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

**Amendment No. 1 to
FORM S-3
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933**

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

Florida
(State or other jurisdiction of
incorporation or organization)

2836
(Primary Standard Industrial
Classification Code Number)

59-3410522
(I.R.S. Employer
Identification No.)

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

Alan Joslyn
Chief Executive Officer and President
Oragenics, Inc.
4902 Eisenhower Boulevard, Suite 125
Tampa, Florida 33634
(813) 286-7900

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

With copies to:

Mark A. Catchur, Esq.
Shumaker, Loop & Kendrick, LLP
101 East Kennedy Boulevard
Suite 2800
Tampa, Florida 33602
Telephone: (813) 229-7600
Facsimile: (813) 229-1660

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

If the only securities being registered on this Form are being offered pursuant to dividend or interest reinvestment plans, please check the following box.

If any of the securities being registered on this Form are to be offered on a delayed or continuous basis pursuant to Rule 415 under the Securities Act of 1933, other than securities offered only in connection with dividend or interest reinvestment plans, check the following box.

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

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

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

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

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

Large accelerated filer

Accelerated filer

Non-accelerated filer (Do not check if a smaller reporting company)

Smaller reporting company

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

Explanatory Note

Orogenics, Inc. (the "Registrant") is filing this Amendment No. 1 (the "Amendment") to its Registration Statement on Form S-3 (File No. 333-213321) as an exhibit-only filing to file Exhibit 5.1 and restate the list of exhibits set forth in Item 16 of Part II of the Registration Statement. According, this Amendment consists only of the facing page, this explanatory note, Part II of the registration Statement, including the signature page and the exhibit index, and the filed exhibit. The prospectus is unchanged and has been omitted.

PART II
INFORMATION NOT REQUIRED IN PROSPECTUS

Item 14. Other Expenses of Issuance and Distribution.

The following table sets forth an estimate of the fees and expenses payable by the registrant in connection with the issuance and distribution of the securities being registered. All amounts are estimated except the SEC registration filing fee. All of the expenses below will be paid by us.

SEC registration fee	\$3,021
FINRA filing fee	\$ *
Accounting fees and expenses	\$ *
Legal fees and expenses	\$ *
Transfer agent and registrar fees	\$ *
Printing and engraving expenses	\$ *
Miscellaneous	\$ *
Total	\$ *

* These fees cannot be estimated at this time as they are calculated based on the securities offered and the number of issuances. An estimate of the aggregate expenses in connection with the sale and distribution of the securities being offered will be included in the applicable prospectus supplement.

Item 15. Indemnification of Directors and Officers.

Under our Bylaws, each of our directors has the right to be indemnified by us to the maximum extent permitted by law against (i) reasonable expenses incurred in connection with any threatened, pending or completed civil, criminal, administrative, investigative or arbitral action, suit or proceeding seeking to hold the director liable by reason of his or her actions in such capacity and (ii) reasonable payments made by the director in satisfaction of any judgment, money decree, fine, penalty or settlement for which he or she became liable in such action, suit or proceeding. This right to indemnification includes the right to the advancement of reasonable expenses by us, to the maximum extent permitted by law. Under our Bylaws, each of our officers who are not directors is entitled to the same indemnification rights, including the right to the advancement of reasonable expenses, which are provided to our directors.

Pursuant to the Florida Business Corporation Act, a Florida corporation has the power to indemnify its directors and officers provided that they act in good faith and reasonably believe that their conduct was lawful and in the corporate interest (or not opposed thereto), as set forth in the Business Corporation Act. Under the Business Corporation Act, unless limited by its articles of incorporation, a corporation must indemnify a director or officer who is wholly successful, on the merits or otherwise, in the defense of any proceeding to which he or she was a party because he or she is or was a director or officer, against reasonable expenses incurred by the director or officer in connection with the proceeding. Our Articles of Incorporation do not contain any such limitations. The Business Corporation Act permits a corporation to pay for or reimburse reasonable expenses in advance of final disposition of an action, suit or proceeding only upon (i) the director's certification that he or she acted in good faith and in the corporate interest (or not opposed thereto), (ii) the director furnishing a written undertaking to repay the advance if it is ultimately determined that he or she did not meet this standard of conduct, and (iii) a determination is made that the facts then known to those making the determination would not preclude indemnification under the Business Corporation Act.

Under our Articles of Incorporation, no director will be liable to us or our shareholders for monetary damages for breach of his or her fiduciary duty as a director, to the maximum extent permitted by law.

The Florida Business Corporation Act also empowers a corporation to provide insurance for directors and officers against liability arising out of their positions, even though the insurance coverage may be broader than the corporation's power to indemnify. We maintain directors' and officers' liability insurance for the benefit of our directors and officers.

In our employment agreement with Michael Sullivan, our Chief Financial Officer, we agreed to indemnify each of these officers for all claims arising out of performance of his duties, other than those arising out of his breach of the agreement or his gross negligence or willful misconduct.

At present, there is no pending litigation or proceeding involving any of the registrant's directors or executive officers as to which indemnification is being sought nor is the registrant aware of any threatened litigation that may result in claims for indemnification by any executive officer or director.

The registrant maintains an insurance policy covering its officers and directors with respect to certain liabilities, including liabilities arising under the Securities Act or otherwise.

The underwriting agreement, if any, entered into with respect to an offering of securities registered hereunder will provide for indemnification by any underwriters of any offering, our directors and officers who sign the registration statement and our controlling persons for some liabilities, including liabilities arising under the Securities Act.

Item 16. Exhibits and Financial Statement Schedules.

(a) Exhibit Index

Exhibit number	Exhibit description	Incorporated by Reference				Filed herewith
		Form	File no.	Exhibit	Filing date	
3.1	Amended and Restated Articles of Incorporation	SB-2	333-100568	3.3	10/16/02	
3.2	Articles of Amendment to Amended and Restated Articles of Incorporation	8-K	001-32188	10.2	10/30/09	
3.3	Articles of Amendment to Amended and Restated Articles of Incorporation	8-K	001-32188	3.1	9/27/10	
3.4	Articles of Amendment to Amended and Restated Articles of Incorporation	8-K	001-32188	3.1	09/01/11	
3.5	Bylaws	SB-2	333-100568	3.2	10/16/02	
3.6	First Amendment to Bylaws	8-K	001-32188	3.1	6/9/10	
3.7	Second Amendment to Bylaws	8-K	001-32188	3.1	8/24/10	
4.1	Specimen Stock Certificate	S-1/A	333-169031	4.0	10/05/10	
4.2*	Form of Warrant					
4.4*	Form of Warrant Agreement					
4.5*	Form of Unit					
4.6*	Form of Unit Agreement					
5.1	Opinion of Shumaker, Loop & Kendrick, LLP					X
10.1	Standard Exclusive License Agreement with Sublicensing Terms between the Company and the University of Florida Research Foundation, Inc. effective June 22, 2000 (the "MU1140 License Agreement")	SB-2	333-100568	10.5	10/16/02	
10.2	First Amendment to the MU1140 License Agreement dated September 15, 2000	SB-2	333-100568	10.6	10/16/02	
10.3	Second Amendment to the MU1140 License Agreement dated June 10, 2002	SB-2	333-100568	10.7	10/16/02	
10.4	Third Amendment to the MU1140 License Agreement dated September 25, 2002	SB-2	333-100568	10.4	10/16/02	
10.5	Fourth Amendment to the Antimicrobial Polypeptide License Agreement dated March 2003	SB-2/A-3	333-100568	10.36	4/9/03	
10.6	Fifth Amendment to the Antimicrobial Polypeptide License Agreement dated April 19, 2013	8-K	001-32188	10.1	4/23/13	
10.7	License Agreement by and between Oragenics Inc. and Texas A&M University System dated December 20, 2011	10-K	001-32188	10.28	4/16/12	
10.8	Exclusive Channel Collaboration Agreement by and between Oragenics, Inc. and Intrexon Corporation dated as of June 5, 2012.**	8-K	001-32188	10.1	6/11/12	

<u>Exhibit number</u>	<u>Exhibit description</u>	<u>Incorporated by Reference</u>				<u>Filed herewith</u>
		<u>Form</u>	<u>File no.</u>	<u>Exhibit</u>	<u>Filing date</u>	
10.9	Stock Issuance Agreement by and between Oragenics, Inc. and Intrexon Corporation dated as of June 5, 2012.	8-K	001-32188	10.2	6/11/12	
10.10	Exclusive Channel Collaboration Agreement by and between Oragenics, Inc. and Intrexon Corporation dated as of June 9, 2015.**	8-K	001-32188	10.1	7/11/15	
10.11	Stock Purchase and Issuance Agreement by and between Oragenics, Inc. and Intrexon Corporation dated as of June 9, 2015.	8-K	001-32188	10.2	7/11/15	
10.12	Lease Agreement between the Company and Hawley-Wiggins LLC dated October 28, 2011 (13700 Progress Blvd, Alachua, FL 32615).	10-K	001-32188	10.20	4/16/12	
10.13	Amendment to Lease Agreement between the Company and Hawley-Wiggins LLC dated July 13, 2014 (13700 Progress Blvd, Alachua, FL 32615).	10-Q	001-32188	10.2	8/7/14	
10.14	Stock Purchase Agreement by and between the Company and Purchasers dated July 30, 2012.	8-K	001-32188	10.1	8/2/12	
10.15	2012 Equity Incentive Plan.+	8-K	001-32188	4.1	10/25/12	
10.16	Amended and Restated Executive Employment Agreement between the Company and Michael Sullivan dated effective January 1, 2015.+	8-K	001-32188	10.1	2/25/15	
10.17	Executive Employment Agreement between the Company and Martin Handfield dated May 11, 2010.+	10-Q	001-32188	10.16	11/14/11	
10.18	Executive Employment Agreement between the Company and Albert Fosmoe dated effective January 1, 2015.+	8-K	001-32188	10.2	2/25/15	
10.19	Form of Placement Agent Warrant.	8-K	001-32188	10-3	8/2/12	
10.20	Form of Employee Stock Option Agreement.+	10-K	001-32188	10.26	3/26/13	
10.21	Form of Consultant Stock Option Agreement.+	10-K	001-32188	10.27	3/26/13	
10.22	Form of Notice of Grant of Stock Options and Stock Option Award Agreement (Employee). +	8-K	001-32188	10.1	3/18/15	
10.23	Form of Notice of Grant of Stock Options and Stock Option Award Agreement (Directors). +	8-K	001-32188	10.2	3/18/15	
10.24	Form of Director Restricted Stock Award Agreement. +	8-K	001-32188	10.3	3/18/15	
10.25	Executive Employment Agreement for Dr. Alan Joslyn+	8-K	001-32188	10.1	6/6/16	
10.26	Asset Purchase Agreement	8-K	001-32188	10.1	6/23/16	
10.27	Transition Services Agreement	8-K	001-32188	10.3	6/27/16	
10.28	Sublease	8-K	001-32188	10.4	6/27/16	
10.29	Stock Purchase Agreement	8-K	001-32188	10.1	6/30/16	
10.30	Unsecured Promissory Note	8-K	001-32188	10.2	6/30/16	
10.31	Amendment No. 1 to the Exclusive Channel Collaboration Agreement between Oragenics, Inc. and Intrexon Corporation dated July 21, 2016.	10-Q	001-32188	10.9	8/15/16	

<u>Exhibit number</u>	<u>Exhibit description</u>	<u>Incorporated by Reference</u>				<u>Filed herewith</u>
		<u>Form</u>	<u>File no.</u>	<u>Exhibit</u>	<u>Filing date</u>	
23.1	Consent of Mayer Hoffman McCann P.C., an independent public accounting firm.	S-3	333-213321	23.1	8/25/16	
23.2	Consent of Shumaker, Loop & Kendrick, LLP (included as part of Exhibit 5.1)					X
24.1	Powers of Attorney (included on signature page).	S-3	333-213321	24.1	8/25/16	

* To be filed by amendment or by a Current Report on Form 8-K and incorporated by reference herein.

** Confidential Treatment has been granted as to certain portions of this exhibit pursuant to Rule 406 of the Securities Act of 1933, as amended, on Rule 24b-2 of the Securities Act of 1934, as amended.

+ Executive management contract or compensatory plan or arrangement.

Item 17. Undertakings.

The undersigned registrant hereby undertakes:

- (1) To file, during any period in which offers or sales are being made, a post-effective amendment to this registration statement:
 - (i) To include any prospectus required by Section 10(a)(3) of the Securities Act;
 - (ii) To reflect in the prospectus any facts or events arising after the effective date of the registration statement (or the most recent post-effective amendment thereof) which, individually or in the 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 SEC pursuant to Rule 424(b) if, in the aggregate, the changes in volume and price represent no more than a 20 percent change in the maximum aggregate offering price set forth in the "Calculation of Registration Fee" table in the effective registration statement; and
 - (iii) To include any material information with respect to the plan of distribution not previously disclosed in the registration statement or any material change to such information in the registration statement;

provided, however, that subparagraphs (i), (ii) and (iii) above shall not apply if the information required to be included in a post-effective amendment by those paragraphs is contained in the periodic reports filed with or furnished to the SEC by the registrant pursuant to Section 13 or Section 15(d) of the Exchange Act that are incorporated by reference in the registration statement, or is contained in a prospectus filed pursuant to Rule 424(b) that is part of the registration statement.

- (2) That, for the purpose of determining any liability under the Securities Act, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.
- (3) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.
- (4) That, for the purpose of determining liability under the Securities Act to any purchaser:
 - (A) Each prospectus filed by a registrant pursuant to Rule 424(b)(3) shall be deemed to be part of the registration statement as of the date the filed prospectus was deemed part of and included in the registration statement; and
 - (B) Each prospectus required to be filed pursuant to Rule 424(b)(2), (b)(5) or (b)(7) as part of a registration statement in reliance on Rule 430B relating to an offering made pursuant to Rule 415(a)(1)(i), (vii) or (x) for the purpose of providing the information required by Section 10(a) of the Securities Act shall be deemed to be part of and included in the registration statement as of the earlier of the date such form of prospectus is first used after effectiveness or the date of the first contract of sale of securities in the offering described in the prospectus. As provided in Rule 430B, for liability purposes of the issuer and any person that is at that date an underwriter, such date shall be deemed to be a new effective date of the registration statement relating to the securities in the registration statement to which the prospectus relates, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof. Provided, however, that no statement made in a registration statement or prospectus that is part of the registration statement or made in a document incorporated or deemed incorporated by reference into the registration statement or prospectus that is part of the registration statement will, as to a purchaser with a time of contract of sale prior to such effective date, supersede or modify any statement that was made in the registration statement or prospectus that was part of the registration statement or made in any such document immediately prior to such effective date.
- (5) That, for the purpose of determining liability of the registrant under the Securities Act to any purchaser in the initial distribution of the securities, the undersigned registrant undertakes that in a primary offering of securities of the undersigned registrant pursuant to this registration statement, regardless of the underwriting method used to sell the securities to the purchaser, if the securities are offered or sold to such purchaser by means of any of the following communications, the undersigned registrant will be a seller to the purchaser and will be considered to offer or sell such securities to such purchaser:

-
- (i) Any preliminary prospectus or prospectus of the undersigned registrant relating to the offering required to be filed pursuant to Rule 424;
 - (ii) Any free writing prospectus relating to the offering prepared by or on behalf of the undersigned registrant or used or referred to by the undersigned registrant;
 - (iii) The portion of any other free writing prospectus relating to the offering containing material information about the undersigned registrant or its securities provided by or on behalf of the undersigned registrant; and
 - (iv) Any other communication that is an offer in the offering made by the undersigned registrant to the purchaser.
- (6) That, for purposes of determining any liability under the Securities Act, each filing of the registrant's annual report pursuant to Section 13(a) or 15(d) of the Exchange Act (and, where applicable, each filing of an employee benefit plan's annual report pursuant to Section 15(d) of the Exchange Act) that is incorporated by reference in the registration statement shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial bona fide offering thereof.
 - (7) That, for purposes of determining any liability under the Securities Act, (i) the information omitted from the form of prospectus filed as part of the registration statement in reliance upon Rule 430A and contained in the form of prospectus filed by the registrant pursuant to Rule 424(b)(1) or (4) or 497(h) under the Securities Act shall be deemed to be a part of the registration statement as of the time it was declared effective; and (ii) each post-effective amendment that contains a form of prospectus 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.
 - (8) To file an application for the purpose of determining the eligibility of the trustee to act under subsection (a) of Section 310 of the Trust Indenture Act of 1939, as amended (the "Act"), in accordance with the rules and regulations prescribed by the SEC under Section 305(b)(2) of the Act.

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

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 Tampa, State of Florida on September 1, 2016.

ORAGENICS, INC.

By: /s/ Alan Joslyn

Alan Joslyn,
Chief Executive Officer, and Principal
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 September 1, 2016.

<u>Signature</u>	<u>Title</u>
<u>/s/ Alan Joslyn</u> Alan Joslyn	Principal Executive Officer, Chief Executive Officer and Director
<u>/s/ Michael Sullivan</u> Michael Sullivan	Principal Financial Officer, Chief Financial Officer (Principal Accounting Officer)
<u>* Frederick W. Telling</u>	Chairman and Director
<u>* Robert C. Koski</u>	Director
<u>* Charles L. Pope</u>	Director
<u>* Alan W. Dunton</u>	Director
<u>*By: /s/ Alan Joslyn</u> Alan Joslyn Attorney-in-fact	



Bank of America Plaza 813.229.7600
101 East Kennedy Boulevard 813.229.1660 fax
Suite 2800
Tampa, Florida 33602

www.slk-law.com

September 1, 2016

Oragenics, Inc.
4902 Eisenhower Boulevard, Suite 125
Tampa, FL 33634

Re: Form S-3 Registration Statement, SEC File No. 333-213321

Ladies and Gentlemen:

You have requested our opinion with respect to certain matters in connection with the filing by Oragenics, Inc., a Florida corporation (the "**Company**"), of a registration statement on Form S-3 (Registration No. 333-213321) (as amended to date, the "**Registration Statement**") under the Securities Act of 1933, as amended (the "**Securities Act**"), including the base prospectus (the "**Base Prospectus**") filed with the Registration Statement. The Base Prospectus provides that it will be supplemented in the future by one or more prospectus supplements (each, a "**Prospectus Supplement**") and any free-writing prospectus(es). The Registration Statement, including the Base Prospectus as supplemented from time to time by one or more Prospectus Supplements and any free-writing prospectus(es), covers the registration of:

- Shares of common stock, par value \$0.001 per share, of the Company (the "**Common Stock**");
- Warrants to purchase Common Stock (the "**Warrants**"), which may be issued under warrant agreements, to be dated on or about the date of the first issuance of the applicable Warrants thereunder, by and between a warrant agent to be selected by the Company (the "**Warrant Agent**") and the Company (each, a "**Warrant Agreement**"); and
- Units comprised of one or more of shares of Common Stock and Warrants (the "**Units**").

The Common Stock, the Warrants and the Units are collectively referred to herein as the "**Securities**." The Securities are being registered for offering and sale from time to time pursuant to Rule 415 under the Securities Act. The aggregate public offering price of the Securities being registered is \$30,000,000.

In connection with this opinion, we have examined and relied upon originals, or copies certified to our satisfaction, of such records, documents, certificates, opinions, memoranda and other instruments as in our judgment are necessary or appropriate to enable us to render the opinion expressed below. As to certain factual matters, we have relied upon a certificate of an officer of the Company and have not independently sought to verify such matters.

In rendering this opinion, we have assumed the genuineness and authenticity of all signatures on original documents; the authenticity of all documents submitted to us as originals; the conformity to originals of all documents submitted to us as copies; the accuracy, completeness and authenticity of certificates of public officials; and the due authorization, execution and delivery of all documents where authorization, execution and delivery are prerequisites to the effectiveness of such documents. With respect to our opinion as to the Common Stock and the Units, we have assumed that, at the time of issuance and sale, a sufficient number of shares of Common Stock are authorized and available for issuance and that the consideration for the issuance and sale of the Common Stock or Units (or for Warrants exercisable for Common Stock) is in an amount that is not less than the par value of the Common Stock. We have also assumed that any Warrants and Units offered under the Registration Statement, and the related Warrant Agreement and Unit Agreement, as applicable, will be executed in the forms filed as exhibits to the Registration Statement or otherwise incorporated by reference into the Registration Statement.

Our opinion herein is expressed solely with respect to the federal laws of the United States and the laws of the State of Florida. Our opinion is based on these laws as in effect on the date hereof. We express no opinion as to whether the laws of any jurisdiction are applicable to the subject matter hereof. We are not rendering any opinion as to compliance with any federal or state law, rule or regulation relating to securities, or to the sale or issuance thereof.

On the basis of the foregoing and in reliance thereon, and subject to the qualifications herein stated, we are of the opinion that:

1. With respect to the Common Stock offered under the Registration Statement, provided that (i) the Registration Statement and any required post-effective amendment thereto have all become effective under the Securities Act and the Base Prospectus, any and all Prospectus Supplement(s) required by applicable laws and all free-writing prospectus(es) related to the offer and sale of the Common Stock have been delivered and filed as required by such laws; (ii) the issuance of the Common Stock has been duly authorized by all necessary corporate action on the part of the Company; (iii) the issuance and sale of the Common Stock do not violate any applicable law, are in conformity with the Company's then operative articles of incorporation (the "*Articles of Incorporation*") and bylaws (the "*Bylaws*"), do not result in a default under or breach of any agreement or instrument binding upon the Company and comply with any applicable requirement or restriction imposed by any court or governmental body having jurisdiction over the Company; and (iv) the certificates for the Common Stock have been duly executed by the Company, countersigned by the transfer agent therefor and duly delivered to the purchasers thereof against payment therefor, then the Common Stock, when issued and sold as contemplated in the Registration Statement, the Base Prospectus and the related Prospectus Supplement(s) and any related free-writing prospectus(es) and in accordance with any applicable duly authorized, executed and delivered purchase, underwriting or similar agreement or upon exercise of any Warrants in accordance with their terms, will be duly authorized, validly issued, fully paid and nonassessable.

2. With respect to the Warrants issued under a Warrant Agreement and offered under the Registration Statement, provided that (i) the Registration Statement and any required post-effective amendment thereto have all become effective under the Securities Act and the Base Prospectus, any and all Prospectus Supplement(s) required by applicable laws and free-writing prospectus(es) related to the offer and sale of the Warrants have been delivered and filed as required by such laws; (ii) the Warrant Agreement has been duly authorized by the Company and the Warrant Agent by all necessary corporate action; (iii) the Warrant Agreement has been duly executed and delivered by the Company and the Warrant Agent; (iv) the terms of the Warrants and their issuance and sale have been duly authorized by the Company by all necessary corporate action; (v) the terms of the Warrants and of their issuance and sale have been duly established in conformity with the Warrant Agreement and as described in the Registration Statement, the Base Prospectus and the related Prospectus Supplement(s) and any related free-writing prospectus(es), so as not to violate any applicable law or result in a default under or breach of any agreement or instrument binding upon the Company, so as to be in conformity with the Articles of Incorporation and Bylaws, and so as to comply with any requirement or restriction imposed by any court or governmental body having jurisdiction over the Company; and (vi) the Warrants have been duly executed and delivered by the Company and authenticated by the Warrant Agent pursuant to the Warrant Agreement and delivered against payment therefor, then the Warrants, when issued and sold in accordance with the Warrant Agreement and a duly authorized, executed and delivered purchase, underwriting or similar agreement, will be valid and legally binding obligations of the Company, enforceable against the Company in accordance with their terms, except as enforcement thereof may be limited by applicable bankruptcy, insolvency, reorganization, arrangement, moratorium or other similar laws affecting creditors' rights, and subject to general equity principles and to limitations on availability of equitable relief, including specific performance.

3. With respect to the Units issued under a Unit Agreement and offered under the Registration Statement, provided that, (i) the Registration Statement and any required post-effective amendment thereto have all become effective under the Securities Act and the Base Prospectus, any and all Prospectus Supplement(s) required by applicable laws and free-writing prospectus(es) related to the offer and sale of the Units have been delivered and filed as required by such laws; (ii) the Unit Agreement has been duly authorized by the Company by all necessary corporate action; (iii) the Unit Agreement has been duly executed and delivered by the Company; (iv) the terms of the Units and their issuance and sale have been duly authorized by the Company by all necessary corporate action; (v) the terms of the Units and of their issuance and sale have been duly established in conformity with the Unit Agreement and as described in the Registration Statement, the Base Prospectus and the related Prospectus Supplement(s) and any related free-writing prospectus(es), so as not to violate any applicable law or result in a default under or breach of any agreement or instrument binding

upon the Company, so as to be in conformity with the Articles of Incorporation and Bylaws, and so as to comply with any requirement or restriction imposed by any court or governmental body having jurisdiction over the Company; (vi) the shares of Common Stock that form a part of such Units are duly authorized, validly issued, fully paid and nonassessable, as contemplated in numbered paragraph 1 above; (vii) the Warrants that form a part of such Units constitute valid and binding obligations of the Company in accordance with their terms, as contemplated in numbered paragraph 2 above; and (viii) the Units have been duly executed and delivered by the Company pursuant to the Unit Agreement and delivered against payment therefor, then the Units, when issued and sold in accordance with the Unit Agreement and a duly authorized, executed and delivered purchase, underwriting or similar agreement, will be valid and legally binding obligations of the Company, enforceable against the Company in accordance with their terms, except as enforcement thereof may be limited by applicable bankruptcy, insolvency, reorganization, arrangement, moratorium or other similar laws affecting creditors' rights, and subject to general equity principles and to limitations on availability of equitable relief, including specific performance.

This opinion is being furnished in accordance with the requirements of Item 16 of Form S-3 and Item 601(b)(5)(i) of Regulation S-K. We hereby consent to the filing of this opinion as an exhibit to the Registration Statement and to the reference to our firm under the caption "Legal Matters" in the Base Prospectus and any Prospectus Supplements. This opinion is expressed as of the date hereof, and we disclaim any undertaking to advise you of any subsequent changes in the facts stated or assumed herein or of any subsequent changes in applicable law.

Sincerely,

/s/ Shumaker, Loop & Kendrick, LLP
SHUMAKER, LOOP & KENDRICK, LLP