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

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Form S-3  
REGISTRATION STATEMENT  
UNDER  
THE SECURITIES ACT OF 1933

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**Moleculin Biotech, Inc.**

(Exact name of registrant as specified in its Charter)

**Delaware**  
(State or other jurisdiction  
of incorporation)

**47-4671997**  
(I.R.S. Employer  
Identification No.)

**5300 Memorial Drive, Suite 950, Houston, TX 77007**  
**713-300-5160**

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

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**Walter V. Klemp**  
**Chief Executive Officer**  
**5300 Memorial Drive, Suite 950, Houston, TX 77007**  
**713-300-5160**

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

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*Copies to:*

**Cavas S. Pavri**  
**Schiff Hardin LLP**  
**100 N. 18th Street, Suite 300**  
**Philadelphia, PA 19103**  
**Telephone: (202) 724-6847**  
**Facsimile: (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 the only securities being registered on this Form are being offered pursuant to dividend or interest reinvestment plans, please check the following box.

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, as amended, other than securities offered only in connection with dividend or interest reinvestment plans, please 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, as amended, check the following box and list the Securities Act registration statement number of the earlier effective registration statement for the same offering.  333-235686

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

If this Form is a registration statement pursuant to General Instruction 1.D. or a post-effective amendment thereto that shall become effective upon filing with the Commission pursuant to Rule 462(e) under the Securities Act, check the following box.

If this Form is a post-effective amendment to a registration statement filed pursuant to General Instruction 1.D. filed to register additional securities or additional classes of securities pursuant to Rule 413(b) under the Securities Act, check the following box.

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

Large accelerated filer   
Non-accelerated filer

Accelerated filer   
Smaller reporting company   
Emerging growth company

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

#### CALCULATION OF REGISTRATION FEE

Title of Each Class of Securities to be Registered (1)	Proposed Maximum Aggregate Offering Price (2)	Amount of Registration Fee (3)
Common Stock, par value \$0.001 per share, and related common stock purchase rights	(4)	
Preferred Stock, par value \$0.001 per share	(4)	
Debt Securities	(4)	
Warrants	(4)	
Units	(4)	
Total:	\$13,000,000.00	\$1,418.30

- (1) The Registrant is registering hereunder such indeterminate number of shares of common stock and preferred stock, such indeterminate principal amount of debt securities, such indeterminate number of warrants to purchase common stock, preferred stock or debt securities, and such indeterminate number of units consisting of such securities. The Registrant previously registered securities, including common stock, preferred stock, debt securities, warrants and units comprised of same, with an aggregate offering price of \$75,000,000 on a Registration Statement on Form S-3 (File No. 333-235686) originally filed by the Registrant on December 23, 2019, and declared effective by the Securities and Exchange Commission on April 9, 2020 (the "Registration Statement"). In accordance with Rule 462(b) under the Securities Act, an additional amount of securities, including common stock, preferred stock, warrants, debt securities and units comprised of same having a proposed maximum aggregate offering price of \$13,000,000. is hereby registered, representing no more than 20% of the maximum aggregate offering price of securities available for issuance under the Registration Statement. In no event will the maximum aggregate offering price of all securities issued pursuant to this Registration Statement exceed that registered under such registration statements. The securities registered also include such indeterminate number of shares of common stock and preferred stock and amount of debt securities as may be issued upon conversion of or exchange for preferred stock or debt securities that provide for conversion or exchange, upon exercise of warrants or pursuant to the anti-dilution provisions of any such securities.
- (2) The proposed maximum per unit and aggregate offering prices per class of security will be determined from time to time by the registrant in connection with the issuance by the registrant of the securities registered hereunder.
- (3) Pursuant to Rule 457(o) under the Securities Act of 1933 (the "Securities Act"), the registration fee is calculated on the maximum offering price of all securities listed, and the table does not specify information by each class about the amount to be registered.
- (4) The proposed maximum aggregate offering price has been estimated for the sole purpose of computing the registration fee pursuant to Rule 457(o) under the Securities Act and is exclusive of accrued interest, distributions and dividends, if any.

## EXPLANATORY NOTE AND INCORPORATION BY REFERENCE

This registration statement is being filed to register an additional \$13,000,000 of securities, including common stock, preferred stock, debt securities, warrants and units comprised of same, of Moleculin Biotech, Inc., a Delaware corporation, pursuant to Rule 462(b) under the Securities Act of 1933, as amended and General Instruction IV of Form S-3 (the "Prior Registration Statement"). This registration statement incorporates by reference the contents of the registrant's registration statement on Form S-3 (File No. 333-235686), which was declared effective by the Commission on April 9, 2020, including all amendments and exhibits thereto and all information incorporated by reference therein, other than the exhibits filed herewith. The Company is filing this Registration Statement for the sole purpose of increasing the maximum aggregate offering amount of securities registered under the Prior Registration Statement by \$13,000,000.

The required opinion and consent is listed on an Exhibit Index attached hereto and filed herewith.

The registrant hereby certifies to the Commission that (i) it has instructed its bank to pay the Commission the filing fee set forth in the cover page of this registration statement by wire transfer of such amount to the Commission's account as soon as practicable (but no later than the close of business on February 3, 2021); (ii) it will not revoke such instruction; and (iii) it has sufficient funds in the relevant account to cover the amount of such filing fee.

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**EXHIBIT INDEX**

<b>Exhibit Number</b>	<b>Description</b>
5	<a href="#"><u>Opinion of Schiff Hardin LLP as to legality of the securities being registered</u></a>
23.1	<a href="#"><u>Consent of Grant Thornton, LLP</u></a>
23.2	<a href="#"><u>Consent of Schiff Hardin LLP (included in Exhibit 5)</u></a>
24.1	<a href="#"><u>Power of Attorney (Filed as an exhibit to the Registrant's Registration Statement on Form S-3 (File No. 333-235686) and incorporated herein by reference)</u></a>

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**SIGNATURES**

Pursuant to the requirements of the Securities Act of 1933, as amended, the registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-3 and has duly caused this registration statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the city of Houston, Texas, on February 2, 2021.

MOLECULIN BIOTECH, INC.  
(Registrant)

By: /s/ Walter V. Klemm  
Walter V. Klemm  
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. Klemm</u> Walter V. Klemm	Chief Executive Officer and Sole Director (Principal Executive Officer)	February 2, 2021
<u>/s/ Jonathan P. Foster</u> Jonathan P. Foster	Chief Financial Officer and Executive Vice President (Principal Financial Officer and Principal Accounting Officer)	February 2, 2021
* <u>Robert George</u>	Director	February 2, 2021
* <u>Michael Cannon</u>	Director	February 2, 2021
* <u>John Climaco</u>	Director	February 2, 2021
* By: <u>/s/ Jonathan P. Foster</u> Jonathan P. Foster Attorney-in-Fact		

February 2, 2021

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

Re: Registration Statement on Form S-3

Ladies and Gentlemen:

We have acted as counsel to Moleculin Biotech, Inc., a Delaware corporation (the "Company") in connection with the Company's earlier filing of a Registration Statement on Form S-3 ((as amended or supplemented, the "Earlier Registration Statement") and the Registration Statement filed pursuant to Rule 462(b) of the Securities Act of 1933, as amended (the "Securities Act") relating to such Earlier Registration Statement (the "462(b) Registration Statement," and, together with the Earlier Registration Statement, the "Registration Statement"). The Registration Statement relates to the issuance and sale from time to time, pursuant to Rule 415 of the rules and regulations promulgated under the Securities Act, of an unspecified number or amount of the following securities of the Company: (i) common stock, par value \$0.001 per share (the "Common Stock"); (ii) preferred stock, par value \$0.001 per share (the "Preferred Stock"); (iii) senior and subordinated debt securities, consisting of debentures, notes or other evidences of indebtedness in one or more series ("Debt Securities"); (iv) warrants to purchase Debt Securities, warrants to purchase Common Stock and warrants to purchase Preferred Stock (collectively, the "Warrants"); and (v) units comprised of Common Stock or Preferred Stock, Warrants to purchase Common Stock or Preferred Stock, Debt Securities or any combination of those securities (the "Units"). The Common Stock, Preferred Stock, Debt Securities, Warrants, and Units are collectively referred to herein as the "Securities."

The senior Debt Securities are to be issued under an indenture, to be entered into between the Company and a trustee chosen by the Company and qualified to act as such under the Trust Indenture Act of 1939, as amended (a "Trustee"), in the form filed as Exhibit 4.1 to the Registration Statement (the "Senior Debt Indenture"). The subordinated Debt Securities are to be issued under an indenture, to be entered into between the Company and a Trustee, in the form filed as Exhibit 4.2 to the Registration Statement (the "Subordinated Debt Indenture"). Each such indenture is referred to as an "Indenture" and, together, as the "Indentures."

This opinion letter is being delivered in accordance with the requirements of Item 601(b)(5) of Regulation S-K under the Securities Act.

In connection with our opinion, we have examined the Registration Statement, including the exhibits thereto, 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.

In rendering the opinions in this letter we have assumed, without independent investigation or verification, that each party to each of the documents executed or to be executed, other than the Company, (a) is validly existing and in good standing under the laws of its jurisdiction of organization, (b) has full power and authority to execute such documents to which it is a party and to perform its obligations thereunder, (c) has taken all necessary action to authorize execution of such documents on its behalf by the persons executing same, (d) has properly executed and delivered, or will properly execute and deliver, each of such documents to which it is a party, and (e) has duly obtained all consents or approvals of any nature from and made all filings with any governmental authorities necessary for such party to execute, deliver or perform its obligations under such documents to which it is a party. In addition, in rendering such opinions we have assumed, without independent investigation or verification, (i) that the execution and delivery of, and performance of their respective obligations under, the documents executed or to be executed by each party thereto, other than the Company, do not violate any law, rule, regulation, agreement or instrument binding upon such party and (ii) that each of such documents is the legal, valid and binding obligation of, and enforceable against, each party thereto, other than the Company.

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We make no representation that we have independently investigated or verified any of the matters that we have assumed for the purposes of this opinion letter.

Based on the foregoing and subject to the qualifications set forth below, we are of the opinion that, when any applicable state securities have been complied with:

1. With respect to any offering of Common Stock (the "Offered Common Stock"), when (i) an appropriate prospectus supplement with respect to the Offered Common Stock has been prepared, delivered and filed in compliance with the Securities Act and the applicable rules and regulations thereunder; (ii) if the Offered Common Stock is to be sold pursuant to a firm commitment underwritten offering, the underwriting agreement with respect to the Offered Common Stock has been duly authorized, executed and delivered by the Company and the other parties thereto; (iii) the board of directors, including any appropriate committee appointed thereby, and appropriate officers of the Company have taken all necessary corporate action to approve the issuance of the Offered Common Stock and related matters; and (iv) the terms of the issuance and sale of the Offered Common Stock have been duly established in conformity with the Company's Certificate of Incorporation and the By-Laws of the Company, so as not to violate any applicable law or the Certificate of Incorporation and the By-Laws of the Company or result in a default under a breach of any agreement or instrument binding upon the Company, the Offered Common Stock, when issued and sold in accordance with the applicable underwriting agreement, if any, or any other duly authorized, executed and delivered valid and binding purchase or agency agreement upon payment of the agreed-upon consideration therefor, will be duly authorized, validly issued, fully paid and nonassessable.

2. With respect to any offering of shares of any series of Preferred Stock (the "Offered Preferred Stock"), when (i) an appropriate prospectus supplement with respect to the Offered Preferred Stock has been prepared, delivered and filed in compliance with the Securities Act and the applicable rules and regulations thereunder; (ii) if the Offered Preferred Stock is to be sold pursuant to a firm commitment underwritten offering, the underwriting agreement with respect to the Offered Preferred Stock has been duly authorized, executed and delivered by the Company and the other parties thereto; (iii) the board of directors, including any appropriate committee appointed thereby, and appropriate officers of the Company have taken all necessary corporate action to approve the issuance and terms of the Offered Preferred Stock and related matters, including the adoption of a Certificate of Designations for the Offered Preferred Stock in accordance with the applicable provisions of Delaware law (the "Certificate of Designations"); (iv) the Certificate of Designations has been duly filed with the Delaware Secretary of State; and (v) the terms of the Offered Preferred Stock and of its issuance and sale have been duly established in conformity with the Company's Certificate of Incorporation and the By-Laws of the Company, including the Certificate of Designations, so as not to violate any applicable law or the Certificate of Incorporation or the By-Laws of the Company or result in a default under or breach of any agreement or instrument binding upon the Company: (1) the shares of the Offered Preferred Stock, when issued and sold in accordance with the applicable underwriting agreement, if any, or any other duly authorized, executed and delivered valid and binding purchase or agency agreement upon payment of the agreed-upon consideration therefor, will be duly authorized, validly issued, fully paid and nonassessable; and (2) if the Offered Preferred Stock is convertible or exchangeable into shares of Common Stock, the shares of Common Stock issuable upon conversion or exchange of the Offered Preferred Stock will be duly authorized, validly issued, fully paid and nonassessable, assuming the conversion or exchange of the Offered Preferred Stock is in accordance with the terms of the Certificate of Designations.

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3. With respect to any offering of any series of Debt Securities (the “Offered Debt Securities”), when (i) the relevant Indenture, if applicable, has been duly executed and delivered, (ii) an appropriate prospectus supplement with respect to the Offered Debt Securities has been prepared, delivered and filed in compliance with the Securities Act and the applicable rules and regulations thereunder; (iii) if the Offered Debt Securities are to be sold pursuant to a firm commitment underwritten offering, the underwriting agreement with respect to the Offered Debt Securities has been duly authorized, executed and delivered by the Company and the other parties thereto; (iv) the board of directors, including any appropriate committee appointed thereby, and appropriate officers of the Company have taken all necessary corporate action to approve the issuance and terms of the Offered Debt Securities and related matters; (v) the terms of the Offered Debt Securities and of their issuance and sale have been duly established in conformity with the relevant Indenture so as not to violate any applicable law or the Company’s Certificate of Incorporation or the By-Laws of the Company or result in a default under or breach of any agreement or instrument binding upon the Company; and (vi) the Offered Debt Securities have been duly executed and authenticated in accordance with the provisions of the relevant Indenture and duly delivered to the purchasers thereof upon payment of the agreed-upon consideration therefor: (1) the Offered Debt Securities, when issued and sold in accordance with the applicable underwriting agreement, if any, or any other duly authorized, executed and delivered valid and binding purchase or agency agreement, will be legal, valid and binding obligations of the Company, enforceable against the Company in accordance with their respective terms; and (2) if the Offered Debt Securities are convertible or exchangeable into shares of Common Stock or Preferred Stock, the shares of Common Stock or Preferred Stock issuable upon conversion or exchange of the Offered Debt Securities will be duly authorized, validly issued, fully paid and nonassessable, assuming the conversion or exchange of the Offered Debt Securities is in accordance with the terms of the relevant Indenture and, in the case of Preferred Stock, a Certificate of Designations has been duly adopted and filed with the Delaware Secretary of State.

4. With respect to any offering of Warrants (the “Offered Warrants”), when (i) an appropriate prospectus supplement with respect to the Offered Warrants has been prepared, delivered and filed in compliance with the Securities Act and the applicable rules and regulations thereunder; (ii) if the Offered Warrants are to be sold pursuant to a firm commitment underwritten offering, the underwriting agreement with respect to the Offered Warrants has been duly authorized, executed and delivered by the Company and the other parties thereto; (iii) the board of directors, including any appropriate committee appointed thereby, and appropriate officers of the Company have taken all necessary corporate action to approve the issuance and terms of the Offered Warrants and related matters, including the adoption of the Warrant Agreement with respect to Warrants to purchase Debt Securities, the Warrant Agreement with respect to Warrants to purchase Common Stock, or the Warrant Agreement with respect to Warrants to purchase Preferred Stock, (individually, a “Warrant Agreement”), as the case may be, for the Offered Warrants; (iv) the terms of the Offered Warrants and of their issuance and sale have been duly established in conformity with the Company’s Certificate of Incorporation and the By-Laws of the Company so as not to violate any applicable law or the Certificate of Incorporation or the By-Laws of the Company or result in a default under or breach of any agreement or instrument binding upon the Company; and (v) the Warrant Agreement for the Offered Warrants has been duly executed and delivered and certificates representing the Offered Warrants have been duly executed, countersigned, registered and delivered to the purchasers thereof upon payment of the agreed-upon consideration therefor: (1) the Offered Warrants, when issued and sold in accordance with the applicable underwriting agreement, if any, or any other duly authorized, executed and delivered valid and binding purchase or agency agreement, will be legal, valid and binding obligations of the Company; (2) if the Offered Warrants are exercisable for shares of Common Stock or Preferred Stock, the shares of Common Stock or Preferred Stock issuable upon exercise of the Offered Warrants will be duly authorized, validly issued, fully paid and nonassessable, assuming the exercise of the Offered Warrants is in accordance with the terms of the Warrant Agreement with respect to Warrants to purchase Common Stock or the Warrant Agreement with respect to Warrants to purchase Preferred Stock, as the case may be, and assuming, in the case of Preferred Stock, a Certificate of Designations has been duly adopted and filed with the Delaware Secretary of State; and (3) if the Offered Warrants are exercisable for Debt Securities, the Debt Securities issuable upon exercise of the Offered Warrants will be legal, valid and binding obligations of the Company, enforceable against the Company in accordance with their terms, assuming the relevant Indenture has been duly executed and delivered and assuming the exercise of the Offered Warrants is in accordance with the terms of the Warrant Agreement with respect to Warrants to purchase Debt Securities and is in accordance with the terms of such Indenture.

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6. With respect to any offering of Units (the “Offered Units”), when (i) an appropriate prospectus supplement with respect to the Offered Units has been prepared, delivered and filed in compliance with the Securities Act and the applicable rules and regulations thereunder; (ii) if the Offered Units are to be sold pursuant to a firm commitment underwritten offering, the underwriting agreement with respect to the Offered Units has been duly authorized, executed and delivered by the Company and the other parties thereto; (iii) the board of directors, including any appropriate committee appointed thereby, and appropriate officers of the Company have taken all necessary corporate action to approve the issuance and terms of the Offered Units and related matters, including the adoption of any Unit Agreement for the Offered Units (the “Unit Agreement”); (iv) the terms of the Offered Units and of their issuance and sale have been duly established in conformity with the Company’s Certificate of Incorporation and the By-Laws of the Company so as not to violate any applicable law or the Certificate of Incorporation or the By-Laws of the Company or result in a default under or breach of any agreement or instrument binding upon the Company; and (v) the Unit Agreement has been duly executed and delivered and certificates representing the Offered Units have been duly executed, authenticated, registered and delivered to the purchasers thereof upon payment of the agreed-upon consideration therefor: (1) the Offered Units, when issued and sold in accordance with the applicable underwriting agreement, if any, or any other duly authorized, executed and delivered valid and binding purchase or agency agreement, will be legal, valid and binding obligations of the Company; and (2) the shares of Common Stock issuable upon settlement of the Offered Units will be duly authorized, validly issued, fully paid and nonassessable, assuming the Offered Units are settled in accordance with the terms of the Unit Agreement.

The opinions set forth above are subject to the following qualifications:

A. The opinions expressed herein with respect to the legality, validity, binding nature and enforceability of any Securities are subject to (i) applicable laws relating to bankruptcy, insolvency, reorganization, moratorium, fraudulent transfer or other similar laws affecting creditors’ rights generally, whether now or hereafter in effect and (ii) general principles of equity, including, without limitation, concepts of materiality, laches, reasonableness, good faith and fair dealing and the principles regarding when injunctive or other equitable remedies will be available (regardless of whether considered in a proceeding at law or in equity).

B. The foregoing opinions are limited to the laws of the State of New York, the General Corporation Law of Delaware (which includes those statutory provisions and all applicable provisions of the Delaware Constitution and the reported judicial decisions interpreting such laws) and the federal laws of the United States of America, 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 5.1 to the Registration Statement 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/ Schiff Hardin

**CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM**

We have issued our report dated March 19, 2020 with respect to the consolidated financial statements of Moleculin Biotech, Inc. incorporated by reference from the Annual Report on Form 10-K for the year ended December 31, 2019 in the Registration Statement on Form S-3, as amended (File No. 333-235686), which are incorporated by reference in this Registration Statement on Form S-3MEF. We consent to the incorporation by reference of the aforementioned report in this Registration Statement, and to the use of our name as it appears under the caption "Experts" in the prospectus incorporated by reference in this Registration Statement.

/s/GRANT THORNTON LLP

Houston, Texas  
February 2, 2021