions expressed in this opinion letter are as of the date of this opinion letter only and as to laws covered hereby only as they are in effect on that date, and we assume no obligation to update or supplement such opinion to reflect any facts or circumstances that may come to our attention after that date or any changes in law that may occur or become effective after that date. The opinions herein are limited to the matters expressly set forth in this opinion letter, and no opinion or representation is given or may be inferred beyond the opinions expressly set forth in this opinion letter.

We hereby consent to the filing of this opinion as Exhibit 5 to the Registration Statement filed as of the date hereof and to the reference to us under the caption “Legal Matters” in the prospectus contained in the Registration Statement. In giving this consent, we do not thereby admit that we are within the category of persons whose consent is required under Section 7 of the Securities Act or the rules and regulations of the Commission promulgated thereunder.

Very truly yours,

SCHIFF HARDIN LLP

By: /s/ Cavas Pavri

Cavas Pavri
