

INTREXON CORP
Form 424B5
August 20, 2015
Table of Contents

Filed pursuant to Rule 424(b)(5)
Registration No. 333-198598

The information in this preliminary prospectus supplement is not complete and may be changed. This preliminary prospectus supplement and the accompanying base prospectus are not an offer to sell these securities, and are not soliciting an offer to buy these securities, in any jurisdiction where the offer or sale is not permitted.

Subject to completion, dated August 20, 2015

PRELIMINARY PROSPECTUS SUPPLEMENT

(To prospectus dated September 5, 2014)

Shares

INTREXON CORPORATION

Common Stock

We are offering _____ shares of our common stock to be sold in this offering.

Our common stock trades on the New York Stock Exchange under the symbol XON. On August 19, 2015, the last reported sales price of our common stock on the New York Stock Exchange was \$47.06 per share.

Investing in our common stock involves risks. Before buying any shares, you should read the discussion of material risks of investing in our common stock in Risk Factors beginning on page S-7 of this prospectus supplement, and in the risks discussed in the documents incorporated by reference in this prospectus supplement, as they may be amended, updated or modified periodically in our reports filed with the SEC.

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

	Per Share	Total
Public offering price	\$	\$
Underwriting discounts and commissions	\$	\$
Proceeds to us, before expenses	\$	\$

We have granted the underwriters an option for a period of 30 days to purchase up to an additional _____ shares of our common stock at the public offering price less the underwriting discounts and commissions.

The underwriters expect to deliver the shares on or about August _____, 2015.

JMP Securities

Stifel

Table of Contents

TABLE OF CONTENTS

PROSPECTUS SUPPLEMENT

<u>ABOUT THIS PROSPECTUS SUPPLEMENT</u>	S-1
<u>SUMMARY</u>	S-2
<u>THE OFFERING</u>	S-6
<u>RISK FACTORS</u>	S-7
<u>SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS</u>	S-12
<u>DILUTION</u>	S-14
<u>USE OF PROCEEDS</u>	S-16
<u>PRICE RANGE OF OUR COMMON STOCK AND DIVIDEND POLICY</u>	S-17
<u>MATERIAL U.S. FEDERAL TAX CONSIDERATIONS FOR NON-U.S. HOLDERS OF COMMON STOCK</u>	S-18
<u>UNDERWRITING</u>	S-22
<u>LEGAL MATTERS</u>	S-29
<u>EXPERTS</u>	S-29
<u>WHERE YOU CAN FIND MORE INFORMATION</u>	S-29
<u>INCORPORATION OF CERTAIN INFORMATION BY REFERENCE</u>	S-30
PROSPECTUS	

<u>ABOUT THIS PROSPECTUS</u>	1
<u>WHERE YOU CAN FIND MORE INFORMATION</u>	2
<u>INCORPORATION BY REFERENCE</u>	3
<u>CAUTIONARY STATEMENT REGARDING FORWARD-LOOKING STATEMENTS</u>	4
<u>OVERVIEW</u>	6
<u>RISK FACTORS</u>	8
<u>RATIO OF EARNINGS TO FIXED CHARGES AND RATION OF EARNINGS TO COMBINED FIXED CHARGES AND PREFERRED STOCK DIVIDENDS</u>	9
<u>USE OF PROCEEDS</u>	10
<u>DESCRIPTION OF DEBT SECURITIES</u>	11
<u>DESCRIPTION OF CAPITAL STOCK</u>	20
<u>DESCRIPTION OF WARRANTS</u>	26
<u>DESCRIPTION OF RIGHTS</u>	27
<u>DESCRIPTION OF STOCK PURCHASE CONTRACTS AND STOCK PURCHASE UNITS</u>	28
<u>SELLING SECURITYHOLDERS</u>	29
<u>PLAN OF DISTRIBUTION</u>	30
<u>LEGAL MATTERS</u>	32
<u>EXPERTS</u>	32

Table of Contents

You should rely only on the information contained in or incorporated by reference into this prospectus supplement or the accompanying prospectus. We have not authorized any other person to provide you with different or additional information. If anyone provides you with different or additional information, you should not rely on it. This prospectus supplement and the accompanying prospectus are not offers to sell, nor are they seeking an offer to buy, the shares offered by this prospectus supplement or the accompanying prospectus in any jurisdiction where the offer or sale is not permitted. The information contained in this prospectus supplement, the accompanying prospectus and the documents incorporated by reference herein is accurate only as of the dates of the respective documents in which such information is included, regardless of the time of delivery of this prospectus supplement or any sale of the shares of common stock offered hereby.

Market data used in this prospectus supplement has been obtained from independent industry sources and publications as well as from research reports prepared for other purposes. We have not independently verified the data obtained from these sources, and we cannot assure you of the accuracy or completeness of the data. Forward-looking information obtained from these sources is subject to the same qualifications and additional uncertainties regarding the other forward-looking statements in this prospectus supplement.

Table of Contents

ABOUT THIS PROSPECTUS SUPPLEMENT

This document is part of the registration statement that we filed with the SEC using a shelf registration process and consists of two parts. The first part is this prospectus supplement, including the documents incorporated by reference, which describes the specific terms of this offering. The second part, the accompanying prospectus, including the documents incorporated by reference, gives more general information, some of which does not apply to this offering. Generally, when we refer only to the prospectus, we are referring to both parts combined. This prospectus supplement may add to, update or change information contained in the accompanying prospectus and the documents incorporated by reference into this prospectus supplement or the accompanying prospectus.

If information in this prospectus supplement is inconsistent with the accompanying prospectus or with any document incorporated by reference that was filed with the SEC before the date of this prospectus supplement, you should rely on this prospectus supplement. This prospectus supplement, the accompanying prospectus and the documents incorporated into each by reference include important information about us, the common stock being offered and other information you should know before investing in our common stock. You should also read and consider information in the documents we have referred you to in the section of this prospectus supplement and the accompanying prospectus entitled *Where You Can Find More Information* and *Incorporation of Certain Information by Reference*.

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

We have not authorized anyone to provide you with information that is in addition to or different from that contained or incorporated by reference in this prospectus supplement and the accompanying prospectus, and any free writing prospectus. We take no responsibility for, and can provide no assurances as to the reliability of, any other information that others may give you. We are not offering to sell these securities in any jurisdiction where the offer or sale is not permitted. You should not assume that the information contained or incorporated by reference in this prospectus supplement or the accompanying prospectus is accurate as of any date other than as of the date of this prospectus supplement or the accompanying prospectus, as the case may be, or in the case of the documents incorporated by reference, the date of such documents regardless of the time of delivery of this prospectus supplement and the accompanying prospectus or any sale of shares of our common stock. Our business, financial condition, liquidity, results of operations and prospects may have changed since those dates.

All references in this prospectus supplement or the accompanying prospectus to Intrexon, the Company, we, us, or mean Intrexon Corporation and its subsidiaries unless we state otherwise or the context otherwise indicates. Intrexon[®], Arctic[®], BeyondBio[®], UltraVector[®], RheoSwitch Therapeutic System[®], RTS[®], AttSite[®], Better DNA[®] and LEAP[®] are our and/or our affiliates' registered trademarks in the United States and ActoBiotics, mAbLogix and TopAct are our common law trademarks in the United States. This prospectus supplement and the information incorporated herein by reference contain references to trademarks, service marks and trade names owned by us or other companies. Solely for convenience, trademarks, service marks and trade names referred to in this prospectus supplement and the information incorporated herein, including logos, artwork, and other visual displays, may appear without the [®] or symbols, but such references are not intended to indicate, in any way, that we will not assert, to the fullest extent under applicable law, our rights or the rights of the applicable licensor to these trademarks, service marks and trade names. We do not intend our use or display of other companies' trade names, service marks or trademarks to imply a relationship with, or endorsement or sponsorship of us by, any other companies. Other trademarks, trade names and

service marks appearing in this prospectus supplement or any related free writing prospectus are the property of their respective owners.

S-1

Table of Contents

SUMMARY

This summary highlights selected information about us and this common stock offering. This summary is not complete and may not contain all of the information that is important to you. We encourage you to read this prospectus supplement and the accompanying prospectus, including the information under the caption "Risk Factors" and the information we incorporate by reference, in its entirety.

Overview

We believe we are a leader in the field of synthetic biology, an emerging and rapidly evolving discipline that applies engineering principles to biological systems. Using our suite of proprietary and complementary technologies, we design, build and regulate gene programs, which are DNA sequences that consist of key genetic components. A single gene program or a complex, multi-genic program are fabricated and stored within a DNA vector. Vectors are segments of DNA used as a vehicle to transmit genetic information. DNA vectors can, in turn, be introduced into cells in order to generate a simple or complex cellular system, which are the basic and complex cellular activities that take place within a cell and the interaction of those systems in the greater cellular environment. It is these genetically modified cell systems that can be used to produce proteins, produce small molecules, or serve as cell-based products, which enable the development of new and improved products and manufacturing processes across a variety of end markets, including health, food, energy, environment and consumer. Our synthetic biology capabilities include the ability to precisely control the amount, location and modification of biological molecules to control the function and output of living cells and optimize for desired results at an industrial scale.

We have devised our business model to bring many different commercial products to market by entering into agreements, including exclusive channel collaborations, or ECCs, with collaborators that have expertise within specific industry sectors. In these collaborations, we provide expertise in the engineering, creation and modification of gene programs and cellular systems, and our collaborators provide market and product development expertise, as well as regulatory, sales and marketing capabilities. Generally, our collaborators compensate us through payment of technology access fees, royalties, milestones and reimbursement of certain costs. This business model allows us to leverage our capabilities and capital across a broader landscape of product opportunities and end markets than we would be capable of addressing on our own. Alternatively, where a collaborator wishes to work with us to develop an early-stage program, we may execute a research collaboration pursuant to which we receive reimbursement for our development costs, but the exclusive license rights, and related access fee, are deferred until completion of an initial research program.

In certain strategic circumstances, we may enter into a joint venture with an ECC collaborator. In that event, we will enter into an ECC with a joint venture entity and may contribute access to our technology, cash or both into the joint venture which we will jointly control with our ECC collaborator. Pursuant to a joint venture agreement, we may be required to contribute additional capital to the joint venture, and we may be able to receive a higher financial return than we would normally receive from an ECC to the extent that we and our ECC collaborator are successful in developing one or more products. We currently are party to several such joint ventures, including: S & I Ophthalmic, LLC, or S & I Ophthalmic, which is a joint venture with Caraco Pharmaceutical Laboratories, Ltd., an indirect subsidiary of Sun Pharmaceutical Industries Ltd., an international specialty pharmaceutical company focused on chronic diseases; OvaXon, LLC, which is a joint venture with OvaScience, Inc., a life sciences company focused on the discovery, development and commercialization of new treatments for infertility; and Intrexon Energy Partners, LLC, a joint venture with a select group of external investors, to optimize and scale-up our gas-to-liquid bioconversion platform for the production of certain fuels and lubricants.

In 2011, we entered into our first collaboration and have added new collaborations since then, either by entering into new agreements or expanding or adding fields to existing ECCs. To date, we have entered into 32 such agreements and expansions with 25 different counterparties, of which 28 remain active. We have 27 active ECCs,

S-2

Table of Contents

including four expansions, and one research collaboration that we anticipate could, if successful, become an ECC. Under these ECCs, we are developing products in the fields of healthcare, food, energy and consumer goods.

In June 2015, we entered into a collaboration with an investment fund sponsored by Harvest Capital Strategies, LLC. We agreed to provide the fund with investment proposals that are suitable for pursuit by a startup, including several in 2015. With respect to such proposals, we will provide the fund with exclusive rights of first look and first negotiation. We believe the collaboration with the fund will be complementary to programs already underway and the collaboration does not limit our ability to execute other collaborations or joint ventures.

As part of our ECC business model, we sometimes receive equity in lieu of cash for technology access fees and milestones and also may participate in capital raises to allow earlier-stage collaborators to focus their resources on product development. However, when such a collaborator develops greater operational or financial resources, its shares become a financial asset within Intrexon that is independent of our operational and collaborative purposes. In June 2015, we provided our shareholders the opportunity to participate directly in the value generated by our ECC with ZIOPHARM Oncology, Inc., or ZIOPHARM, by distributing all of our shares in ZIOPHARM to our shareholders as a special stock dividend.

Recent Developments in Mergers, Acquisitions, and Technology In-Licensing

We may augment our suite of proprietary technologies through mergers or acquisitions of companies and technologies, which can then become available to new or existing collaborators. Among other things, we seek to ensure that these acquired businesses and technologies are complementary to our existing technologies and that these mergers and acquisitions meet our desired return on investment and other economic criteria. In certain cases, acquired technologies may already be applied in the production of innovative products or services. In these cases, we seek to ensure that the target company can achieve the creation of a new market or enable a disruptive position within an existing market for their existing products or services and that there is an opportunity for expansion of that unique position when complemented by our technology.

In August 2015, we entered into an agreement to acquire 100 percent of Oxitec Limited, or Oxitec, a pioneer in biological insect control solutions, for approximately \$80.0 million in cash and approximately 1,372,212 shares of our common stock valued at approximately \$80.0 million subject to certain adjustments as defined in the agreement. Oxitec is utilizing advanced genetics and molecular biology to develop a new and innovative solution to control insect populations through the production of sterile, self-limiting insects whose offspring do not survive. Oxitec is focused on using its technology to control mosquitoes that spread disease and limit pest-related crop damage. We expect the transaction to close in the third quarter of 2015.

In April 2015, we acquired 100 percent of Okanagan Specialty Fruits Inc., or Okanagan, a company which developed and received regulatory approval for the world's first non-browning apple without the use of any flavor-altering chemical or antioxidant additives, for \$10.0 million in cash and 707,853 shares of our common stock valued at \$30.9 million. In addition to supporting Okanagan's further commercialization and exploitation of its apple products, we expect to utilize our proprietary technologies to assist Okanagan in the development of further novel beneficial plant traits. We began consolidating Okanagan's results of operations and financial position with ours in April 2015.

In February 2015, we acquired 100 percent of ActoGeniX NV, or ActoGeniX, a European clinical-stage biopharmaceutical company, for \$32.7 million in cash and 965,377 shares of our common stock valued at \$39.7 million. We believe ActoGeniX's platform technology complements our suite of proprietary technologies available for current and future collaborations. We began consolidating ActoGeniX's results of operations and financial position with ours in February 2015.

S-3

Table of Contents

In January 2015, we and ZIOPHARM jointly entered into a license agreement with the University of Texas System Board of Regents on behalf of the University of Texas MD Anderson Cancer Center, or MD Anderson, whereby we received an exclusive license to certain research and development technologies owned and licensed by MD Anderson, including technologies relating to novel chimeric antigen receptor (CAR) T-cell therapies, as well as co-licenses and non-exclusive licenses to certain other related technologies. ZIOPHARM also received access to these technologies pursuant to the terms of our ECC with ZIOPHARM. As consideration for the license agreement, we issued 2,100,085 shares of our common stock valued at \$59.6 million to MD Anderson as consideration. Subject to certain exceptions, the license agreement expires on the last to occur of (i) the expiration of all patents licensed thereunder, or (ii) the twentieth anniversary of the date of the license agreement.

Intellectual Property

As we advance technologies across multiple platforms and synthetic biology areas, correspondingly, we apply a multilayered approach for protecting intellectual property relating to the inventions we have developed internally as well as those we have acquired from third parties, such as by assignment or by in-license. We seek patent protection in the United States and in other countries for our inventions and discoveries, and we develop and protect our key know-how and trade secrets relating to our platform technologies as well as to the products we are developing with our collaborators.

We seek patent protection for our platform technologies, including but not limited to our (i) switch technology, (ii) activator ligands for our switch technology, (iii) portfolio around various genetic componentry such as vectors, cells and organisms containing these genetic componentry and (iv) cell identification and selection platform. In addition, we seek patents covering specific collaborator's products. With respect to a particular collaborator's product, we may seek patent protection on some or all of the following aspects of the invention such as: the compound or material, the composition of matter, and/or the method or process of making or using the composition.

Through the use of our various platform technologies we seek to design and build proprietary compounds, vectors, methods and processes across a variety of end markets. In particular, we focus our intellectual property on synthetic biology technologies that provide platforms for the design and creation of cells, vectors and components for our collaborators. In addition, we may pursue intermediate and product-specific patents associated with our collaborators lead programs.

Our success depends, in part, upon our ability to obtain patents and maintain adequate protection for our intellectual property relating to our technologies and products and potential products. We have adopted a strategy of seeking patent protection in the United States and in other jurisdictions globally as we deem appropriate under the circumstances, with respect to certain of the technologies used in or relating to our products and processes. For instance, where we believe appropriate, we have also filed counterpart patents and patent applications in other countries, including Australia, Argentina, Brazil, Canada, China, Europe, Hong Kong, India, Indonesia, Israel, Japan, Korea, Mexico, New Zealand, Philippines, Russia, Singapore, South Africa and Taiwan. In the future we may file in these or additional jurisdictions as deemed appropriate for the protection of our technologies.

As of July 31, 2015, we owned at least 65 issued U.S. patents and 45 pending U.S. patent applications relating to certain aspects of our technologies, and we have pursued counterpart patents and patent applications in other jurisdictions around the world, as we have deemed appropriate. We continue to actively develop our portfolio through the filing of new patent applications, provisionals and continuations or divisionals relating to our technologies, methods and products as we and our collaborators deem appropriate.

We have strategic positioning with respect to our key technologies including owned patent portfolios directed to: our switch technology covering aspects of our switches and gene modulation systems with a last to expire patent

S-4

Table of Contents

currently in 2026, our portfolio around various genetic componentry such as vectors, cells and organisms containing these genetic componentry with a last to expire patent in 2031, and their use; our activator ligand technology covering aspects of our activator ligands and their use with a last to expire patent in 2032; and our cell identification and selection technology covering aspects of our cell identification and selection platform, including our cell purification, isolation, characterization and manipulation technologies with a last to expire patent in 2031. Although we cannot be assured that these patents may not be subject to challenge in the future, as of the date of this prospectus supplement, there are currently no material contested proceedings and/or third party claims with respect to any of these patent portfolios. Additionally, we complement our intellectual property portfolio with exclusive and non-exclusive patent licenses and options for licenses to third party technologies.

A principal component of our strategy is maximizing the value of our ECCs through our intellectual property that covers our technologies, which is accentuated by intermediate and program-specific intellectual property protections. In addition to owned and in-licensed patents, we solidify our intellectual property protection through a combination of trade secrets, know-how, confidentiality, nondisclosure and other contractual provisions, and security measures to protect our confidential and proprietary information related to each platform and collaborator program. We regularly assess and review the risks and benefits of protecting our developments through each aspect of intellectual property available to us.

Because we rely on trade secrets, know-how and continuing technological advances to protect various aspects of our core technology, we require our employees, consultants and scientific collaborators to execute confidentiality and invention assignment agreements with us to maintain the confidentiality of our trade secrets and proprietary information. Our confidentiality agreements generally provide that the employee, consultant or scientific collaborator will not disclose our confidential information to third parties. These agreements also provide that inventions conceived by the employee, consultant or scientific collaborator in the course of working for us will be our exclusive property. Additionally, our employees agree to take certain steps to facilitate our assertion of ownership over such intellectual property. These measures may not adequately protect our trade secrets or other proprietary information. If they do not adequately protect our rights, third parties could use our technologies, and we could lose any competitive advantage we may have. In addition, others may independently develop similar proprietary information or techniques or otherwise gain access to our trade secrets, which could impair any competitive advantage we may have.

Corporate Information

We were founded by Thomas D. Reed, Ph.D., in 1998, as an Ohio limited liability company under the name Genomatix LTD. We were reincorporated as a Virginia corporation in 2004 and changed our name to Intrexon Corporation in 2005. The principal executive offices of Intrexon are located at 20374 Seneca Meadows Parkway, Germantown, Maryland 20876, and our telephone number is (301) 556-9900. Our website is www.dna.com. The information on, or that can be accessed through, our website does not constitute part of this prospectus supplement, and you should not rely on any such information in making the decision whether to purchase our common stock. Our common stock is traded on the NYSE under the symbol XON.

Table of Contents

THE OFFERING

Common stock offered by us	shares
Common stock to be outstanding immediately after this offering	shares
Option to purchase additional shares from us	We have granted the underwriters an option for a period of up to 30 days to purchase up to additional shares from us.
Use of proceeds	We intend to use the net proceeds from the sale of the securities offered by us pursuant to this prospectus for general corporate purposes and for strategic acquisitions or investments, including to fund a portion of our acquisition of Oxitec Limited. See Use of Proceeds on page S 16.
Risk Factors	In analyzing an investment in the shares of common stock being offered pursuant to this prospectus supplement, you should carefully consider, along with other matters included or incorporated by reference in this prospectus supplement or the accompanying prospectus, the information set forth under Risk Factors in this prospectus supplement and the risks discussed in the documents incorporated by reference in this prospectus supplement, as they may be amended, updated or modified periodically in our reports filed with the SEC.
New York Stock Exchange symbol	XON

The number of shares of common stock to be outstanding after this offering is based on 109,729,717 shares of common stock outstanding on June 30, 2015 and excludes:

9,503,729 shares of common stock issuable upon the exercise of outstanding options at a weighted average exercise price of \$26.08 per share, of which 7,930,652 options are vested as of June 30, 2015;

220,021 shares of common stock issuable upon the exercise of warrants outstanding as of June 30, 2015 at a weighted average exercise price of \$0.78 per share;

4,534,088 shares of our common stock available for future issuance under our 2013 Omnibus Incentive Plan as of June 30, 2015; and

Approximately 1,372,212 shares of common stock, subject to certain adjustments, to be issued pursuant to an agreement, dated as of August 7, 2015, to acquire Oxitec.

Except as otherwise noted, all information in this prospectus assumes no exercise by the underwriters of their option to purchase additional shares of common stock from us.

Table of Contents

RISK FACTORS

*An investment in our shares of common stock involves a high degree of risk. Prior to making a decision about investing in our shares of common stock, you should carefully consider the risks, uncertainties and assumptions discussed under Item 1A, Risk Factors, in our Annual Report on Form 10-K for the fiscal year ended December 31, 2014 and any subsequent updates described in our Quarterly Reports on Form 10-Q and Current Reports on Form 8-K, all of which are incorporated herein by reference and may be amended, supplemented or superseded from time to time by other reports we file with the SEC in the future, together with information in this prospectus and any other information incorporated by reference into this prospectus. See the sections of this prospectus supplement entitled *Where You Can Find More Information* and *Incorporation of Certain Information by Reference*. Additional risks and uncertainties not presently known to us, or that we currently see as immaterial, may also harm our business. If any of these risks occur, our business, financial condition and operating results could be harmed, the trading price of our common stock could decline and you could lose part or all of your investment.*

*This prospectus supplement also contains forward-looking statements that involve risks and uncertainties. Our actual results could differ materially from those anticipated in these forward-looking statements as a result of certain factors, including the risks faced by us described below and elsewhere in this prospectus. See *Special Note Regarding Forward-Looking Statements* for information relating to these forward-looking statements.*

Risks related to recent developments in our business

We may encounter difficulties in connection with our acquisition of Oxitec.

In August 2015, we executed an agreement to acquire Oxitec. We cannot be certain that this acquisition will be successful or that we will realize the anticipated benefits of the acquisition. In particular, we may not be able to realize the strategic and operational benefits and objectives we anticipate. In addition, we may face increased competition in the markets for Oxitec's products. Any of the following factors may have a material adverse effect on our business, operating results and financial condition. These factors may include:

the potential disruption of our ongoing business and diversion of management resources;

unanticipated expenses related to Oxitec's operations;

the impairment of relationships with Oxitec's customers;

the impairment of relationships with key suppliers and their ability to meet our demand;

potential unknown liabilities associated with the acquired business and technology;

potential liabilities related to litigation involving Oxitec;

potential periodic impairment of goodwill and intangible assets acquired; and

potential inability to retain, integrate and motivate key personnel.

AquaBounty will need additional capital.

In order for AquaBounty Technologies, Inc., or Aqua Bounty, to execute on its business plan as announced by its management, AquaBounty will have future capital requirements, and we may be asked to invest additional funds in AquaBounty. On June 30, 2015, we invested an additional \$3.0 million into AquaBounty. If we fail to invest additional funds, we may not retain control over AquaBounty. We have been advised by the management of AquaBounty that as of June 30, 2015, AquaBounty held \$4.7 million of cash and cash equivalents and had a working capital balance of \$4.3 million and that the proceeds from Intrexon's \$3.0 million investment will provide AquaBounty with sufficient cash resources to continue operating to early 2016 at its current rate of spending. We have no contractual obligation to provide funds to AquaBounty and therefore we do not know whether, or to what extent, we will be required to invest additional funds in AquaBounty.

S-7

Table of Contents

Risks related to our common stock and this offering

An active trading market may not be sustained following this offering.

Although our common stock is listed on the New York Stock Exchange, an active public market for our common stock may not be sustained. If an active market for our common stock is not maintained, it may be difficult for you to sell shares you purchase in this offering without depressing the market price for the shares or at all. An inactive trading market also may impair our ability to raise capital to continue to fund operations by selling shares and may impair our ability to acquire other companies or technologies by using our shares as consideration. The lack of an active market also may reduce the fair market value of your shares.

The price of our shares of common stock is likely to be volatile, and you could lose all or part of your investment.

The trading price of our common stock has been, and is likely to continue to be, volatile. Since shares of our common stock were sold in our initial public offering in August 2013 at a price of \$16.00 per share, our stock price has ranged from \$13.13 to \$69.45, through August 19, 2015. In addition to the factors discussed in this prospectus, the trading price of our common stock may fluctuate significantly in response to numerous factors, many of which are beyond our control, including:

developments concerning our collaborators and licensees;

competition from existing technologies and products or new technologies and products that may emerge;

announcements of new ECCs, license agreements, significant acquisitions, strategic partnerships, joint ventures, new products, capital commitments or other events by us or our competitors;

the inability to establish ECCs or terminate ECCs;

actual or anticipated variations in our quarterly operating results;

failure to meet the estimates and projections of the investment community or that we may otherwise provide to the public;

our cash position;

announcement or expectation of additional financing efforts;

issuances of debt or equity securities;

our inability to successfully enter new markets or develop additional products, whether with our collaborators or independently;

actual or anticipated fluctuations in our competitors , our subsidiaries or our collaborators and licensees operating results or changes in their respective growth rates;

fluctuations in the market value of collaborators for which we own equity interests, particularly in light of our use of equity accounting for certain of these investments;

sales of our shares of common stock by us, or our shareholders in the future;

trading volume of our shares of common stock on the New York Stock Exchange;

market conditions in our industry;

overall performance of the equity markets and general political and economic conditions;

additions or departures of key management, scientific or other personnel;

publication of research reports about us or our industry or positive or negative recommendations or withdrawal of research coverage by securities or industry analysts;

changes in the market valuation of similar companies;

Table of Contents

disputes or other developments related to intellectual property and other proprietary rights, including patents, litigation matters and our ability to obtain patent protection for our technologies;

changes in accounting practices;

significant lawsuits, including patent or shareholder litigation with respect to us, our subsidiaries or our collaborators;

failure by our ECC partners to obtain regulatory approvals of products produced by our ECC partners; and

other events or factors, many of which are beyond our control.

Furthermore, the public equity markets have experienced extreme price and volume fluctuations that have affected and continue to affect the market prices of equity securities of many companies. These fluctuations often have been unrelated or disproportionate to the operating performance of those companies. These broad market and industry fluctuations, as well as general economic, political and market conditions such as recessions, interest rate changes or international currency fluctuations, may negatively impact the market price of our shares of common stock.

We do not anticipate paying cash dividends, and accordingly, shareholders must rely on stock appreciation for any return on their investment.

We have never declared or paid cash dividends on our capital stock. We do not anticipate paying cash dividends in the future and intend to retain all of our future earnings, if any, to finance the operations, development and growth of our business. As a result, generally, only appreciation of the price of our common stock, which may never occur, will provide a return to shareholders. Investors seeking cash dividends should not invest in our common stock.

If securities or industry analysts do not publish research or reports, or publish inaccurate or unfavorable research or reports about our business, our share price and trading volume could decline.

The trading market for our shares of common stock depends, in part, on the research and reports that securities or industry analysts publish about us or our business. We do not have any control over these analysts. If securities or industry analysts do not continue to cover us, the trading price for our shares of common stock may be negatively impacted. If one or more of the analysts who covers us downgrades our shares of common stock, changes their opinion of our shares or publishes inaccurate or unfavorable research about our business, our share price would likely decline. If one or more of these analysts ceases coverage of us or fails to publish reports on us regularly, demand for our shares of common stock could decrease and we could lose visibility in the financial markets, which could cause our share price and trading volume to decline.

If our executive officers, directors and largest shareholders choose to act together, they may be able to control our management and operations, acting in their own best interests and not necessarily those of other shareholders.

As of June 30, 2015, our executive officers, directors and beneficial holders of five percent or more of our outstanding stock owned approximately 59 percent of our voting stock, including shares subject to outstanding options and warrants. As a result, these shareholders, acting together, would be able to significantly influence all matters requiring approval by our shareholders, including the election of directors and the approval of mergers or other business

combination transactions, as well as our management and affairs. The interests of this group of shareholders may not always coincide with the interests of other shareholders, and they may act in a manner that advances their best interests and not necessarily those of other shareholders. This concentration of ownership control may:

delay, defer or prevent a change in control;

entrench our management and/or the board of directors; or

S-9

Table of Contents

impede a merger, consolidation, takeover or other business combination involving us that other shareholders may desire.

Randal J. Kirk controls approximately 56 percent of our common stock and is able to control or significantly influence corporate actions, which may result in Mr. Kirk taking actions contrary to the desires of our other shareholders.

We have historically been controlled, managed and principally funded by Randal J. Kirk, our Chief Executive Officer, and affiliates of Mr. Kirk. As of June 30, 2015, Mr. Kirk and shareholders affiliated with him beneficially owned approximately 56 percent of our voting stock. Mr. Kirk is able to control or significantly influence all matters requiring approval by our shareholders, including the election of directors and the approval of mergers or other business combination transactions. The interests of Mr. Kirk may not always coincide with the interests of other shareholders, and he may take actions that advance his personal interests and are contrary to the desires of our other shareholders.

A significant portion of our total outstanding shares of common stock may be sold into the market in the near future. This could cause the market price of our common stock to drop significantly, even if our business is doing well.

Sales of a substantial number of shares of our common stock in the public market could occur at any time. These sales, or the perception in the market that the holders of a large number of shares of common stock intend to sell shares, could reduce the market price of our common stock. If Mr. Kirk or any of his affiliates were to sell a substantial portion of the shares they hold, it could cause our stock price to decline.

In addition, we have registered 13,000,000 shares of common stock that we may issue under our Intrexon Corporation 2013 Omnibus Incentive Plan, or the 2013 Plan, plus the shares of common stock reserved for future issuance upon exercise of outstanding stock options under our Intrexon Corporation 2008 Equity Incentive Plan that remain unissued. As of June 30, 2015, there were 9,503,729 shares subject to outstanding options that will become eligible for sale in the public market to the extent permitted by any applicable vesting requirements and Rules 144 and 701 under the Securities Act of 1933, as amended. Shares issuable upon the exercise of such options can be freely sold in the public market upon issuance and once vested, subject to the lock-up periods under any lock-up agreements applicable to such shares, including those described in the Underwriting section of this prospectus.

We are subject to anti-takeover provisions in our articles of incorporation and bylaws and under Virginia law that could delay or prevent an acquisition of our Company, even if the acquisition would be beneficial to our shareholders.

Certain provisions of Virginia law, the commonwealth in which we are incorporated, and our articles of incorporation and bylaws could hamper a third party's acquisition of us, or discourage a third party from attempting to acquire control of us. These provisions include:

a provision allowing our board of directors to issue preferred stock with rights senior to those of the common stock without any vote or action by the holders of our common stock. The issuance of preferred stock could adversely affect the rights and powers, including voting rights, of the holders of common stock;

establish advance notice requirements for nominations for election to the board of directors or for proposing matters that can be acted on at shareholder meetings;

the inability of shareholders to convene a shareholders meeting without the support of shareholders owning together 25 percent of our common stock;

the application of Virginia law prohibiting us from entering into a business combination with the beneficial owner of 10 percent or more of our outstanding voting stock for a period of three years after the 10 percent or greater owner first reached that level of stock ownership, unless we meet certain criteria;

S-10

Table of Contents

a provision allowing the authorized number of our directors to be changed only by resolution of our board of directors;

a provision limiting the manner in which shareholders can remove directors from the board;

requirement that shareholder actions must be effected at a duly called shareholder meeting and prohibit actions by our shareholders by written consent; and

a provision limiting who may call a special meeting of shareholders.

These provisions also could limit the price that certain investors might be willing to pay in the future for shares of our common stock. In addition, these provisions make it more difficult for our shareholders, should they choose to do so, to remove our board of directors or management. See [Description of capital stock](#) in the prospectus accompanying this prospectus supplement.

Table of Contents

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus supplement, the accompanying prospectus and the information incorporated herein by reference contain forward-looking statements within the meaning of the federal securities laws, which statements involve substantial risks and uncertainties. All statements, other than statements of historical facts, included or incorporated by reference in this prospectus supplement and the accompanying prospectus regarding our strategy, future events, future operations, future financial position, future revenue, projected costs, prospects, plans, objectives of management and expected market growth are forward-looking statements. The words anticipate, believe, estimate, expect, intend, plan, predict, project, would and similar expressions are intended to identify forward-looking statements, although all forward-looking statements contain these identifying words. These forward-looking statements include, among other things, statements about:

our current and future exclusive channel collaborations, or ECCs, license agreements and other collaborations and agreements;

developments concerning our collaborators and licensees;

our ability to successfully enter new markets or develop additional products, whether with our collaborators or independently;

competition from existing technologies and products or new technologies and products that may emerge;

actual or anticipated variations in our operating results;

actual or anticipated fluctuations in our competitors or our collaborators and licensees operating results or changes in their respective growth rates;

our cash position;

market conditions in our industry;

our ability, and the ability of our collaborators and licensees, to protect our intellectual property and other proprietary rights and technologies;

our ability, and the ability of our collaborators and licensees, to adapt to changes in laws or regulations and policies;

the ability of our collaborators and licensees to secure any necessary regulatory approvals to commercialize any products developed under the ECCs and license agreements;

the rate and degree of market acceptance of any products developed by a collaborator under an ECC or through a joint venture or license under a license agreement;

our ability to retain and recruit key personnel;

our expectations related to the use of proceeds from this offering and prior offerings and other financing efforts; and

our estimates regarding expenses, future revenue, capital requirements and needs for additional financing. Forward-looking statements may also concern our expectations relating to our subsidiaries and other affiliates. We caution you that the foregoing list may not contain all of the forward-looking statements made in this prospectus supplement, the accompanying prospectus and the information incorporated herein and therein.

We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Actual results or events could differ materially from the plans, intentions and expectations disclosed in the forward-looking statements we make. We have included important factors in the cautionary statements included in this prospectus supplement, the

Table of Contents

accompanying prospectus and the information incorporated herein and therein, particularly in Risk Factors, that could cause actual results or events to differ materially from the forward-looking statements that we make. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures or investments that we may make.

You should read this prospectus supplement, the accompanying prospectus, the documents that we incorporate by reference into this prospectus supplement, including our Annual Report on Form 10-K for the year ended December 31, 2014, our Quarterly Reports on Form 10-Q and Current Reports on Form 8-K, and the documents that we have filed as exhibits to our filings with the SEC completely and with the understanding that our actual future results may be materially different from what we expect. We do not assume any obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by law.

S-13

Table of Contents**DILUTION**

Purchasers of common stock in this offering will experience immediate dilution to the extent of the difference between the public offering price per share of common stock and the net tangible book value per share of common stock immediately after this offering.

Our net tangible book value as of June 30, 2015 was approximately \$205.7 million, or \$1.87 per share of common stock. Net tangible book value per share is determined by dividing the net of total tangible assets, which excludes intangible assets, less total liabilities, by the aggregate number of shares of common stock outstanding as of June 30, 2015. After giving effect to the sale by us of _____ shares of common stock at the public offering price of \$ _____ per share of common stock and after deducting the estimated underwriting discounts and commissions and estimated offering expenses, our net tangible book value as of June 30, 2015 would have been approximately \$ _____, or \$ _____ per share of common stock. This represents an immediate increase in net tangible book value of \$ _____ per share to our existing shareholders and an immediate dilution of \$ _____ per share of common stock issued to the new investors purchasing securities in this offering.

The following table illustrates this dilution on a per-share basis:

Public offering price per share of common stock	\$
Net tangible book value per share as of June 30, 2015	\$ 1.87
Increase per share attributable to new investors	\$
Net tangible book value per share after this offering	\$
Dilution per share to new investors	\$

If the underwriters exercise their option in full to purchase _____ additional shares of common stock in this offering at the public offering price of \$ _____ per share, the net tangible book value per share after the offering would be \$ _____ per share, the increase in the net tangible book value per share to existing shareholders would be \$ _____ per share and the dilution to new investors purchasing securities in this offering would be \$ _____ per share.

The above table excludes:

9,503,729 shares of common stock issuable upon the exercise of outstanding options at a weighted average exercise price of \$26.08 per share, of which 7,930,652 options are vested as of June 30, 2015;

220,021 shares of common stock issuable upon the exercise of warrants outstanding as of June 30, 2015 at a weighted average exercise price of \$0.78 per share;

4,534,088 shares of our common stock available for future issuance under our 2013 Omnibus Incentive Plan as of June 30, 2015; and

Approximately 1,372,212 shares of common stock, subject to certain adjustments, to be issued pursuant to an agreement, dated as of August 7, 2015, to acquire Oxitec Limited.

If the underwriters exercise their option to purchase additional shares in full, the following will occur:

the percentage of shares of our common stock held by existing shareholders will decrease to approximately
percent of the total number of shares of our common stock outstanding after this offering; and

the number of shares of our common stock held by investors purchasing shares in this offering will increase to
or approximately percent of the total number of shares of our common stock outstanding
after this offering.

To the extent that options or warrants are exercised, new options are issued under our equity incentive plans, or we issue additional shares of common stock in the future, there may be further dilution to investors participating

S-14

Table of Contents

in this offering. In addition, we may choose to raise additional capital because of market conditions or strategic considerations, even if we believe that we have sufficient funds for our current or future operating plans. If we raise additional capital through the sale of equity or convertible debt securities, the issuance of these securities could result in further dilution to our shareholders.

S-15

Table of Contents

USE OF PROCEEDS

We estimate that the net proceeds we will receive from this offering will be approximately \$ million, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us. If the underwriters exercise their option to purchase additional shares in full, we estimate that the net proceeds from this offering will be approximately \$ million, after deducting the estimated underwriting discounts and commissions and estimated offering expenses payable by us.

We intend to use the net proceeds from the sale of the securities offered by us pursuant to this prospectus for general corporate purposes and for strategic acquisitions or investments. General corporate purposes may include additions to working capital, financing of capital expenditures, repayment or redemption of existing indebtedness or payments to satisfy commitments under our ECCs and joint ventures. In addition, we intend to use the net proceeds for future strategic acquisitions and strategic investment opportunities. We intend to use a portion of the net proceeds from this offering to finance a portion of our previously announced acquisition of Oxitec Limited, as described on page S-3. Other than in connection with our acquisition of Oxitec, we have not determined the amount of net proceeds to be used specifically for such purposes. As a result, management will retain broad discretion over the allocation of net proceeds. Pending the application of net proceeds, we expect to invest the net proceeds in investment grade, interest-bearing securities.

Table of Contents**PRICE RANGE OF OUR COMMON STOCK AND DIVIDEND POLICY**

Our common stock is listed and traded on the NYSE under the symbol XON. The following table sets forth, for the periods indicated, the high and low sale prices per share of our common stock.

	High	Low
Year Ended December 31, 2015		
Third Quarter (through August 19, 2015)	\$ 69.45	\$ 44.70
Second Quarter	\$ 51.44	\$ 37.30
First Quarter	\$ 50.98	\$ 25.23
Year Ended December 31, 2014		
Fourth Quarter	\$ 28.78	\$ 16.13
Third Quarter	\$ 26.62	\$ 17.35
Second Quarter	\$ 26.60	\$ 13.13
First Quarter	\$ 38.50	\$ 22.53
Year Ended December 31, 2013		
Fourth Quarter	\$ 25.95	\$ 17.52
Third Quarter ⁽¹⁾	\$ 31.44	\$ 20.65

⁽¹⁾ Our common stock commenced trading on the NYSE on August 8, 2013.

The closing sales price of our common on August 19, 2015, as reported on the NYSE was \$47.06 per share.

Cash dividend policy

We have never declared or paid any cash dividends on our capital stock. We currently intend to retain earnings, if any, to finance the growth and development of our business. We do not expect to pay any cash dividends on our common stock in the foreseeable future. Payment of future dividends, if any, will be at the discretion of our board of directors and will depend on our financial condition, results of operations, capital requirements, restrictions contained in current or future financing instruments, provisions of applicable law and other factors that our board of directors deems relevant.

In June 2015, we distributed all 17,830,305 shares of common stock of ZIOPHARM Oncology, Inc. held by us to our securityholders as a special stock dividend.

Table of Contents

MATERIAL U.S. FEDERAL TAX CONSIDERATIONS FOR NON-U.S. HOLDERS OF COMMON STOCK

The following is a summary of certain material U.S. federal income and estate tax considerations relating to the purchase, ownership and disposition of our common stock by Non-U.S. Holders (defined below), but does not purport to be a complete analysis of all the potential tax considerations. This summary is based upon the U.S. Internal Revenue Code of 1986, as amended (the Code), the Treasury regulations promulgated or proposed thereunder and administrative and judicial interpretations thereof, all as of the date hereof and all of which are subject to change at any time, possibly on a retroactive basis. This summary is limited to the tax consequences to Non-U.S. Holders who hold our common stock as capital assets within the meaning of Section 1221 of the Code.

This summary does not purport to deal with all aspects of U.S. federal income and estate taxation that might be relevant to particular Non-U.S. Holders in light of their particular investment circumstances or status, nor does it address specific tax considerations that may be relevant to particular persons (including, for example, financial institutions, regulated investment companies, broker-dealers in securities or currencies, insurance companies, pension plans, partnerships or other pass-through entities, certain U.S. expatriates, tax-exempt organizations, controlled foreign corporations, passive foreign investment companies, corporations that accumulate earnings to avoid U.S. federal income tax, or persons in special situations, such as those who have elected to mark securities to market or those who hold common stock as part of a straddle, hedge, conversion transaction or other integrated investment, or those who are deemed to sell our common stock under the constructive sale provisions of the Code). In addition, this summary does not address U.S. federal alternative minimum tax, certain estate and gift tax considerations or considerations under the tax laws of any state, local or non-U.S. jurisdiction.

This summary is for general information only. Non-U.S. Holders are urged to consult their tax advisors concerning the U.S. federal income and estate taxation, state, local and non-U.S. taxation and other tax consequences to them of the purchase, ownership and disposition of our common stock.

For purposes of this summary, a Non-U.S. Holder means a beneficial owner of common stock that for U.S. federal income tax purposes that is not:

an individual who is a citizen or resident of the United States;

an entity, including a corporation (or other entity taxable as a corporation), created or organized under the laws of the U.S., any state thereof, or the District of Columbia;

an estate the income of which is subject to U.S. federal income tax regardless of its source; or

a trust if (a) a court within the United States is able to exercise primary supervision over the administration of the trust, and one or more U.S. persons have the authority to control all substantial decisions of the trust, or (b) a valid election to be treated as a U.S. person is in effect with respect to such trust.

If a partnership, or an entity or arrangement treated as a partnership for U.S. federal income tax purposes, holds common stock, the tax treatment of a partner in the partnership generally will depend upon the partner's tax status and upon the activities of the partnership. Accordingly, partnerships and other entities that are classified as partnerships for U.S. federal income tax purposes that hold our common stock and partners in such partnerships should consult

their tax advisors.

An individual may be treated as a resident instead of a nonresident of the United States in any calendar year for U.S. federal income tax purposes if the individual was present in the United States for at least 31 days in that calendar year and for an aggregate of at least 183 days during the three-year period ending with the current calendar year. For purposes of this calculation, all of the days present in the current year, one-third of the days present in the immediately preceding year and one-sixth of the days present in the second preceding year are counted. Residents are taxed for U.S. federal income tax purposes as if they were U.S. citizens. The tax treatment of U.S. citizens and residents (including individuals who meet the foregoing substantial presence test) who hold shares of our common stock is not discussed in this summary.

S-18

Table of Contents

Prospective investors should consult their own tax advisors regarding the U.S. federal, state, local and non-U.S. income and other tax considerations of acquiring, holding and disposing of our common stock.

Distributions on Our Common Stock

As discussed above under "The Offering - Cash Dividend policy", we do not currently expect to pay cash dividends. In the event that we do make a distribution of cash with respect to our common stock, any such distributions will be treated as a dividend for U.S. federal income tax purposes to the extent paid from our current or accumulated earnings and profits (as determined under U.S. federal income tax principles). If a distribution exceeds our current and accumulated earnings and profits, the excess will be treated first as a tax-free return of capital to the extent of the Non-U.S. Holder's tax basis in our common stock and thereafter as capital gain from the sale or exchange of such stock. Any such distribution would also be subject to the discussion below under the section titled "Additional withholding and information reporting requirements." Dividends paid to a Non-U.S. Holder generally will be subject to a 30% U.S. federal withholding tax unless such Non-U.S. Holder provides us or our agent, as the case may be, with a properly executed:

1. IRS Form W-8BEN or W-8BEN-E (or successor form) claiming, under penalties of perjury, a reduction in withholding under an applicable income tax treaty, or
2. IRS Form W-8ECI (or successor form) stating that a dividend paid on common stock is not subject to withholding tax because it is effectively connected with a U.S. trade or business of the Non-U.S. Holder (in which case such dividend generally will be subject to regular graduated U.S. tax rates as described below). Additionally, the certification requirement described above may require a Non-U.S. Holder that provides an IRS form or that claims treaty benefits to provide its U.S. taxpayer identification number. Special certification and other requirements apply in the case of certain Non-U.S. Holders that are intermediaries or pass-through entities for U.S. federal income tax purposes.

Each Non-U.S. Holder is urged to consult its own tax advisor about the specific methods for satisfying these requirements. A claim for exemption will not be valid if the person receiving the applicable form has actual knowledge or reason to know that the statements on the form are false.

If dividends are effectively connected with a U.S. trade or business of the Non-U.S. Holder (and, if required by an applicable income tax treaty, attributable to a U.S. permanent establishment), the Non-U.S. Holder, although exempt from the withholding tax described above (provided that the certifications described above are satisfied), will be subject to U.S. federal income tax on such dividends on a net income basis in the same manner as if it were a resident of the United States. In addition, if such Non-U.S. Holder is a non-U.S. corporation and dividends are effectively connected with its U.S. trade or business (and, if required by an applicable income tax treaty, attributable to a U.S. permanent establishment), such Non-U.S. Holder may be subject to an additional branch profits tax equal to 30% (unless reduced by an applicable income treaty) in respect of such effectively-connected income.

If a Non-U.S. Holder is eligible for a reduced rate of U.S. federal withholding tax pursuant to an income tax treaty, such holder may obtain a refund or credit of any excess amount withheld by timely filing an appropriate claim for refund with the Internal Revenue Service (IRS).

Disposition of Our Common Stock

Subject to the discussion below under the section titled "Additional withholding and information reporting requirements", in general, a Non-U.S. Holder will not be subject to U.S. federal income tax or withholding tax on gain recognized on a sale, exchange or other taxable disposition of a share of our common stock, unless:

the gain is effectively connected with a trade or business of the Non-U.S. Holder in the United States (and, if required by an applicable income tax treaty, attributable to a U.S. permanent establishment);

S-19

Table of Contents

the Non-U.S. Holder is a nonresident alien who is present in the United States for 183 days or more in the taxable year of the disposition and meets certain other conditions; or

we are or have been a United States real property holding corporation, as defined in the Code (a USRPHC), at any time within the shorter of the five-year period preceding the disposition and the Non-U.S. Holder's holding period in the share of our common stock.

We believe that we are not, and do not anticipate becoming, a USRPHC. However, because the determination of whether we are a USRPHC depends on the fair market value of our U.S. real property relative to the fair market value of other business assets, there can be no assurance that we will not become a USRPHC in the future. Even if we become a USRPHC, a Non-U.S. Holder would not be subject to U.S. federal income tax on a sale, exchange or other taxable disposition of our common stock so long as our common stock continues to be regularly traded on an established securities market and such Non-U.S. Holder does not own and is not deemed to own (directly, indirectly or constructively) more than 5% of our common stock at any time during the shorter of the five year period ending on the date of disposition and the holder's holding period.

If a Non-U.S. Holder is engaged in a trade or business in the U.S. and gain recognized by the Non-U.S. Holder on a sale or other disposition of our common stock is effectively connected with the conduct of such trade or business, the Non-U.S. Holder generally will be subject to regular U.S. income tax as if the Non-U.S. Holder were a U.S. person, subject to an applicable income tax treaty providing otherwise. A non-U.S. corporation may also, under certain circumstances, be subject to an additional branch profits tax imposed at a rate of 30% (or, if applicable, a lower income tax treaty rate). Non-U.S. Holders whose gain from dispositions of our common stock may be effectively connected with the conduct of a trade or business in the United States are urged to consult their own tax advisors with respect to the U.S. tax consequences of the purchase, ownership and disposition of our common stock.

A nonresident alien who is subject to U.S. federal income tax because such individual was present in the United States for 183 days or more in the taxable year of the taxable disposition of our common stock will be subject to a flat 30% tax on the gain derived from such disposition, which may be offset by U.S. source capital loss, if any.

Backup withholding and information reporting

Generally, we must report annually to the IRS and to each Non-U.S. Holder certain information including the Non-U.S. Holder's name, address and taxpayer identification number, the aggregate amount of distributions on our common stock paid to that Non-U.S. Holder during the calendar year and the amount of tax withheld, if any.

Backup withholding tax is imposed on dividends and certain other types of payments to certain U.S. persons (currently at a rate of 28%). In general, backup withholding tax will not apply to payments of dividends on our common stock or proceeds from the sale of our common stock payable to a Non-U.S. Holder if the certification described above under Distributions on Our Common Stock is duly provided by such Non-U.S. Holder or the Non-U.S. Holder otherwise establishes an exemption, provided that we or our agent do not have actual knowledge or reason to know that the Non-U.S. Holder is a U.S. person or that the conditions of any claimed exemption are not satisfied. Certain information reporting may still apply to distributions even if an exemption from backup withholding is established. Copies of any information returns reporting the distributions to a Non-U.S. Holder and any withholding also may be made available to the tax authorities in the country in which a Non-U.S. Holder resides under the provisions of an applicable income tax treaty.

Backup withholding is not an additional tax and any amounts withheld under the backup withholding tax rules from a payment to a Non-U.S. Holder generally will be allowed as a refund or a credit against such Non-U.S. Holder's U.S.

federal income tax liability, provided that the requisite procedures are followed.

Non-U.S. Holders are urged to consult their own tax advisors regarding their particular circumstances and the availability of and procedure for obtaining an exemption from backup withholding.

S-20

Table of Contents

Additional withholding and information reporting requirements

Sections 1471 through 1474 of the Code, commonly referred to as the Foreign Account Tax Compliance Act or FATCA, and applicable Treasury Regulations thereunder impose withholding at a rate of 30% on certain withholdable payments (including dividends on, and gross proceeds from the sale or redemption of, our common stock) paid to foreign financial institutions (which is broadly defined for this purpose and, in general, includes investment vehicles) and certain other non-U.S. entities unless various U.S. information reporting and due diligence requirements (generally relating to ownership by U.S. persons of certain interests in or accounts with those entities) have been satisfied, or an exemption applies. Withholding under FATCA on withholdable payments to foreign financial institutions and non-financial foreign entities began on July 1, 2014, with respect to dividends on our common stock, and will begin on January 1, 2017, with respect to gross proceeds of a disposition of our common stock. Non-U.S. Holders should consult their own tax advisors regarding the possible implications of FATCA on their investment in our common stock.

U.S. Federal Estate Tax

Common stock owned or treated as owned by an individual who is a Non-U.S. Holder at the time of death generally will be included in the individual's gross estate for U.S. federal estate tax purposes and may be subject to U.S. federal estate tax unless an applicable estate or other tax treaty provides otherwise.

Table of Contents

UNDERWRITING

We are offering the shares of common stock described in this prospectus through a number of underwriters. JMP Securities LLC is acting as sole book-running manager of the offering. Stifel Nicolaus & Company, Incorporated is acting as lead manager. We have entered into an underwriting agreement with JMP Securities LLC on behalf of the underwriters. Subject to the terms and conditions of the underwriting agreement, we have agreed to sell to the underwriters, and each underwriter has severally agreed to purchase, at the public offering price less the underwriting discounts and commissions set forth on the cover page of this prospectus, the number of shares of common stock listed next to its name in the following table:

Name	Number of shares
JMP Securities LLC	
Stifel Nicolaus & Company, Incorporated	
Total	

The underwriters are committed to purchase all the shares of common stock offered by us if they purchase any shares. The underwriting agreement also provides that if an underwriter defaults, the purchase commitments of non-defaulting underwriters may also be increased or the offering may be terminated.

The underwriters propose to offer the shares of common stock directly to the public at the public offering price set forth on the cover page of this prospectus supplement and to certain dealers at that price less a concession not in excess of \$ per share. After the public offering of the shares, the offering price and other selling terms may be changed by the underwriters. Sales of shares made outside of the United States may be made by affiliates of the underwriters.

The underwriters have an option to buy up to additional shares of common stock from us. The underwriters have 30 days from the date of this prospectus to exercise this option. If any shares are purchased with this option, the underwriters will purchase shares in approximately the same proportion as shown in the table above. If any additional shares of common stock are purchased, the underwriters will offer the additional shares on the same terms as those on which the shares are being offered.

The underwriting fee is equal to the public offering price per share of common stock less the amount paid by the underwriters to us per share of common stock. The underwriting fee is \$ per share. The following table shows the per share and total underwriting discounts and commissions to be paid to the underwriters assuming both no exercise and full exercise of the underwriters option to purchase additional shares.

	Without exercise of Underwriters options	With full exercise Of Underwriters option
Per Share	\$	\$
Total	\$	\$

We estimate that the total expenses of this offering, including registration, filing and listing fees, printing fees and legal and accounting expenses, but excluding the underwriting discounts and commissions, will be approximately \$. We have agreed to reimburse the underwriters for all expenses incurred in connection with the registration or qualification of the shares issued in this offering under state or foreign or blue sky laws (in an amount not to exceed \$30,000).

A prospectus supplement in electronic format may be made available on the web sites maintained by one or more underwriters, or selling group members, if any, participating in the offering. The underwriters may agree to

S-22

Table of Contents

allocate a number of shares to underwriters and selling group members for sale to their online brokerage account holders. Internet distributions will be allocated by the representatives to underwriters and selling group members that may make Internet distributions on the same basis as other allocations.

We have agreed that we will not (i) offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, or otherwise transfer or dispose of, directly or indirectly, or file with the SEC a registration statement under the Securities Act relating to, any shares of our common stock or securities convertible into or exchangeable or exercisable for any shares of our common stock, or publicly disclose the intention to make any offer, sale, pledge, disposition or filing, or (ii) enter into any swap or other arrangement that transfers all or a portion of the economic consequences associated with the ownership of any shares of common stock or any such other securities (regardless of whether any such transaction described in (i) or (ii) is to be settled by the delivery of shares of common stock or such other securities, in cash or otherwise), in each case without the prior written consent of JMP Securities LLC for a period of 90 days after the date of this prospectus, other than the shares of our common stock to be sold hereunder; any options exercisable for common stock granted under company stock plans in the ordinary course of business consistent with past practice; any shares of our common stock issued upon the exercise of options granted under company stock plans or outstanding warrants; and the issuance of shares of our common stock in connection with mergers or acquisitions of businesses, entities, property or other assets, joint ventures or strategic alliances.

Our directors and certain of our executive officers, and holders of a substantial majority of our common stock and securities convertible into or exchangeable for our common stock have entered into lock-up agreements with the underwriters prior to the commencement of this offering pursuant to which each of these persons or entities, with limited exceptions, for a period of 90 days after the date of this prospectus, may not, without the prior written consent of JMP Securities LLC, (i) offer, pledge, sell, contract to sell, sell any option or contract to purchase, purchase any option or contract to sell, grant any option, right or warrant to purchase, or otherwise transfer or dispose of, directly or indirectly, any shares of our common stock or any securities convertible into or exercisable or exchangeable for our common stock (including, without limitation, common stock or such other securities which may be deemed to be beneficially owned by such directors, executive officers, shareholders, managers and members in accordance with the rules and regulations of the SEC and securities which may be issued upon exercise of a stock option or warrant), or publicly disclose the intention to make any offer, sale, pledge or disposition, (ii) enter into any swap or other agreement that transfers, in whole or in part, any of the economic consequences of ownership of the common stock or such other securities, whether any such transaction described in clause (i) or (ii) above is to be settled by delivery of common stock or such other securities, in cash or otherwise, or (iii) make any demand for or exercise any right with respect to the registration of any shares of our common stock or any security convertible into or exercisable or exchangeable for our common stock. These lock-up restrictions are subject to limited exceptions that are specified in the lock-up agreements.

We have agreed to indemnify the underwriters against certain liabilities, including liabilities under the Securities Act of 1933, or the Securities Act.

Our common stock is listed on the New York Stock Exchange under the symbol XON.

In connection with this offering, the underwriters may engage in stabilizing transactions, which involves making bids for, purchasing and selling shares of common stock in the open market for the purpose of preventing or retarding a decline in the market price of the common stock while this offering is in progress. These stabilizing transactions may include making short sales of the common stock, which involves the sale by the underwriters of a greater number of shares of common stock than they are required to purchase in this offering, and purchasing shares of common stock on the open market to cover positions created by short sales. Short sales may be covered shorts, which are short positions

in an amount not greater than the underwriters' option referred to above, or may be naked shorts, which are short positions in excess of that amount. The underwriters may close out any covered short position either by exercising their option, in whole or in part, or by purchasing shares in the

S-23

Table of Contents

open market. In making this determination, the underwriters will consider, among other things, the price of shares available for purchase in the open market compared to the price at which the underwriters may purchase shares through the option. A naked short position is more likely to be created if the underwriters are concerned that there may be downward pressure on the price of the common stock in the open market that could adversely affect investors who purchase in this offering. To the extent that the underwriters create a naked short position, they will purchase shares in the open market to cover the position.

The underwriters have advised us that, pursuant to Regulation M of the Securities Act, they may also engage in other activities that stabilize, maintain or otherwise affect the price of the common stock, including the imposition of penalty bids. This means that if the representatives of the underwriters purchase common stock in the open market in stabilizing transactions or to cover short sales, the representatives can require the underwriters that sold those shares as part of this offering to repay the underwriting discount received by them.

These activities may have the effect of raising or maintaining the market price of the common stock or preventing or retarding a decline in the market price of the common stock, and, as a result, the price of the common stock may be higher than the price that otherwise might exist in the open market. If the underwriters commence these activities, they may discontinue them at any time. The underwriters may carry out these transactions on the New York Stock Exchange, in the over-the-counter market or otherwise.

In compliance with the guidelines of the Financial Industry Regulatory Authority, Inc., or FINRA, the maximum aggregate discounts, commissions, agency fees or other items constituting compensation to be received by any FINRA member or independent broker-dealer will not exceed 8% of the aggregate offering price of the securities offered pursuant to this prospectus supplement.

The underwriters and their respective affiliates are full-service financial institutions engaged in various activities, which may include securities trading, commercial and investment banking, financial advisory, investment management, investment research, principal investment, hedging, financing and brokerage activities. Certain of the underwriters and their affiliates have provided in the past to us and our affiliates and may provide from time to time in the future certain commercial banking, financial advisory, investment banking and other services for us and such affiliates in the ordinary course of their business, for which they have received and may continue to receive customary fees and commissions. As we previously announced in June 2015, we have entered into a collaboration with an investment fund sponsored by Harvest Capital Strategies, LLC, or Harvest. Harvest is an indirect subsidiary of JMP Group LLC (NYSE: JMP), a public company that operates its investment banking, equity research and institutional brokerage business through JMP Securities LLC, the sole book-running manager for the offering. One or more affiliates of Mr. Kirk are invested in the fund in an aggregate amount of 20% of the fund's committed capital. In addition, from time to time, certain of the underwriters and their affiliates may effect transactions for their own account or the account of customers, and hold on behalf of themselves or their customers, long or short positions in our debt or equity securities or loans, and may do so in the future.

Selling Restrictions

General

Other than in the United States, no action has been taken by us or the underwriter that would permit a public offering of the securities offered by this prospectus supplement and the accompanying prospectus in any jurisdiction where action for that purpose is required. The securities offered by this prospectus supplement and the accompanying prospectus may not be offered or sold, directly or indirectly, nor may this prospectus supplement and the accompanying prospectus or any other offering material or advertisements in connection with the offer and sale of any

such securities be distributed or published in any jurisdiction, except under circumstances that will result in compliance with the applicable rules and regulations of that jurisdiction. Persons into whose possession this prospectus supplement and the accompanying prospectus comes are advised to inform themselves about and to observe any restrictions relating to the offering and the distribution of this prospectus supplement and the accompanying prospectus. This prospectus supplement and the accompanying prospectus do not constitute an offer to sell or a solicitation of an offer to buy any securities offered by this prospectus

S-24

Table of Contents

supplement and the accompanying prospectus in any jurisdiction in which such an offer or a solicitation is unlawful.

Notice to Prospective Investors in the European Economic Area

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

- A. to any legal entity which is a qualified investor as defined in the Prospectus Directive;
- B. to fewer than 100 or, if the Relevant Member State has implemented the relevant provision of the 2010 PD Amending Directive, 150, natural or legal persons (other than qualified investors as defined in the Prospectus Directive), as permitted under the Prospectus Directive, subject to obtaining the prior consent of the representatives; or
- C. in any other circumstances falling within Article 3(2) of the Prospectus Directive, provided that no such offer of shares shall require the Company or the representatives to publish a prospectus pursuant to Article 3 of the Prospectus Directive or supplement a prospectus pursuant to Article 16 of the Prospectus Directive.

Each person in a Relevant Member State who initially acquires any shares or to whom any offer is made will be deemed to have represented, acknowledged and agreed that it is a **qualified investor** within the meaning of the law in that Relevant Member State implementing Article 2(1)(e) of the Prospectus Directive. In the case of any shares being offered to a financial intermediary as that term is used in Article 3(2) of the Prospectus Directive, each such financial intermediary will be deemed to have represented, acknowledged and agreed that the shares acquired by it in the offer have not been acquired on a non-discretionary basis on behalf of, nor have they been acquired with a view to their offer or resale to, persons in circumstances which may give rise to an offer of any shares to the public other than their offer or resale in a Relevant Member State to qualified investors as so defined or in circumstances in which the prior consent of the representatives has been obtained to each such proposed offer or resale.

The Company, the representatives and their affiliates will rely upon the truth and accuracy of the foregoing representations, acknowledgements and agreements.

This prospectus has been prepared on the basis that any offer of shares in any Relevant Member State will be made pursuant to an exemption under the Prospectus Directive from the requirement to publish a prospectus for offers of shares. Accordingly any person making or intending to make an offer in that Relevant Member State of shares which are the subject of the offering contemplated in this prospectus may only do so in circumstances in which no obligation arises for the Company or any of the underwriters to publish a prospectus pursuant to Article 3 of the Prospectus Directive in relation to such offer. Neither the Company nor the underwriters have authorized, nor do they authorize, the making of any offer of shares in circumstances in which an obligation arises for the Company or the underwriters to publish a prospectus for such offer.

For the purpose of the above provisions, the expression **an offer to the public** in relation to any shares in any Relevant Member State means the communication in any form and by any means of sufficient information on the terms of the offer and the shares to be offered so as to enable an investor to decide to purchase or subscribe the shares, as the same may be varied in the Relevant Member State by any measure implementing the Prospectus Directive in the Relevant

Member State and the expression "Prospectus Directive" means Directive 2003/71/EC (including the 2010 PD Amending Directive, to the extent implemented in the Relevant Member States) and includes any relevant implementing measure in the Relevant Member State and the expression "2010 PD Amending Directive" means Directive 2010/73/EU.

S-25

Table of Contents

Notice to Prospective Investors in the United Kingdom

In addition, in the United Kingdom, this document is being distributed only to, and is directed only at, and any offer subsequently made may only be directed at persons who are qualified investors (as defined in the Prospectus Directive) (i) who have professional experience in matters relating to investments falling within Article 19 (5) of the Financial Services and Markets Act 2000 (Financial Promotion) Order 2005, as amended (the Order) and/or (ii) who are high net worth companies (or persons to whom it may otherwise be lawfully communicated) falling within Article 49(2)(a) to (d) of the Order (all such persons together being referred to as relevant persons). This document must not be acted on or relied on in the United Kingdom by persons who are not relevant persons. In the United Kingdom, any investment or investment activity to which this document relates is only available to, and will be engaged in with, relevant persons.

Notice to Prospective Investors in Switzerland

The shares may not be publicly offered in Switzerland and will not be listed on the SIX Swiss Exchange (SIX) or on any other stock exchange or regulated trading facility in Switzerland. This document has been prepared without regard to the disclosure standards for issuance prospectuses under art. 652a or art. 1156 of the Swiss Code of Obligations or the disclosure standards for listing prospectuses under art. 27 ff. of the SIX Listing Rules or the listing rules of any other stock exchange or regulated trading facility in Switzerland. Neither this document nor any other offering or marketing material relating to the shares or the offering may be publicly distributed or otherwise made publicly available in Switzerland.

Neither this document nor any other offering or marketing material relating to the offering, the Company, the shares have been or will be filed with or approved by any Swiss regulatory authority. In particular, this document will not be filed with, and the offer of shares will not be supervised by, the Swiss Financial Market Supervisory Authority FINMA (FINMA), and the offer of shares has not been and will not be authorized under the Swiss Federal Act on Collective Investment Schemes (CISA). The investor protection afforded to acquirers of interests in collective investment schemes under the CISA does not extend to acquirers of shares.

Notice to Prospective Investors in the Dubai International Financial Centre

This prospectus supplement relates to an Exempt Offer in accordance with the Offered Securities Rules of the Dubai Financial Services Authority (DFSA). This prospectus supplement is intended for distribution only to persons of a type specified in the Offered Securities Rules of the DFSA. It must not be delivered to, or relied on by, any other person. The DFSA has no responsibility for reviewing or verifying any documents in connection with Exempt Offers. The DFSA has not approved this prospectus supplement nor taken steps to verify the information set forth herein and has no responsibility for the prospectus supplement. The shares to which this prospectus supplement relates may be illiquid and/or subject to restrictions on their resale. Prospective purchasers of the shares offered should conduct their own due diligence on the shares. If you do not understand the contents of this prospectus supplement you should consult an authorized financial advisor.

Notice to Prospective Investors in Australia

No placement document, prospectus, product disclosure statement or other disclosure document has been lodged with the Australian Securities and Investments Commission (ASIC), in relation to the offering. This prospectus does not constitute a prospectus, product disclosure statement or other disclosure document under the Corporations Act 2001 (the Corporations Act), and does not purport to include the information required for a prospectus, product disclosure statement or other disclosure document under the Corporations Act.

Any offer in Australia of the shares may only be made to persons (the Exempt Investors) who are sophisticated investors (within the meaning of section 708(8) of the Corporations Act), professional investors (within the meaning of section 708(11) of the Corporations Act) or otherwise pursuant to one or more exemptions contained in section 708 of the Corporations Act so that it is lawful to offer the shares without disclosure to investors under Chapter 6D of the Corporations Act.

S-26

Table of Contents

The shares applied for by Exempt Investors in Australia must not be offered for sale in Australia in the period of 12 months after the date of allotment under the offering, except in circumstances where disclosure to investors under Chapter 6D of the Corporations Act would not be required pursuant to an exemption under section 708 of the Corporations Act or otherwise or where the offer is pursuant to a disclosure document which complies with Chapter 6D of the Corporations Act. Any person acquiring shares must observe such Australian on-sale restrictions.

This prospectus contains general information only and does not take account of the investment objectives, financial situation or particular needs of any particular person. It does not contain any securities recommendations or financial product advice. Before making an investment decision, investors need to consider whether the information in this prospectus is appropriate to their needs, objectives and circumstances, and, if necessary, seek expert advice on those matters.

Notice to Prospective Investors in Hong Kong

The shares have not been offered or sold and will not be offered or sold in Hong Kong, by means of any document, other than (i) to professional investors as defined in the Securities and Futures Ordinance (Cap. 571) of Hong Kong and any rules made under that Ordinance; or (ii) in other circumstances which do not result in the document being a prospectus as defined in the Companies Ordinance (Cap. 32) of Hong Kong or which do not constitute an offer to the public within the meaning of that Ordinance. No advertisement, invitation or document relating to the shares has been or may be issued or has been or may be in the possession of any person for the purposes of issue, whether in Hong Kong or elsewhere, which is directed at, or the contents of which are likely to be accessed or read by, the public of Hong Kong (except if permitted to do so under the securities laws of Hong Kong) other than with respect to shares which are or are intended to be disposed of only to persons outside Hong Kong or only to professional investors as defined in the Securities and Futures Ordinance and any rules made under that Ordinance.

Notice to Prospective Investors in Japan

The shares have not been and will not be registered under the Financial Instruments and Exchange Law of Japan (Law No. 25 of 1948, as amended) and, accordingly, will not be offered or sold, directly or indirectly, in Japan, or for the benefit of any Japanese Person or to others for re-offering or resale, directly or indirectly, in Japan or to any Japanese Person, except in compliance with all applicable laws, regulations and ministerial guidelines promulgated by relevant Japanese governmental or regulatory authorities in effect at the relevant time. For the purposes of this paragraph, Japanese Person shall mean any person resident in Japan, including any corporation or other entity organized under the laws of Japan.

Notice to Prospective Investors in Singapore

This prospectus has not been registered as a prospectus with the Monetary Authority of Singapore. Accordingly, this prospectus and any other document or material in connection with the offer or sale, or invitation for subscription or purchase, of shares may not be circulated or distributed, nor may the shares be offered or sold, or be made the subject of an invitation for subscription or purchase, whether directly or indirectly, to persons in Singapore other than (i) to an institutional investor under Section 274 of the Securities and Futures Act, Chapter 289 of Singapore (the SFA), (ii) to a relevant person pursuant to Section 275(1), or any person pursuant to Section 275(1A), and in accordance with the conditions specified in Section 275, of the SFA, or (iii) otherwise pursuant to, and in accordance with the conditions of, any other applicable provision of the SFA.

Where the shares are subscribed or purchased under Section 275 of the SFA by a relevant person which is:

- (a) a corporation (which is not an accredited investor (as defined in Section 4A of the SFA)) the sole business of which is to hold investments and the entire share capital of which is owned by one or more individuals, each of whom is an accredited investor; or

S-27

Table of Contents

(b) a trust (where the trustee is not an accredited investor) whose sole purpose is to hold investments and each beneficiary of the trust is an individual who is an accredited investor, securities (as defined in Section 239(1) of the SFA) of that corporation or the beneficiaries' rights and interest (howsoever described) in that trust shall not be transferred within six months after that corporation or that trust has acquired the shares pursuant to an offer made under Section 275 of the SFA except:

- (a) to an institutional investor or to a relevant person defined in Section 275(2) of the SFA, or to any person arising from an offer referred to in Section 275(1A) or Section 276(4)(i)(B) of the SFA;
- (b) where no consideration is or will be given for the transfer;
- (c) where the transfer is by operation of law;
- (d) as specified in Section 276(7) of the SFA; or
- (e) as specified in Regulation 32 of the Securities and Futures (Offers of Investments) (Shares and Debentures) Regulations 2005 of Singapore.

Table of Contents

LEGAL MATTERS

The validity of the common stock being offered will be passed upon for us by Troutman Sanders LLP, Richmond, Virginia. Goodwin Procter LLP, New York, New York is counsel for the underwriters in connection with this offering.

EXPERTS

The financial statements and management's assessment of the effectiveness of internal control over financial reporting (which is included in Management's Report on Internal Control over Financial Reporting) incorporated in this Prospectus by reference to the Annual Report on Form 10-K for the year ended December 31, 2014, have been so incorporated in reliance on the report which contains an explanatory paragraph on the effectiveness of internal control over financial reporting due to the exclusion of certain elements of the internal control over financial reporting of Trans Ova Genetics, L.C. as it was acquired by the Company in a purchase business combination during 2014 of PricewaterhouseCoopers LLP, an independent registered public accounting firm, given on the authority of said firm as experts in auditing and accounting.

The financial statements of ZIOPHARM Oncology, Inc. as of and for the years ended December 31, 2014 and 2013 incorporated in this Prospectus by reference to the Annual Report on Form 10-K for the year ended December 31, 2014, have been audited by McGladrey LLP, an independent registered public accounting firm, as stated in their report incorporated by reference herein, and have been so incorporated in reliance upon such reports and upon the authority of such firm as experts in accounting and auditing.

The financial statements of Trans Ova Genetics, L.C. incorporated in this prospectus by reference to the Current Report on Form 8-K filed on August 8, 2014 and amended on October 24, 2014, have been so incorporated in reliance upon the report of Frost, PLLC, an independent registered public accounting firm, given upon the authority of said firm as experts in auditing and accounting.

WHERE YOU CAN FIND MORE INFORMATION

We file annual, quarterly and current reports, proxy statements and other information with the SEC. You can inspect and copy these reports, proxy statements and other information at the public reference facilities of the SEC at the SEC's Public Reference Room located at 100 F Street, N.E., Washington, D.C. 20549. Please call the SEC at 1-800-SEC-0330 for further information on the operation of the Public Reference Room. The SEC also maintains an internet web site that contains reports, proxy and information statements and other information regarding registrants that file electronically with the SEC (www.sec.gov). We make available, free of charge through our website, www.dna.com, our annual report, quarterly reports, current reports, proxy statements, section 16 reports and other information (and any amendments thereto) as soon as practicable after filing or furnishing the material to the SEC, in addition to our Corporate Governance Guidelines, codes of ethics and the charters of the Audit, Compensation, and Nominating and Governance Committees. However, the information contained on, or that can be accessed through, our website is not a part of this prospectus. We have included our website address in this prospectus solely as an inactive textual reference. These materials also may be requested by contacting the Corporate Secretary in writing at Intrexon Corporation, 20374 Seneca Meadows Parkway, Germantown, Maryland 20876. You can also inspect reports, proxy statements and other information about us at the offices of the New York Stock Exchange, 20 Broad Street, New York, New York 10005.

We have filed with the SEC a registration statement on Form S-3 under the Securities Act with respect to the common stock offered with this prospectus. This prospectus does not contain all of the information in the registration statement,

parts of which we have omitted, as allowed under the rules and regulations of the SEC. You should refer to the registration statement for further information with respect to us and the common stock. Copies of the registration statement, including exhibits, may be inspected without charge at the SEC's Public Reference Room and on the SEC's website at the addresses set forth above.

S-29

Table of Contents

INCORPORATION OF CERTAIN INFORMATION BY REFERENCE

The SEC allows us to incorporate by reference information and reports we file with it, which means that we can disclose important information to you by referring to those documents. The information incorporated by reference is considered to be part of this prospectus supplement and the accompanying prospectus, except for information superseded by information in this prospectus supplement. We hereby incorporate by reference the documents listed below, which means that we are disclosing important information to you by referring you to those documents. The information that we file later with the SEC will automatically update and in some cases supersede this information (other than portions of these documents that are either (1) described in paragraph (e) of Item 201 of Registration S-K or paragraphs (d)(1)-(3) and (e)(5) of Item 407 of Regulation S-K promulgated by the SEC or (2) furnished under Item 2.02 or Item 7.01 of a Current Report on Form 8-K). Specifically, we incorporate by reference the following documents or information filed with the SEC (other than, in each case, documents or information deemed to have been furnished and not filed in accordance with SEC rules, unless otherwise indicated):

Our Annual Report on Form 10-K for the year ended December 31, 2014;

Our Quarterly Reports on Form 10-Q for the quarters ended March 31, 2015 and June 30, 2015;

Our Current Reports on Form 8-K filed on January 14, 2015 (as amended on January 28, 2015), January 20, 2015, January 22, 2015, February 19, 2015, March 3, 2015, April 1, 2015, April 2, 2015, April 23, 2015, May 11, 2015, June 5, 2015, June 17, 2015, June 18, 2015, and August 12, 2015;

The description of our common stock, no par value, contained in our Form 8-A filed on August 5, 2013, including any amendment or report filed for the purpose of updating such description; and

Future filings we make with the SEC under Sections 13(a), 13(c), 14 or 15(d) of the Securities Exchange Act of 1934, as amended (the Exchange Act) on or after the date of this prospectus, until we have sold all of the offered securities to which this prospectus relates or the offering is otherwise terminated.

All documents filed by us with the SEC pursuant to Section 13(a), 13(c), 14 or 15(d) of the Exchange Act, from the date of this prospectus supplement until the completion of the offering to which this prospectus supplement relates or this offering is terminated, shall also be deemed to be incorporated by reference in, and to be part of, this prospectus supplement and the accompanying prospectus from the date any such document is filed. We are not, however, incorporating, in each case, any documents or information that we are deemed to furnish and not file in accordance with SEC rules.

Any statements contained in a document incorporated by reference in this prospectus supplement shall be deemed to be modified, superseded or replaced for purposes of this prospectus supplement and the accompanying prospectus to the extent that a statement contained in this prospectus supplement (or in any other subsequently filed document which also is incorporated by reference in this prospectus supplement) modifies, supersedes or replaces such statement. Any statement so modified, superseded or replaced shall not be deemed, except as so modified, superseded or replaced, to constitute a part of this prospectus supplement and the accompanying prospectus. Statements contained in this prospectus supplement, the accompanying prospectus and any document incorporated by reference as to the

Edgar Filing: INTREXON CORP - Form 424B5

contents of any contract, agreement or other document referred to are not necessarily complete, and in each instance reference is made to the copy of the contract, agreement or other document filed as an exhibit to the registration statement or any incorporated document, each statement being so qualified by this reference.

You may request a copy of the above-documented filings at no cost by contacting the Corporate Secretary in writing at Intrexon Corporation, 20374 Seneca Meadows Parkway, Germantown, Maryland 20876.

S-30

Table of Contents

PROSPECTUS

INTREXON CORPORATION

DEBT SECURITIES

COMMON STOCK

PREFERRED STOCK

WARRANTS

RIGHTS

STOCK PURCHASE CONTRACTS

STOCK PURCHASE UNITS

We or any selling securityholder may, from time to time, offer and sell in one or more offerings:

senior or subordinated debt securities;

shares of our common stock;

shares of our preferred stock;

warrants to purchase our debt securities or shares of our common stock or preferred stock, or other securities;

rights to purchase our debt securities or shares of our common stock or preferred stock, or other securities;

stock purchase contracts to purchase shares of our common stock or our preferred stock;

stock purchase units, each representing ownership of a stock purchase contract and any of our debt securities, shares of our common stock or preferred stock, or preferred securities or debt obligations of third parties, including U.S. Treasury securities, any other securities described in the applicable prospectus supplement, or any combination of the foregoing, securing the holder's obligation to purchase shares of our common stock or preferred stock under the stock purchase contracts; or

any combination thereof.

The debt securities may consist of debentures, notes, bonds or other types of indebtedness. The debt securities, preferred stock, warrants, rights, stock purchase contracts and stock purchase units may be convertible or exercisable or exchangeable for common or preferred stock or other securities of ours.

Our common stock is listed on the New York Stock Exchange under the symbol XON. If we decide to seek a listing of any securities offered by this prospectus, the applicable prospectus supplement will disclose the exchange or market on which such securities will be listed, if any, or where we have made an application for listing, if any.

We or any selling securityholder may offer and sell our securities to or through one or more underwriters, dealers, agents or other third parties, or directly to one or more purchasers, on a continuous or delayed basis. These securities also may be resold by securityholders, if so provided in a prospectus supplement hereto. We will provide specific terms of any securities to be offered, including the amount, prices and other terms of the securities and information about any selling securityholders, in one or more supplements to this prospectus. The prospectus supplement may also add, update or change information contained in this prospectus. You should read this prospectus and any applicable prospectus supplement carefully before you invest. **This prospectus may not be used to sell securities unless accompanied by a prospectus supplement and/or free writing prospectus.**

INVESTING IN OUR SECURITIES INVOLVES A HIGH DEGREE OF RISK. YOU SHOULD REVIEW CAREFULLY THE RISKS AND UNCERTAINTIES REFERENCED UNDER THE HEADING RISK FACTORS ON PAGE 8 OF THIS PROSPECTUS AS WELL AS THOSE CONTAINED IN THE APPLICABLE PROSPECTUS SUPPLEMENT AND ANY RELATED FREE WRITING PROSPECTUS, AND IN THE OTHER DOCUMENTS THAT ARE INCORPORATED BY REFERENCE INTO THIS PROSPECTUS OR THE APPLICABLE PROSPECTUS SUPPLEMENT.

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

The date of this prospectus is September 5, 2014.

Table of Contents

Table of Contents

<u>ABOUT THIS PROSPECTUS</u>	1
<u>WHERE YOU CAN FIND MORE INFORMATION</u>	2
<u>INCORPORATION BY REFERENCE</u>	3
<u>CAUTIONARY STATEMENT REGARDING FORWARD-LOOKING STATEMENTS</u>	4
<u>OVERVIEW</u>	6
<u>RISK FACTORS</u>	8
<u>RATIO OF EARNINGS TO FIXED CHARGES AND RATIO OF EARNINGS TO COMBINED FIXED CHARGES AND PREFERRED STOCK DIVIDENDS</u>	9
<u>USE OF PROCEEDS</u>	10
<u>DESCRIPTION OF DEBT SECURITIES</u>	11
<u>DESCRIPTION OF CAPITAL STOCK</u>	20
<u>DESCRIPTION OF WARRANTS</u>	26
<u>DESCRIPTION OF RIGHTS</u>	27
<u>DESCRIPTION OF STOCK PURCHASE CONTRACTS AND STOCK PURCHASE UNITS</u>	28
<u>SELLING SECURITYHOLDERS</u>	29
<u>PLAN OF DISTRIBUTION</u>	30
<u>LEGAL MATTERS</u>	32
<u>EXPERTS</u>	32

We are responsible for the information contained and incorporated by reference in this prospectus, in any accompanying prospectus supplement, and in any related free writing prospectus we prepare or authorize. We have not authorized anyone to give you any other information, and we take no responsibility for any other information that others may give you. If you are in a jurisdiction where offers to sell, or solicitations of offers to purchase, the securities offered by this documentation are unlawful, or if you are a person to whom it is unlawful to direct these types of activities, then the offer presented in this document does not extend to you. The information contained in this document speaks only as of the date of this document, unless the information specifically indicates that another date applies. Our business, financial condition, results of operations and prospectus may have changed since those dates.

Table of Contents

ABOUT THIS PROSPECTUS

This prospectus is part of an automatic shelf registration statement on Form S-3 that we filed with the Securities and Exchange Commission (the SEC), as a well-known seasoned issuer as defined in Rule 405 under the Securities Act of 1933, as amended (the Securities Act). By using a shelf registration statement, we and/or selling securityholders may offer and sell, at any time and from time to time, in one or more offerings, any combination of the securities described in this prospectus. As allowed by the SEC rules, this prospectus and any prospectus supplement or other offering materials do not contain all of the information included in the registration statement. For further information, we refer you to the registration statement, including its exhibits. Statements contained in this prospectus and any prospectus supplement or other offering materials about the provisions or contents of any agreement or other document are not necessarily complete. If the SEC's rules and regulations require that an agreement or document be filed as an exhibit to the registration statement, please see that agreement or document for a complete description of these matters.

This prospectus provides you with a general description of the securities that we and/or selling securityholders may offer. Each time we and/or selling securityholders sell securities, we will provide a prospectus supplement that contains specific information about the terms of that offering, including the specific amounts, prices and terms of the securities offered. The prospectus supplement may also add information to this prospectus or update or change information in this prospectus. To the extent that this prospectus is used by any securityholder to resell any securities, information with respect to the securityholder and the terms of the securities being offered will be contained in a prospectus supplement. You should read this prospectus and any prospectus supplement together with any additional information you may need to make your investment decision. You should also read and carefully consider the information in the documents we have referred you to in [Where You Can Find More Information](#) and [Incorporation by Reference](#) below. Information incorporated by reference after the date of this prospectus is considered a part of this prospectus and may add, update or change information contained in this prospectus. Any information in such subsequent filings that is inconsistent with this prospectus will supersede the information in this prospectus or any earlier prospectus supplement. You should rely only on the information incorporated by reference or provided in this prospectus and any supplement. We have not authorized anyone else to provide you with other information.

You should not assume that the information in this prospectus, any prospectus supplement or any other offering materials is accurate as of any date other than the date on the front of each document. Our business, financial condition, results of operations and prospects may have changed since then.

When used in this prospectus, the terms [Intrexon](#), [the Company](#), [we](#), [our](#) and [us](#) refer to Intrexon Corporation and its subsidiaries, unless otherwise specified or the context otherwise requires. [Intrexon®](#), [BeyondBio®](#), [UltraVector®](#), [RheoSwitch Therapeutic System®](#), [RTS®](#), [AttSite®](#), [Better DNA®](#) and [LEAP®](#) are our and/or our affiliates registered trademarks in the United States and [mAbLogix](#) is our common law trademark in the United States. This prospectus and the information incorporated herein by reference contains references to trademarks, service marks and trade names owned by us or other companies. Solely for convenience, trademarks, service marks and trade names referred to in this prospectus and the information incorporated herein, including logos, artwork, and other visual displays, may appear without the ® or ™ symbols, but such references are not intended to indicate, in any way, that we will not assert, to the fullest extent under applicable law, our rights or the rights of the applicable licensor to these trademarks, service marks and trade names. We do not intend our use or display of other companies' trade names, service marks or trademarks to imply a relationship with, or endorsement or sponsorship of us by, any other companies. Other trademarks, trade names and service marks appearing in this prospectus and any accompanying prospectus supplement or any related free writing prospectus are the property of their respective owners.

Table of Contents

WHERE YOU CAN FIND MORE INFORMATION

We file annual, quarterly and current reports, proxy statements and other information with the SEC. You can inspect and copy these reports, proxy statements and other information at the public reference facilities of the SEC at the SEC's Public Reference Room located at 100 F Street, N.E., Washington, D.C. 20549. Please call the SEC at 1-800-SEC-0330 for further information on the operation of the Public Reference Room. The SEC also maintains an internet web site that contains reports, proxy and information statements and other information regarding registrants that file electronically with the SEC (www.sec.gov). Our internet address is www.dna.com. However, the information contained on, or that can be accessed through, our website is not a part of this prospectus. We have included our website address in this prospectus solely as an inactive textual reference. In addition, you can inspect reports and other information we file at the office of the New York Stock Exchange, Inc., 20 Broad Street, New York, New York 10005.

We have the authority to designate and issue more than one class or series of stock having various preferences, conversion and other rights, voting powers, restrictions, limitations as to dividends, qualifications, and terms and conditions of redemption. See **Description of Capital Stock Preferred Stock**. We will furnish a full statement of the relative rights and preferences of each class or series of our stock which has been so designated and any restrictions on the ownership or transfer of our stock to any shareholder upon request and without charge. Written requests for such copies should be directed to 20374 Seneca Meadows Parkway, Germantown, Maryland 20876, Attention: Chief Legal Officer, or by telephone request to (301) 556-9900.

We have filed a registration statement and related exhibits with the SEC under the Securities Act. The registration statement contains additional information about us and the securities we may issue. You may inspect the registration statement and exhibits without charge at the office of the SEC at 100 F Street, N.E., Washington, D.C. 20549, and you may obtain copies from the SEC at prescribed rates.

Table of Contents

INCORPORATION BY REFERENCE

The SEC allows us to incorporate by reference information and reports we file with the SEC into this prospectus, which means that we can disclose important information to you by referring to those documents. We hereby incorporate by reference the documents listed below, which means that we are disclosing important information to you by referring you to those documents. The information that we file later with the SEC will automatically update and in some cases supersede this information (other than portions of these documents that are either (1) described in paragraph (e) of Item 201 of Registration S-K or paragraphs (d)(1)-(3) and (e)(5) of Item 407 of Regulation S-K promulgated by the SEC or (2) furnished under Item 2.02 or Item 7.01 of a Current Report on Form 8-K). Specifically, we incorporate by reference the following documents or information filed with the SEC (other than, in each case, documents or information deemed to have been furnished and not filed in accordance with SEC rules, unless otherwise indicated):

Our Annual Report on Form 10-K for the year ended December 31, 2013, filed on March 31, 2014;

Our Quarterly Reports on Form 10-Q for the quarters ended March 31, 2014 and June 30, 2014, filed on May 9, 2014 and August 14, 2014, respectively;

Our Current Reports on Form 8-K filed on January 13, 2014, January 30, 2014, February 21, 2014, March 27, 2014 (as amended on April 4, 2014), April 16, 2014, May 12, 2014, June 13, 2014, July 3, 2014 and August 11, 2014;

The description of Medistem Inc., (Medistem) and the description of our merger with Medistem appearing within the Registration Statement on Form S-4, filed on February 3, 2014;

The description of our common stock, no par value, contained in our Form 8-A filed on August 5, 2013, including any amendment or report filed for the purpose of updating such description; and

Future filings we make with the SEC under Sections 13(a), 13(c), 14 or 15(d) of the Securities Exchange Act of 1934, as amended (the Exchange Act) on or after the date of this prospectus, until we have sold all of the offered securities to which this prospectus relates or the offering is otherwise terminated.

You may request a copy of these filings at no cost by writing or telephoning us at the following address:

Corporate Secretary

Intrexon Corporation

20374 Seneca Meadows Parkway

Germantown, Maryland 20876

This prospectus is part of a registration statement we filed with the SEC. We have incorporated exhibits into this registration statement. You should read the exhibits carefully for provisions that may be important to you.

Neither we nor any selling securityholder have authorized anyone to provide you with information other than what is incorporated by reference or provided in this prospectus, any prospectus supplement or any free writing prospectus. Neither we nor any selling securityholder are making an offer of these securities in any state where the offer is not permitted. You should not assume that the information in this prospectus or in the documents incorporated by reference is accurate as of any date other than the date on the front of this prospectus or those documents.

Table of Contents

CAUTIONARY STATEMENT REGARDING FORWARD-LOOKING STATEMENTS

This prospectus, the documents incorporated by reference into this prospectus and our future oral and written statements, may contain forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995 concerning our business, consolidated financial condition and results of operations. All statements other than statements of historical facts included or incorporated by reference into this prospectus regarding our strategies, prospects, financial condition, costs, plans and objectives are forward-looking statements. The SEC encourages companies to disclose forward-looking statements so that investors can better understand a company's future prospects and make informed investment decisions. These forward-looking statements reflect our beliefs and expectations as to future events and trends affecting our business, our consolidated financial condition and results of operations. These forward-looking statements are based upon our current expectations concerning future events and discuss, among other things, anticipated future financial performance and future business plans. Forward-looking statements are necessarily subject to risks and uncertainties, many of which are outside our control, that could cause actual results to differ materially from these statements. Forward-looking statements can be identified by such words as anticipates, believes, plan, assumes, could, should, estimates, expects, intends, potential, seek, predict, m expressions.

These forward-looking statements include, among other things, statements about:

our current and future exclusive channel collaborations (ECCs);

developments concerning our collaborators;

our ability to successfully enter new markets or develop additional products, whether with our collaborators or independently;

competition from existing technologies and products or new technologies and products that may emerge;

actual or anticipated variations in our operating results;

actual or anticipated fluctuations in our competitors or our collaborators operating results or changes in their respective growth rates;

our cash position;

market conditions in our industry;

our ability, and the ability of our collaborators, to protect our intellectual property and other proprietary rights and technologies;

our ability, and the ability of our collaborators, to adapt to changes in laws or regulations and policies;

our ability, and the ability of our collaborators, to secure any necessary regulatory approvals to commercialize any products developed under ECCs or other ventures;

the rate and degree of market acceptance of any products developed by us or our collaborators under an ECC or other venture;

our ability to retain and recruit key personnel;

our expectations related to the use of proceeds from any offering of our securities;

our estimates regarding expenses, future revenue, capital requirements and needs for additional financing;
and

our expectations relating to AquaBounty Technologies, Inc. and Trans Ova Genetics, L.C.

Table of Contents

We may not actually achieve the plans, intentions or expectations disclosed in our forward-looking statements, and you should not place undue reliance on our forward-looking statements. Item 1A, **Risk Factors** in our Annual Report on Form 10-K, and Item 1A, **Risk Factors** in our Quarterly Reports on Form 10-Q, which are incorporated by reference into this prospectus, includes factors that could cause actual results or events to differ materially from the forward-looking statements that we make. Our forward-looking statements do not reflect the potential impact of any future acquisitions, mergers, dispositions, joint ventures or investments that we may make.

We do not assume any obligation to update any forward-looking statements, whether as a result of new information, future events or otherwise, except as required by law.

Table of Contents**OVERVIEW**

We believe we are a leader in the field of synthetic biology, an emerging and rapidly evolving discipline that applies engineering principles to biological systems. Using our suite of proprietary and complementary technologies, we design, build and regulate gene programs, which are DNA sequences that consist of key genetic components. A single gene program or a complex, multi-genic program are fabricated and stored within a DNA vector. Vectors are segments of DNA used as a vehicle to transmit genetic information. DNA vectors can, in turn, be introduced into cells in order to generate a simple or complex cellular system, which are the basic and complex cellular activities that take place within a cell and the interaction of those systems in the greater cellular environment. It is these genetically modified cell systems that can be used to produce proteins, produce small molecules, or serve as cell-based products, which enable the development of new and improved products and manufacturing processes across a variety of end markets, including health, food, energy, environment, and consumer. Intrexon's synthetic biology capabilities include the ability to precisely control the amount, location and modification of biological molecules to control the function and output of living cells and optimize for desired results at an industrial scale.

We have devised our business model to bring many different commercial products to market through the formation of exclusive channel collaborations, or ECCs, with collaborators that have expertise within specific industry segments. Through our ECCs, we provide expertise in the engineering, creation and modification of gene programs and cellular systems, and our collaborators are responsible for providing market and product development expertise, as well as regulatory, sales and marketing capabilities. Generally, our collaborators compensate us through payment of technology access fees, royalties, milestones and reimbursement of certain costs. This business model allows us to leverage our capabilities and capital across a broader landscape of product opportunities and end markets than we would be capable of addressing on our own.

In certain strategic circumstances, we may enter into a joint venture with an ECC collaborator. In that event, we will enter into an ECC with a joint venture entity and may contribute access to our technology, cash or both into the joint venture which we will jointly control with our ECC collaborator. Pursuant to a joint venture agreement, we may be required to contribute additional capital to the joint venture, and we may be able to receive a higher financial return than we would normally receive from an ECC to the extent that we and our ECC collaborator are successful in developing one or more products. We currently are party to three such joint venture agreements: S & I Ophthalmic, LLC, which is a joint venture with a subsidiary of Sun Pharmaceutical Industries Ltd., an international specialty pharmaceutical company focused on chronic diseases, OvaXon, LLC, which is a joint venture with OvaScience, Inc., a life sciences company focused on the discovery, development and commercialization of new treatments for infertility, and Intrexon Energy Partners, LLC, a joint venture with a select group of external investors, to optimize and scale-up our gas-to-liquid bioconversion platform for the production of certain fuels and lubricants. As an alternative to either an ECC or joint venture, where a collaborator wishes to work with us to develop an early-stage program, we may execute a research collaboration pursuant to which we receive reimbursement for our development costs but the exclusive license rights, and related access fee, are deferred until completion of an initial research program.

In 2011, we entered into our first collaboration and have added new collaborations since then, either by entering into new agreements or expanding or adding fields to existing ECCs. As of September 2, 2014, we have entered into 24 such agreements and expansions with 20 different counterparties, of which 22 remain active. We have 21 active ECCs, including three expansions, and one research collaboration that we anticipate could, if successful, become an ECC. Under the ECCs, we are developing products in the fields of healthcare, food, energy and consumer goods. In healthcare, our ECCs include programs in oncology, anti-infectives, antibiotics and tissue repair. In food, we are working to increase the productivity and nutritional value of salmon and other fish. In energy, we are working to develop certain fuels and lubricants from natural gas. In consumer goods, we are working to advance new skin and

hair care products.

On March 6, 2014, we acquired California-based Medistem, Inc., or Medistem, a pioneer in the development of Endometrial Regenerative Cells, or ERCs, universal donor adult-derived stem cells. We intend to

Table of Contents

employ our synthetic biology platforms to engineer a diverse array of cell-based therapeutic candidates using Medistem's multipotent ERCs. On August 8, 2014, we acquired Trans Ova Genetics, L.C., or Trans Ova, an industry-leading provider of bovine reproductive technologies. Intrexon and Trans Ova intend to build upon Trans Ova's current platform with new capabilities to allow for even higher levels of delivered value to dairy and beef cattle producers.

We were founded by Thomas D. Reed, Ph.D., in 1998, as an Ohio limited liability company under the name Genomatix LTD. We were reincorporated as a Virginia corporation in 2004 and changed our name to Intrexon Corporation in 2005. The principal executive offices of Intrexon are located at 20374 Seneca Meadows Parkway, Germantown, Maryland 20876, and our telephone number is (301) 556-9900. Our website is www.dna.com. The information on, or that can be accessed through, our website does not constitute part of this prospectus, and you should not rely on any such information in making the decision whether to purchase our common stock. Our common stock is traded on the NYSE under the symbol XON.

Table of Contents

RISK FACTORS

Investing in our securities involves a high degree of risk. You should carefully consider the risks described in the documents incorporated by reference in this prospectus and any prospectus supplement, as well as other information we include or incorporate by reference into this prospectus and any applicable prospectus supplement, before making an investment decision. Our business, financial condition or results of operations could be materially adversely affected by the materialization of any of these risks. The trading price of our securities could decline due to the materialization of any of these risks, and you may lose all or part of your investment. This prospectus and the documents incorporated herein by reference also contain forward-looking statements that involve risks and uncertainties. Actual results could differ materially from those anticipated in these forward-looking statements as a result of certain factors, including the risks described in the documents incorporated herein by reference, including (i) our most recent annual report on Form 10-K which is on file with the SEC and is incorporated herein by reference, (ii) our most recent quarterly report on Form 10-Q, which is on file with the SEC and is incorporated by reference into this prospectus, and (iii) other documents we file with the SEC that are deemed incorporated by reference into this prospectus. These risk factors may be amended, supplemented or superseded from time to time by risk factors contained in other Exchange Act reports that we file with the SEC, which will be subsequently incorporated herein by reference; by any prospectus supplement accompanying this prospectus; or by a post-effective amendment to the registration statement of which this prospectus forms a part. In addition, new risks may emerge at any time and we cannot predict such risks or estimate the extent to which they may affect our financial performance. For more information, see [Where You Can Find More Information](#), [Incorporation By Reference](#) and [Cautionary Statement Regarding Forward-Looking Statements](#).

Table of Contents**RATIO OF EARNINGS TO FIXED CHARGES AND RATIO OF EARNINGS TO COMBINED FIXED CHARGES AND PREFERRED STOCK DIVIDENDS**

The following table sets forth our historical ratio of earnings to fixed charges and ratio of earnings to combined fixed charges and preferred stock dividends for each of the periods indicated. You should read this table in conjunction with our consolidated financial statements and related notes and Management's Discussion and Analysis of Financial Condition and Results of Operations, which are incorporated by reference in this prospectus. For further information, see Exhibit 12.1 (Computation of Ratio of Earnings to Fixed Charges and Ratio of Earnings to Combined Fixed Charges and Preferred Stock Dividends) to the registration statement of which this prospectus forms a part.

	Quarter Ended	Year Ended		
	June 30, 2014	2013	2012	2011

Ratio of earnings to fixed charges				
------------------------------------	--	--	--	--

Ratio of earnings to combined fixed charges and preferred stock dividends				
---	--	--	--	--

The historical ratios were prepared on a consolidated basis using amounts calculated in accordance with U.S. generally accepted accounting principles, or U.S. GAAP, and, therefore, reflect all consolidated earnings, fixed charges and preferred stock dividends. For purposes of calculating the ratios for the six months ended June 30, 2014 and the years ended December 31, 2013, 2012 and 2011 above, earnings consist of pre-tax loss from continuing operations before adjustment for loss from equity method investment plus fixed charges. Fixed charges for the six months ended June 30, 2014 and the years ended December 31, 2013, 2012 and 2011 include interest expense and an estimate of interest expense within rental expense. Preferred stock dividends for the years ended December 31, 2013, 2012 and 2011 include the accretion of dividends on our redeemable convertible preferred stock outstanding during those periods. All outstanding shares of redeemable convertible preferred stock along with cumulative dividends that existed prior to our initial public offering in August 2013 were converted into shares of common stock in connection with our initial public offering. As of the date hereof, no shares of preferred stock are outstanding.

We did not record earnings for the six months ended June 30, 2014 and the years ended December 31, 2013, 2012 and 2011. Accordingly, during those periods our earnings were insufficient to cover fixed charges in such periods and we are unable to disclose a ratio of earnings to fixed charges for such periods. Due to our losses for the six months ended June 30, 2014 and the years ended December 31, 2013, 2012 and 2011, the ratio coverage was less than 1:1. For the six months ended June 30, 2014 and the years ended December 31, 2013, 2012 and 2011, we would have needed to generate additional earnings of \$47.8 million, \$40.3 million, \$82.1 million and \$85.3 million, respectively, to achieve an earnings to fixed charges coverage ratio of 1:1.

During the six months ended June 30, 2014 and the years ended December 31, 2013, 2012 and 2011, our earnings were insufficient to cover fixed charges and preferred stock dividends in such periods and we are unable to disclose a ratio of earnings to combined fixed charges and preferred stock dividends for such periods. Due to our losses for the six months ended June 30, 2014 and the years ended December 31, 2013, 2012 and 2011, the ratio coverage was less than 1:1. For the six months ended June 30, 2014 and the years ended December 31, 2013, 2012 and 2011, we would have needed to generate additional earnings of \$47.8 million, \$58.7 million, \$104.1 million and \$99.1 million, respectively, to achieve an earnings to combined fixed charges and preferred stock dividends coverage ratio of 1:1. We had no preferred stock outstanding during the six months ended June 30, 2014.

Table of Contents

USE OF PROCEEDS

The securities that may, from time to time, be listed under this prospectus may be sold by us or by selling securityholders.

Unless we state otherwise in the accompanying prospectus supplement, we intend to use the net proceeds from the sale of the securities offered by us pursuant to this prospectus for general corporate purposes. General corporate purposes may include additions to working capital, financing of capital expenditures, repayment or redemption of existing indebtedness, and future acquisitions and strategic investment opportunities. We have not determined the amount of net proceeds to be used specifically for such purposes. As a result, management will retain broad discretion over the allocation of net proceeds. Additional information on the use of net proceeds from any sale of securities offered under this prospectus may be set forth in the prospectus supplement or in any related free writing prospectus relating to a specific offering. Pending the application of net proceeds, we expect to invest the net proceeds in investment grade, interest-bearing securities.

We may file prospectus supplements allowing selling securityholders to sell securities received from us in connection with acquisition transactions, private offerings, or other transactions. Unless otherwise set forth in a prospectus supplement, we will not receive any proceeds from sales by selling securityholders.

Table of Contents

DESCRIPTION OF DEBT SECURITIES

We may offer debt securities which may be senior or subordinated. We refer to the senior debt securities and the subordinated debt securities collectively as debt securities. The following description summarizes the general terms and provisions of the debt securities. We will describe the specific terms of the debt securities and the extent, if any, to which the general provisions summarized below apply to any series of debt securities in the prospectus supplement relating to the series and any applicable free writing prospectus that we authorize to be delivered. When we refer to the Company, we, our, and us in this section, we mean Intrexon Corporation, a Virginia corporation, excluding, unless the context otherwise requires or as otherwise expressly stated, our subsidiaries.

We may issue senior debt securities from time to time, in one or more series under a senior indenture to be entered into between us and a senior trustee to be named in a prospectus supplement, which we refer to as the senior trustee. We may issue subordinated debt securities from time to time, in one or more series under a subordinated indenture to be entered into between us and a subordinated trustee to be named in a prospectus supplement, which we refer to as the subordinated trustee. The forms of senior indenture and subordinated indenture are filed as exhibits to the registration statement of which this prospectus forms a part. Together, the senior indenture and the subordinated indenture are referred to as the indentures and, together, the senior trustee and the subordinated trustee are referred to as the trustees. This prospectus briefly outlines some of the provisions of the indentures. The following summary of the material provisions of the indentures is qualified in its entirety by the provisions of the indentures, including definitions of certain terms used in the indentures. Wherever we refer to particular sections or defined terms of the indentures, those sections or defined terms are incorporated by reference in this prospectus or the applicable prospectus supplement. You should review the indentures that are filed as exhibits to the registration statement of which this prospectus forms a part for additional information.

None of the indentures will limit the amount of debt securities that we may issue. The applicable indenture will provide that debt securities may be issued up to an aggregate principal amount authorized from time to time by us and may be payable in any currency or currency unit designated by us or in amounts determined by reference to an index.

General

The senior debt securities will constitute our unsecured and unsubordinated general obligations and will rank pari passu with our other unsecured and unsubordinated obligations. The subordinated debt securities will constitute our unsecured and subordinated general obligations and will be junior in right of payment to our senior indebtedness (including senior debt securities), as described under the heading **Certain Terms of the Subordinated Debt Securities Subordination**.

The debt securities will be our unsecured obligations. Any secured debt or other secured obligations will be effectively senior to the debt securities of any series to the extent of the value of the assets securing such debt or other obligations.

The applicable prospectus supplement and/or free writing prospectus will include any additional or different terms of the debt securities being offered, including the following terms:

the title and type of the debt securities;

whether the debt securities will be senior or subordinated debt securities, and, with respect to debt securities issued under the subordinated indenture, the terms on which they are subordinated;

the aggregate principal amount of the debt securities;

the price or prices at which we will sell the debt securities;

the maturity date or dates of the debt securities and the right, if any, to extend such date or dates;

Table of Contents

the rate or rates, if any, per year, at which the debt securities will bear interest, or the method of determining such rate or rates;

the date or dates from which such interest will accrue, the interest payment dates on which such interest will be payable or the manner of determination of such interest payment dates and the related record dates;

the right, if any, to extend the interest payment periods and the duration of that extension;

the manner of paying principal and interest and the place or places where principal and interest will be payable;

provisions for a sinking fund, purchase fund or other analogous fund, if any;

any redemption dates, prices, obligations and restrictions on the debt securities;

the currency, currencies or currency units in which the debt securities will be denominated and the currency, currencies or currency units in which principal and interest, if any, on the debt securities may be payable;

any conversion or exchange features of the debt securities;

whether and upon what terms the debt securities may be defeased;

any events of default or covenants in addition to or in lieu of those set forth in the indenture;

whether the debt securities will be issued in definitive or global form or in definitive form only upon satisfaction of certain conditions;

whether the debt securities will be guaranteed as to payment or performance;

any special tax implications of the debt securities; and

any other material terms of the debt securities.

When we refer to principal in this section with reference to the debt securities, we are also referring to premium, if any.

We may from time to time, without notice to or the consent of the holders of any series of debt securities, create and issue further debt securities of any such series ranking equally with the debt securities of such series in all respects (or in all respects other than (1) the payment of interest accruing prior to the issue date of such further debt securities or (2) the first payment of interest following the issue date of such further debt securities). Such further debt securities may be consolidated and form a single series with the debt securities of such series and have the same terms as to status, redemption or otherwise as the debt securities of such series.

A holder may present debt securities for exchange and may present debt securities for transfer in the manner, at the places and subject to the restrictions set forth in the debt securities and the applicable prospectus supplement. We will provide those services to the holders without charge, although the holder may have to pay any tax or other governmental charge payable in connection with any exchange or transfer, as set forth in the indenture.

Debt securities may bear interest at a fixed rate or a floating rate. Debt securities bearing no interest or interest at a rate that at the time of issuance is below the prevailing market rate (original issue discount securities) may be sold at a discount below their stated principal amount. U.S. federal income tax considerations applicable to any such discounted debt securities or to certain debt securities issued at par that are treated as having been issued at a discount for U.S. federal income tax purposes will be described in the applicable prospectus supplement.

Table of Contents

We may issue debt securities with the principal amount payable on any principal payment date, or the amount of interest payable on any interest payment date, to be determined by reference to one or more currency exchange rates, securities or baskets of securities, commodity prices or indices. The holder may receive a payment of principal on any principal payment date, or a payment of interest on any interest payment date, that is greater than or less than the amount of principal or interest otherwise payable on such dates, depending on the value on such dates of the applicable currency, security or basket of securities, commodity or index. Information as to the methods for determining the amount of principal or interest payable on any date, the currencies, securities or baskets of securities, commodities or indices to which the amount payable on such date is linked and certain related tax considerations will be set forth in the applicable prospectus supplement.

Certain Terms of the Senior Debt Securities

Covenants. Unless we indicate otherwise in a prospectus supplement, the senior debt securities will not contain any financial or restrictive covenants, including covenants restricting either us or any of our subsidiaries from incurring, issuing, assuming or guaranteeing any indebtedness secured by a lien on any of our or our subsidiaries' property or capital stock, or restricting either us or any of our subsidiaries from entering into sale and leaseback transactions.

Consolidation, Merger and Sale of Assets. Unless we indicate otherwise in a prospectus supplement, we may not consolidate with or merge into any other person in a transaction in which we are not the surviving corporation, or convey, transfer or lease our properties and assets substantially as an entirety to any person, in either case, unless:

the successor entity, if any, is a U.S. corporation, limited liability company, partnership or trust (subject to certain exceptions provided for in the senior indenture);

the successor entity assumes our obligations on the senior debt securities and under the senior indenture;

immediately after giving effect to the transaction, no default or event of default shall have occurred and be continuing; and

certain other conditions are met.

No Protection in the Event of a Change in Control. Unless we indicate otherwise in a prospectus supplement with respect to a particular series of senior debt securities, the senior debt securities will not contain any provisions that may afford holders of the senior debt securities protection in the event we have a change in control or in the event of a highly leveraged transaction (whether or not such transaction results in a change in control).

Events of Default. The following are events of default under the senior indenture for any series of senior debt securities:

failure to pay interest on any senior debt securities of such series when due and payable, if that default continues for a period of 90 days (or such other period as may be specified for such series);

failure to pay principal on the senior debt securities of such series when due and payable whether at maturity, upon redemption, by declaration or otherwise (and, if specified for such series, the continuance of such failure for a specified period);

default in the performance of or breach of any of our covenants or agreements in the senior indenture applicable to senior debt securities of such series, other than a covenant breach which is specifically dealt with elsewhere in the senior indenture, and that default or breach continues for a period of 90 days after we receive written notice from the trustee or from the holders of 25% or more in aggregate principal amount of the senior debt securities of such series;

Table of Contents

certain events of bankruptcy or insolvency, whether or not voluntary; and

any other event of default provided for in such series of senior debt securities as may be specified in the applicable prospectus supplement.

The default by us under any other debt, including any other series of debt securities, is not a default under the senior indenture.

If an event of default other than an event of default specified in the fourth bullet point immediately above occurs with respect to a series of senior debt securities and is continuing under the senior indenture, then, and in each such case, either the trustee or the holders of not less than 25% in aggregate principal amount of such series then outstanding under the senior indenture (each such series voting as a separate class) by written notice to us and to the trustee, if such notice is given by the holders, may, and the trustee at the request of such holders shall, declare the principal amount of and accrued interest on such series of senior debt securities to be immediately due and payable, and upon this declaration, the same shall become immediately due and payable.

If an event of default specified in the fourth bullet point immediately above occurs and is continuing, the entire principal amount of and accrued interest on each series of senior debt securities then outstanding shall become immediately due and payable.

Unless otherwise specified in the prospectus supplement relating to a series of senior debt securities originally issued at a discount, the amount due upon acceleration shall include only the original issue price of the senior debt securities, the amount of original issue discount accrued to the date of acceleration and accrued interest, if any.

Upon certain conditions, declarations of acceleration may be rescinded and annulled and past defaults may be waived by the holders of a majority in aggregate principal amount of all the senior debt securities of such series affected by the default, each series voting as a separate class. Furthermore, prior to a declaration of acceleration and subject to various provisions in the senior indenture, the holders of a majority in aggregate principal amount of a series of senior debt securities, by notice to the trustee, may waive an existing default or event of default with respect to such senior debt securities and its consequences, except a default in the payment of principal of or interest on such senior debt securities or in respect of a covenant or provision of the senior indenture which cannot be modified or amended without the consent of the holders of each such senior debt security. Upon any such waiver, such default shall cease to exist, and any event of default with respect to such senior debt securities shall be deemed to have been cured, for every purpose of the senior indenture; but no such waiver shall extend to any subsequent or other default or event of default or impair any right consequent thereto.

The holders of a majority in aggregate principal amount of a series of senior debt securities may direct the time, method and place of conducting any proceeding for any remedy available to the trustee or exercising any trust or power conferred on the trustee with respect to such senior debt securities. However, the trustee may refuse to follow any direction that conflicts with law or the senior indenture, that may involve the trustee in personal liability or that the trustee determines in good faith may be unduly prejudicial to the rights of holders of such series of senior debt securities not joining in the giving of such direction and may take any other action it deems proper that is not inconsistent with any such direction received from holders of such series of senior debt securities. A holder may not pursue any remedy with respect to the senior indenture or any series of senior debt securities unless:

the holder gives the trustee written notice of a continuing event of default;

the holders of at least 25% in aggregate principal amount of such series of senior debt securities make a written request to the trustee to pursue the remedy in respect of such event of default;

the requesting holder or holders offer the trustee indemnity satisfactory to the trustee against any costs, liability or expense;

Table of Contents

the trustee does not comply with the request within 60 days after receipt of the request and the offer of indemnity; and

during such 60-day period, the holders of a majority in aggregate principal amount of such series of senior debt securities do not give the trustee a direction that is inconsistent with the request.

These limitations, however, do not apply to the right of any holder of a senior debt security to receive payment of the principal of and interest on such senior debt security in accordance with the terms of such debt security, or to bring suit for the enforcement of any such payment in accordance with the terms of such debt security, on or after the due date for the senior debt securities, which right shall not be impaired or affected without the consent of the holder.

The senior indenture requires certain of our officers to certify, on or before a fixed date in each year in which any senior debt security is outstanding, as to their knowledge of our compliance with all covenants, agreements and conditions under the senior indenture.

Satisfaction and Discharge. We can satisfy and discharge our obligations to holders of any series of debt securities if:

we pay or cause to be paid, as and when due and payable, the principal of and any interest on all senior debt securities of such series outstanding under the senior indenture; or

all senior debt securities of such series have become due and payable or will become due and payable within one year (or are to be called for redemption within one year) and we deposit in trust a combination of cash and U.S. government or U.S. government agency obligations that will generate enough cash to make interest, principal and any other payments on the debt securities of that series on their various due dates.

Under current U.S. federal income tax law, the deposit and our legal release from the debt securities would be treated as though we took back the debt securities and gave the holder their share of the cash and debt securities or bonds deposited in trust. In that event, the holder could recognize gain or loss on the debt securities such holder gives back to us. Purchasers of the debt securities should consult their own advisers with respect to the tax consequences to them of such deposit and discharge, including the applicability and effect of tax laws other than the U.S. federal income tax law.

Defeasance. Unless the applicable prospectus supplement provides otherwise, the following discussion of legal defeasance and discharge and covenant defeasance will apply to any series of debt securities issued under the indentures.

Legal Defeasance. We can legally release ourselves from any payment or other obligations on the debt securities of any series (called legal defeasance) if certain conditions are met, including the following:

We deposit in trust for the benefit of all direct holders of the debt securities of the same series a combination of cash and U.S. government or U.S. government agency obligations that will generate enough cash to make interest, principal and any other payments on the debt securities of that series on their various due dates.

There is a change in current U.S. federal income tax law or an IRS ruling that lets us make the above deposit without causing the holder to be taxed on the debt securities any differently than if we did not make the deposit and instead repaid the debt securities ourselves when due. Under current U.S. federal income tax law, the deposit and our legal release from the debt securities would be treated as though we took back the debt securities and gave the holder their share of the cash and debt securities or bonds deposited in trust. In that event, the holder could recognize gain or loss on the debt securities such holder gives back to us.

Table of Contents

We deliver to the trustee a legal opinion of our counsel confirming the tax law change or ruling described above.

If we ever did accomplish legal defeasance, as described above, holders would have to rely solely on the trust deposit for repayment of the debt securities. The holders could not look to us for repayment in the event of any shortfall.

Covenant Defeasance. Without any change of current U.S. federal tax law, we can make the same type of deposit described above and be released from some of the covenants in the debt securities (called *covenant defeasance*). In that event, the holder would lose the protection of those covenants but would gain the protection of having money and securities set aside in trust to repay the debt securities. In order to achieve covenant defeasance, we must do the following (among other things):

We must deposit in trust for the benefit of all direct holders of the debt securities of the same series a combination of cash and U.S. government or U.S. government agency obligations that will generate enough cash to make interest, principal and any other payments on the debt securities of that series on their various due dates.

We must deliver to the trustee a legal opinion of our counsel confirming that under current U.S. federal income tax law we may make the above deposit without causing the holders to be taxed on the debt securities any differently than if we did not make the deposit and instead repaid the debt securities ourselves when due.

If we accomplish covenant defeasance, the holders can still look to us for repayment of the debt securities if there were a shortfall in the trust deposit. In fact, if one of the Events of Default occurred (such as our bankruptcy) and the debt securities become immediately due and payable, there may be such a shortfall. Depending on the events causing the default, the holders may not be able to obtain payment of the shortfall.

Modification and Waiver. We and the trustee may amend or supplement the senior indenture or the senior debt securities without the consent of any holder:

to convey, transfer, assign, mortgage or pledge any assets as security for the senior debt securities of one or more series;

to evidence the succession of a corporation, limited liability company, partnership or trust to us, and the assumption by such successor of our covenants, agreements and obligations under the senior indenture;

to add to our covenants such new covenants, restrictions, conditions or provisions for the protection of the holders, and to make the occurrence, or the occurrence and continuance, of a default in any such additional covenants, restrictions, conditions or provisions an event of default;

to cure any ambiguity, defect or inconsistency in the senior indenture or in any supplemental indenture or to conform the senior indenture or the senior debt securities to the description of senior debt securities of such

series set forth in this prospectus or any applicable prospectus supplement;

to provide for or add guarantors with respect to the senior debt securities of any series;

to establish the form or forms or terms of the senior debt securities as permitted by the senior indenture;

to evidence and provide for the acceptance of appointment under the senior indenture by a successor trustee, or to make such changes as shall be necessary to provide for or facilitate the administration of the trusts in the senior indenture by more than one trustee;

to add to, delete from or revise the conditions, limitations and restrictions on the authorized amount, terms, purposes of issue, authentication and delivery of any series of senior debt securities;

Table of Contents

to make any change to the senior debt securities of any series so long as no senior debt securities of such series are outstanding; or

to make any change that does not adversely affect the rights of any holder in any material respect.

Other amendments and modifications of the senior indenture or the senior debt securities issued may be made, and our compliance with any provision of the senior indenture with respect to any series of senior debt securities may be waived, with the consent of the holders of a majority of the aggregate principal amount of the outstanding senior debt securities of all series affected by the amendment or modification (voting together as a single class); provided, however, that each affected holder must consent to any modification, amendment or waiver that:

extends the final maturity of any senior debt securities of such series;

reduces the principal amount of on any senior debt securities of such series;

reduces the rate or extends the time of payment of interest on any senior debt securities of such series;

reduces the amount payable upon the redemption of any senior debt securities of such series;

changes the currency of payment of principal of or interest on any senior debt securities of such series;

reduces the principal amount of original issue discount securities payable upon acceleration of maturity or the amount provable in bankruptcy;

waives a default in the payment of principal of or interest on the senior debt securities;

changes the provisions relating to the waiver of past defaults or changes or impairs the right of holders to receive payment or to institute suit for the enforcement of any payment or conversion of any senior debt securities of such series on or after the due date therefor;

modifies any of the provisions of these restrictions on amendments and modifications, except to increase any required percentage or to provide that certain other provisions cannot be modified or waived without the consent of the holder of each senior debt security of such series affected by the modification; or

reduces the above-stated percentage of outstanding senior debt securities of such series whose holders must consent to a supplemental indenture or to modify or amend or to waive certain provisions of or defaults under the senior indenture.

It shall not be necessary for the holders to approve the particular form of any proposed amendment, supplement or waiver, but it shall be sufficient if the holders' consent approves the substance thereof. After an amendment, supplement or waiver of the senior indenture in accordance with the provisions described in this section becomes effective, the trustee must give to the holders affected thereby certain notice briefly describing the amendment, supplement or waiver. Any failure by the trustee to give such notice, or any defect therein, shall not, however, in any way impair or affect the validity of any such amendment, supplemental indenture or waiver.

No Personal Liability of Incorporators, Shareholders, Officers, Directors. The senior indenture provides that no recourse shall be had under any obligation, covenant or agreement of ours in the senior indenture or any supplemental indenture, or in any of the senior debt securities or because of the creation of any indebtedness represented thereby, against any of our incorporators, shareholders, officers or directors, past, present or future, or of any predecessor or successor entity thereof under any law, statute or constitutional provision or by the enforcement of any assessment or by any legal or equitable proceeding or otherwise. Each holder, by accepting the senior debt securities, waives and releases all such liability.

Concerning the Trustee. The senior indenture provides that, except during the continuance of an event of default, the trustee will not be liable except for the performance of such duties as are specifically set forth in the

Table of Contents

senior indenture. If an event of default has occurred and is continuing, the trustee will exercise such rights and powers vested in it under the senior indenture and will use the same degree of care and skill in its exercise as a prudent person would exercise under the circumstances in the conduct of such person's own affairs.

The senior indenture and the provisions of the Trust Indenture Act of 1939 incorporated by reference therein contain limitations on the rights of the trustee thereunder, should it become a creditor of ours or any of our subsidiaries, to obtain payment of claims in certain cases or to realize on certain property received by it in respect of any such claims, as security or otherwise. The trustee is permitted to engage in other transactions, provided that if it acquires any conflicting interest (as defined in the Trust Indenture Act), it must eliminate such conflict or resign.

We may have normal banking relationships with the senior trustee in the ordinary course of business.

Unclaimed Funds. All funds deposited with the trustee or any paying agent for the payment of principal, premium, interest or additional amounts in respect of the senior debt securities that remain unclaimed for two years after the date upon which such principal, premium or interest became due and payable will be repaid to us. Thereafter, any right of any holder of senior debt securities to such funds shall be enforceable only against us, and the trustee and paying agents will have no liability therefor.

Governing Law. The senior indenture and the senior debt securities will be governed by, and construed in accordance with, the internal laws of the State of New York.

Certain Terms of the Subordinated Debt Securities

Other than the terms of the subordinated indenture and subordinated debt securities relating to subordination or otherwise as described in the prospectus supplement relating to a particular series of subordinated debt securities, the terms of the subordinated indenture and subordinated debt securities are identical in all material respects to the terms of the senior indenture and senior debt securities.

Additional or different subordination terms may be specified in the prospectus supplement applicable to a particular series.

Subordination. The indebtedness evidenced by the subordinated debt securities is subordinate to the prior payment in full of all of our senior indebtedness, as defined in the subordinated indenture.

During the continuance beyond any applicable grace period of any default in the payment of principal, premium, interest or any other payment due on any of our senior indebtedness, we may not make any payment of principal or interest on the subordinated debt securities (except for certain sinking fund payments). In addition, upon any payment or distribution of our assets upon any dissolution, winding-up, liquidation or reorganization, the payment of the principal of and interest on the subordinated debt securities will be subordinated to the extent provided in the subordinated indenture in right of payment to the prior payment in full of all our senior indebtedness. Because of this subordination, if we dissolve or otherwise liquidate, holders of our subordinated debt securities may receive less, ratably, than holders of our senior indebtedness. The subordination provisions do not prevent the occurrence of an event of default under the subordinated indenture.

The term "senior indebtedness" of a person means with respect to such person the principal of, premium, if any, interest on, and any other payment due pursuant to any of the following, whether outstanding on the date of the subordinated indenture or incurred by that person in the future:

all of the indebtedness of that person for money borrowed;

all of the indebtedness of that person evidenced by notes, debentures, bonds or other securities sold by that person for money;

Table of Contents

all of the lease obligations that are capitalized on the books of that person in accordance with generally accepted accounting principles;

all indebtedness of others of the kinds described in the first two bullet points immediately above and all lease obligations of others of the kind described in the third bullet point immediately above that the person, in any manner, assumes or guarantees or that the person in effect guarantees through an agreement to purchase, whether that agreement is contingent or otherwise; and

all renewals, extensions or refundings of indebtedness of the kinds described in the first, second or fourth bullet points immediately above and all renewals or extensions of leases of the kinds described in the third or fourth bullet points immediately above;

unless, in the case of any particular indebtedness, renewal, extension or refunding, the instrument creating or evidencing it or the assumption or guarantee relating to it expressly provides that such indebtedness, renewal, extension or refunding is not superior in right of payment to the subordinated debt securities. Our senior debt securities constitute senior indebtedness for purposes of the subordinated debt indenture.

Table of Contents

DESCRIPTION OF CAPITAL STOCK

The following description summarizes information about our capital stock. This information does not purport to be complete and is subject to, and qualified in its entirety by reference to, the terms of our amended and restated articles of incorporation and amended and restated bylaws, which are included as exhibits to the registration statement of which this prospectus forms a part, and the applicable provisions of Virginia law, the state in which we are incorporated.

As of August 31, 2014, our authorized capital stock consisted of 200,000,000 shares of common stock, no par value per share, and 25,000,000 shares of preferred stock, no par value per share.

As of August 31, 2014, there were 100,500,079 shares of common stock outstanding and held of record by approximately 187 shareholders. The actual number of shareholders is greater than this number of record holders and includes shareholders who are beneficial owners but whose shares are held in street name by brokers and other nominees. This number of holders of record also does not include shareholders whose shares may be held in trust by other entities. All outstanding shares of common stock are fully paid and nonassessable. There are no shares of preferred stock outstanding.

Common Stock

Shares of our common stock have the following rights, preferences and privileges:

Voting rights

Each outstanding share of common stock is entitled to one vote on all matters submitted to a vote of our shareholders, including the election of directors. Holders of our common stock do not have cumulative voting rights in the election of directors, and therefore the holders of a plurality of the shares of common stock voting for the election of directors may elect all of our directors standing for election.

Dividends

Holders of common stock are entitled to receive dividends if and when dividends are declared by our board of directors out of assets legally available for the payment of dividends, subject to preferential rights of outstanding shares of preferred stock, if any.

Liquidation

In the event of a liquidation, dissolution or winding up of the affairs of our Company, whether voluntary or involuntary, after payment of our debts and other liabilities and making provision for the holders of outstanding shares of preferred stock, if any, we will distribute the remainder of our assets ratably among the holders of shares of common stock.

Rights and preferences

The common stock has no preemptive, redemption, conversion or subscription rights. The rights, powers, preferences and privileges of holders of common stock are subject to, and may be impaired by, the rights of the holders of shares of any series of preferred stock that we may designate and issue in the future.

Stock options

As of August 31, 2014, options to purchase 8,479,905 shares of our common stock were outstanding, of which options to purchase 1,251,419 shares of our common stock were exercisable.

Table of Contents

Warrants

As of August 31, 2014, we had outstanding warrants to purchase shares of our common stock that will be exercisable for an aggregate of 373,102 shares of our common stock. Each of these warrants was and remains exercisable in full.

Registration Rights

We have entered into an investors' rights agreement with certain of our shareholders who will have the right to require us to register their shares under the Securities Act under specified circumstances and will have incidental registration rights as described below. After registration pursuant to these rights, these shares will become freely tradable without restriction under the Securities Act.

Certain holders who were issued shares of our common stock upon the consummation of our acquisition of Trans Ova Genetics, L.C. will have the right to require us to register these shares under the Securities Act under specified circumstances. After registration pursuant to these rights, these shares will become freely tradable without restriction under the Securities Act.

Demand registration rights

Certain holders, or Demand Holders, have demand registration rights. Beginning on February 4, 2014, subject to specified limitations set forth in the investor rights agreement, at any time the Demand Holders who are holders of at least 75 percent of the then-outstanding registrable securities, as defined in the investor rights agreement, of all Demand Holders as a class, acting together, may demand in writing that we register their registrable securities under the Securities Act. We are not obligated to file a registration statement pursuant to this demand provision on more than two occasions, subject to specified exceptions.

In addition, subject to specified limitations, the holders of registrable securities may demand in writing that we register on Form S-3 the registrable securities held by them so long as the total amount of registrable securities being registered has an aggregate offering price of at least \$500,000. We are not obligated to file a Form S-3 pursuant to this provision within 12 months of the effective date of any other Form S-3 registration statement that we may file.

In addition, certain holders who entered into securities purchase agreements with us on March 26, 2014, or March 2014 Investors, have demand registration rights. Any March 2014 Investor who purchased at least \$10.0 million of our common stock in the March 2014 private placement has the right to require us to register such shares of our common stock on a registration statement on Form S-3, if available for use.

Incidental registration rights

If we propose to file a registration statement to register any of our securities under the Securities Act for our own account, other than pursuant to a Form S-4 or Form S-8, the holders of our registrable securities are entitled to notice of registration and, subject to specified exceptions, we will be required to register the registrable securities then held by them that they request that we register. The holders of these registrable securities may be deemed to have such rights with respect to offerings under any prospectus supplement.

Expenses

Pursuant to the investor rights agreement, we are required to pay all registration expenses, including all registration, filing and qualification fees, printers' and accounting fees, fees and expenses incurred in connection with complying

with state securities or blue sky laws, fees and expenses of listing registrable securities on any securities exchange on which shares of our common stock are then listed, fees and disbursements of our counsel,

Table of Contents

but excluding any underwriting discounts and commissions, related to any demand or incidental registration. The investor rights agreement contains customary cross-indemnification provisions, pursuant to which we are obligated to indemnify the selling shareholders in the event of material misstatements or omissions in the registration statement attributable to us, and they are obligated to indemnify us for material misstatements or omissions in the registration statement attributable to them.

Preferred Stock

As of August 31, 2014, we have no shares of preferred stock issued or outstanding. Our amended and restated articles of incorporation authorize our board to designate and issue from time to time one or more series of preferred stock without shareholder approval. Our board may fix and determine the preferences, limitations and relative rights of each series of preferred stock issued. Because our board has the power to establish the preferences and rights of each series of preferred stock, it may afford the holders of any series of preferred stock preferences and rights, voting or otherwise, senior to the rights of holders of our common stock. It is not possible to state the actual effect of the issuance of any shares of preferred stock upon the rights of holders of common stock until our board determines the specific rights of the holders of preferred stock. However, the effects might include:

restricting dividends on our common stock;

diluting the voting power of our common stock;

impairing liquidation rights of our common stock; or

delaying or preventing a change in control of us without further action by our shareholders.

We have no present plans to issue any shares of preferred stock.

Anti-takeover Effects of Provisions of our Charter and Bylaws and of Virginia Law

Our amended and restated articles of incorporation, bylaws and Virginia law contain provisions that may have the effect of impeding the acquisition of control of us by means of a tender offer, a proxy contest, open market purchases or otherwise in a transaction not approved by our board of directors. These provisions are designed to reduce, or have the effect of reducing, our vulnerability to coercive takeover practices and inadequate takeover bids. The existence of these provisions could limit the price that investors might otherwise pay in the future for shares of common stock. In addition, these provisions make it more difficult for our shareholders to remove our board of directors or management, should they choose to do so.

Articles of Incorporation and Bylaws

Preferred stock

Our amended and restated articles of incorporation authorize our board to establish one or more series of preferred stock and to determine, with respect to any series of preferred stock, the preferences, rights and other terms of such series. See Preferred stock above for additional information. Under this authority, our board could create and issue a

series of preferred stock with rights, preferences or restrictions that have the effect of discriminating against an existing or prospective holder of our capital stock as a result of such holder beneficially owning or commencing a tender offer for a substantial amount of our common stock. One of the effects of authorized but unissued and unreserved shares of preferred stock may be to render it more difficult for, or to discourage an attempt by, a potential acquiror to obtain control of us by means of a merger, tender offer, proxy contest or otherwise, and thereby protect the continuity of our management. The issuance of shares of preferred stock may have the effect of delaying, deferring or preventing a change in control of our Company without any action by our shareholders.

Table of Contents

Qualification and election of directors

Our bylaws provide that to be eligible to be a nominee for election to our board of directors, a person must submit a written questionnaire regarding his or her background and qualifications and must agree to other representations as set forth in our bylaws. In addition, we have adopted a director resignation policy. The director resignation policy is incorporated into our bylaws and Corporate Governance Guidelines and provides that any nominee for director in an uncontested election who receives a greater number of votes withheld from his or her election than votes for his or her election must tender his or her resignation to the board of directors for consideration in accordance with the procedures set forth in our Corporate Governance Guidelines. The Nominating and Governance Committee will then evaluate the best interests of us and our shareholders and will recommend to the board of directors the action to be taken with respect to the tendered resignation. Following the board of directors' determination, we will promptly publicly disclose the board of directors' decision of whether or not to accept the resignation and an explanation of how the decision was reached, including, if applicable, the reasons for rejecting the resignation.

Board vacancies; removal

Our amended and restated articles of incorporation provide that any vacancy occurring on our board of directors may be filled by a majority of directors then in office, even if less than a quorum.

Special meetings of shareholder

Our bylaws provide that the vote of 25 percent of shareholders is required to call a special meeting, and that shareholders may only conduct business at special meetings of shareholders that was specified in the notice of the meeting.

Advance notification of shareholder nominations and proposals

Our amended and restated bylaws establish advance notice procedures with respect to shareholder proposals and the nomination of persons for election as directors, other than nominations made by or at the direction of our board.

Virginia Anti-takeover Statutes

Affiliated transactions statute

Virginia law contains provisions governing affiliated transactions. In general, these provisions prohibit a Virginia corporation from engaging in affiliated transactions with any holder of more than 10 percent of any class of its outstanding voting shares, or an interested shareholder, for a period of three years following the date that such person became an interested shareholder unless:

a majority of (but not fewer than two) disinterested directors of the corporation and the holders of two-thirds of the voting shares, other than the shares beneficially owned by the interested shareholder, approve the affiliated transaction; or

before or on the date the person became an interested shareholder, a majority of disinterested directors approved the transaction that resulted in the shareholder becoming an interested shareholder.

Affiliated transactions subject to this approval requirement include mergers, share exchanges, material dispositions of corporate assets not in the ordinary course of business, any dissolution of the corporation proposed by or on behalf of an interested shareholder or any reclassification, including reverse stock splits, recapitalizations or mergers of the corporation with its subsidiaries, which increases the percentage of voting shares owned beneficially by an interested shareholder by more than five percent.

Table of Contents

Virginia law permits a corporation to exempt itself from this statutory provision by placing a statement to that effect in its articles of incorporation. Our amended and restated articles of incorporation do not specifically address the Virginia statute regarding affiliated transactions; therefore, we are subject to this provision.

Control share acquisitions statute

Virginia law also contains provisions relating to control share acquisitions, which are transactions causing the voting strength of any person acquiring beneficial ownership of shares of a Virginia public corporation to meet or exceed certain threshold percentages (20 percent, 33¹/₃ percent or 50 percent) of the total votes entitled to be cast for the election of directors. Shares acquired in a control share acquisition have no voting rights unless:

the voting rights are granted by a majority vote of all outstanding shares other than those held by the acquiring person or any officer or employee director of the corporation; or

the articles of incorporation or bylaws of the corporation provide that these Virginia law provisions do not apply to acquisitions of its shares.

The acquiring person may require that a special meeting of the shareholders be held within 50 days of the acquiring person's request to consider the grant of voting rights to the shares acquired in the control share acquisition. If voting rights are not granted and the corporation's articles of incorporation or bylaws permit, the acquiring person's shares may be repurchased by the corporation, at its option, at a price per share equal to the acquiring person's cost. Virginia law grants dissenters' rights to any shareholder who objects to a control share acquisition that is approved by a vote of disinterested shareholders and that gives the acquiring person control of a majority of the corporation's voting shares.

Our amended and restated articles of incorporation provide that this second statutory provision does not apply to our Company; therefore, we are not subject to this provision.

Indemnification and Limitation of Directors and Officers Liability

The Virginia Stock Corporation Act and our articles of incorporation provide for indemnification of our directors and officers in a variety of circumstances, which may include liabilities under the Securities Act. Virginia law provides that, unless limited by its articles of incorporation, a corporation must indemnify a director or officer who entirely prevails in the defense of any proceeding to which he was a party because he is or was a director or officer of the corporation against reasonable expenses incurred by him in connection with the proceeding. Virginia law permits a corporation to indemnify, after a determination has been made that indemnification of the director is permissible in the circumstances because he has met the following standard of conduct, an individual made a party to a proceeding because he is or was a director against liability incurred in the proceeding if:

he conducted himself in good faith;

he believed in the case of conduct in his official capacity with the corporation, that his conduct was in its best interests and in all other cases that his conduct was at least not opposed to its best interests; and

in the case of any criminal proceeding, he had no reasonable cause to believe his conduct was unlawful. A Virginia corporation may not indemnify a director in connection with a proceeding by or in the right of the corporation in which the director was adjudged liable to the corporation or in connection with any other proceeding charging improper personal benefit to him, whether or not involving action in his official capacity, in which he was adjudged liable on the basis that personal benefit was improperly received by him, unless in either case a court orders indemnification and then only for expenses. In addition, the Virginia Stock Corporation Act permits a corporation to advance reasonable expenses to a director or officer upon the corporation's receipt of:

a written affirmation by the director or officer of his good faith belief that he has met the standard of conduct necessary for indemnification by the company; and

Table of Contents

a written undertaking by the director or on the director's behalf to repay the amount paid or reimbursed by the corporation if it is ultimately determined that the director is not entitled to indemnification and did not meet the relevant standard of conduct.

In addition, Virginia law permits a corporation to make any further indemnity, including indemnity with respect to a proceeding by or in the right of the corporation, and to make additional provision for advances and reimbursement of expenses, to any director or officer that may be authorized by the articles of incorporation or any bylaw made by the shareholders or any resolution adopted by the shareholders, except an indemnity against his willful misconduct or a knowing violation of the criminal law.

In addition, the Virginia Stock Corporation Act permits a Virginia corporation to limit the personal liability of an officer or director in any proceeding brought by or in the name of the corporation or its shareholders, except if the director or officer engaged in willful misconduct or a knowing violation of the criminal law or any federal or state securities laws, including insider trading or market manipulation.

Our articles of incorporation require indemnification of directors and officers with respect to certain liabilities, expenses, and other amounts imposed on them by reason of having been a director or officer, except in the case of willful misconduct or a knowing violation of criminal law. Our articles of incorporation also limit the liability of our officers and directors to the extent not prohibited by Virginia law. We also carry insurance on behalf of directors, officers, employees or agents which may cover liabilities under the Securities Act.

Insofar as the foregoing provisions permit indemnification of directors, officers or persons controlling us for liability arising under the Securities Act, we have been informed that in the opinion of the SEC, this indemnification is against public policy as expressed in the Securities Act and is therefore unenforceable.

Listing on the New York Stock Exchange

Our common stock is listed on the New York Stock Exchange under the symbol XON.

Authorized but Unissued Shares

The authorized but unissued shares of common stock and preferred stock are available for future issuance without shareholder approval, subject to any limitations imposed by the New York Stock Exchange listing rules. These additional shares may be used for a variety of corporate finance transactions, acquisitions and employee benefit plans. The existence of authorized but unissued and unreserved common stock and preferred stock could make it more difficult or discourage an attempt to obtain control of us by means of a proxy contest, tender offer, merger or otherwise.

Transfer Agent and Registrar

The transfer agent and registrar for the common stock is American Stock Transfer & Trust Company, LLC.

Table of Contents

DESCRIPTION OF WARRANTS

We may issue warrants to purchase debt securities, preferred stock, common stock or other securities. We may issue warrants independently or together with other securities. Warrants sold with other securities may be attached to or separate from the other securities. We will issue warrants under one or more warrant agreements between us and a warrant agent that we will name in the applicable prospectus supplement. The warrant agent will act solely as our agent in connection with the warrants and will not assume any obligation or relationship of agency or trust for or with any holders or beneficial owners of warrants. Further terms of the warrants and the applicable warrant agreements will be set forth in the applicable prospectus supplement.

The prospectus supplement relating to any warrants we offer will include specific terms relating to the offering. These terms will include some or all of the following:

the title of the warrants;

the aggregate number of warrants offered;

the designation, number and terms of the debt securities, preferred stock, common stock or other securities purchasable upon exercise of the warrants and procedures by which those numbers may be adjusted;

the exercise price of the warrants;

the dates or periods during which the warrants are exercisable;

the designation and terms of any securities with which the warrants are issued;

if the warrants are issued as a unit with another security, the date on and after which the warrants and the other security will be separately transferable;

if the exercise price is not payable in United States dollars, the foreign currency, currency unit or composite currency in which the exercise price is denominated;

any minimum or maximum amount of warrants that may be exercised at any one time;

any terms relating to the modification of the warrants;

any terms, procedures and limitations relating to the transferability, exchange or exercise of the warrants;
and

any other specific terms of the warrants.

We and the warrant agent may amend or supplement the warrant agreement for a series of warrants without the consent of the holders of the warrants issued thereunder to effect changes that are not inconsistent with the provisions of the warrants and that do not materially and adversely affect the interests of the holders of the warrants.

The description in the applicable prospectus supplement of any warrants that we may offer will not necessarily be complete and will be qualified in its entirety by reference to the applicable warrant agreement, which will be filed with the SEC.

Table of Contents

DESCRIPTION OF RIGHTS

We may issue rights to purchase debt securities, preferred stock, common stock or other securities. These rights may be issued independently or together with any other security offered hereby and may or may not be transferable by the shareholder receiving the rights in such offering. The applicable prospectus supplement may add, update or change the terms and conditions of the rights as described in this prospectus.

The applicable prospectus supplement will describe the specific terms of any offering of rights for which this prospectus is being delivered, including the following:

the price, if any, per right;

the exercise price payable for debt securities, preferred stock, common stock, or other securities upon the exercise of the rights;

the number of rights issued or to be issued to each shareholder;

the number and terms of debt securities, preferred stock, common stock, or other securities which may be purchased per right;

the extent to which the rights are transferable;

any other terms of the rights, including the terms, procedures and limitations relating to the exchange and exercise of the rights;

the date on which the holder's ability to exercise the rights shall commence, and the date on which the rights shall expire;

the extent to which the rights may include an over-subscription privilege with respect to unsubscribed securities; and

if applicable, the material terms of any standby underwriting or purchase arrangement entered into by us in connection with the offering of such rights.

Holders may exercise rights as described in the applicable prospectus supplement. Upon receipt of payment and the rights certificate properly completed and duly executed at the corporate trust office of the rights agent or any other office indicated in the prospectus supplement, we will, as soon as practicable, forward the applicable securities purchased upon exercise of the rights. If less than all of the rights issued in any rights offering are exercised, we may offer any unsubscribed securities directly to persons other than shareholders, to or through agents, underwriters or

dealers or through a combination of such methods, including pursuant to standby arrangements with one or more underwriters or other purchasers, pursuant to which the underwriters or other purchasers may be required to purchase any securities remaining unsubscribed for after such offering, as described in the applicable prospectus supplement.

The description in the applicable prospectus supplement of any rights that we may offer will not necessarily be complete and will be qualified in its entirety by reference to the applicable rights certificate, which will be filed with the SEC.

Table of Contents

DESCRIPTION OF STOCK PURCHASE CONTRACTS AND STOCK PURCHASE UNITS

We may issue stock purchase contracts, including contracts obligating holders to purchase from or sell to us, and obligating us to sell to or purchase from the holders, a specified number of shares of common stock, preferred stock or other securities at a future date or dates, which we refer to in this prospectus as stock purchase contracts. The price per share of the securities and the number of shares of the securities may be fixed at the time the stock purchase contracts are issued or may be determined by reference to a specific formula set forth in the stock purchase contracts, and may be subject to adjustment under anti-dilution formulas. The stock purchase contracts may be issued separately or as part of units consisting of a stock purchase contract and our debt securities, shares of our common stock or preferred stock, or preferred securities or debt obligations of third parties, including U.S. Treasury securities, any other securities described in the applicable prospectus supplement, or any combination of the foregoing, securing the holder's obligations to purchase shares of our common stock or preferred stock under the stock purchase contracts, which we refer to herein as stock purchase units. The stock purchase units may require holders to secure their obligations under the stock purchase contracts in a specified manner. The stock purchase units also may require us to make periodic payments to the holders of the stock purchase contracts or the stock purchase units, as the case may be, or vice versa, and those payments may be unsecured or pre-funded on some basis.

The applicable prospectus supplement will describe the terms of the stock purchase contracts or stock purchase units. This description is not complete and the description in the prospectus supplement will not necessarily be complete, and reference is made to the stock purchase contracts, and, if applicable, collateral or depositary arrangements relating to the stock purchase contracts or stock purchase units, which will be filed with the SEC each time we issue stock purchase contracts or stock purchase units. If any particular terms of the stock purchase contracts or stock purchase units described in the prospectus supplement differ from any of the terms described herein, then the terms described herein will be deemed superseded by that prospectus supplement. Material United States federal income tax considerations applicable to the stock purchase units and the stock purchase contracts will also be discussed in the applicable prospectus supplement.

Table of Contents

SELLING SECURITYHOLDERS

Selling securityholders are persons or entities that, directly or indirectly, have acquired or will from time to time acquire from us our securities. Such selling securityholders may be parties to registration rights agreements with us, or we otherwise may have agreed or will agree to register their securities for resale. The initial purchasers of our securities, as well as their transferees, pledges, donees or successors, all of whom we refer to as selling securityholders, may from time to time offer and sell our securities pursuant to this prospectus and any applicable prospectus supplement.

The applicable prospectus supplement or post-effective amendment, or in filings we make with the SEC under the Exchange Act that are incorporated by reference to such registration statement, will set forth the name of each of the selling securityholders and the number of securities beneficially owned by such selling securityholder that are covered by such prospectus supplement. The applicable prospectus supplement will also disclose whether any of the selling securityholders has held any position or office with, has been employed by, or otherwise has had a material relationship with us during the three years prior to the date of the applicable prospectus supplement.

Table of Contents

PLAN OF DISTRIBUTION

We and/or any selling securityholder may sell our securities from time to time in one or more transactions. We and/or any selling securityholder may sell our securities to or through agents, underwriters, dealers, remarketing firms or other third parties or directly to one or more purchasers or through a combination of any of these methods. In some cases, we and/or any selling securityholder or dealers acting with us and/or any selling securityholder or on behalf of us and/or any selling securityholder may also purchase our securities and reoffer them to the public. We and/or any selling securityholder may also offer and sell, or agree to deliver, our securities pursuant to, or in connection with, any option agreement or other contractual arrangement. The securities may or may not be listed on a national securities exchange.

Agents whom we designate may solicit offers to purchase our securities.

We and/or any selling securityholder will name any agent involved in offering or selling our securities, and disclose any commissions that we will pay to the agent, in the applicable prospectus supplement.

Unless we and/or any selling securityholder indicate otherwise in the applicable prospectus supplement, agents will act on a best efforts basis for the period of their appointment.

Agents may be deemed to be underwriters under the Securities Act, of any of our securities that they offer or sell.

We and/or any selling securityholder may use an underwriter or underwriters in the offer or sale of our securities.

If we and/or any selling securityholder use an underwriter or underwriters, we will execute an underwriting agreement with the underwriter or underwriters at the time that we reach an agreement for the sale of our securities.

We and/or any selling securityholder will include the names of the specific managing underwriter or underwriters, as well as the names of any other underwriters, and the terms of the transactions, including the compensation the underwriters and dealers will receive, in the applicable prospectus supplement.

The underwriters will use the applicable prospectus supplement, together with the prospectus, to sell our securities.

We may use a dealer to sell our securities.

If we and/or any selling securityholder use a dealer, we will sell our securities to the dealer, as principal.

The dealer will then sell our securities to the public at varying prices that the dealer will determine at the time it sells our securities.

We and/or any selling securityholder will include the name of the dealer and the terms of the transactions with the dealer in the applicable prospectus supplement.

We and/or any selling securityholder may solicit directly offers to purchase our securities, and we may directly sell our securities to institutional or other investors. We and/or any selling securityholder will describe the terms of direct sales in the applicable prospectus supplement.

We and/or any selling securityholder may engage in at-the-market offerings into an existing trading market in accordance with Rule 415(a)(4) of the Securities Act.

We and/or any selling securityholder will indemnify agents, underwriters and dealers against certain liabilities, including liabilities under the Securities Act. Agents, underwriters and dealers, or their affiliates, may be customers of, engage in transactions with or perform services for us or our respective affiliates in the ordinary course of business.

Table of Contents

We and/or any selling securityholder may authorize agents and underwriters to solicit offers by certain institutions to purchase our securities the public offering price under delayed delivery contracts.

If we and/or any selling securityholder use delayed delivery contracts, we will disclose that we are using them in the prospectus supplement and will tell you when we will demand payment and when delivery of our securities will be made under the delayed delivery contracts.

These delayed delivery contracts will be subject only to the conditions that we describe in the prospectus supplement.

We and/or any selling securityholder will describe in the applicable prospectus supplement the commission that underwriters and agents soliciting purchases of our securities under delayed delivery contracts will be entitled to receive.

Unless otherwise specified in connection with a particular underwritten offering of our securities, the underwriters will not be obligated to purchase offered securities unless specified conditions are satisfied, and if the underwriters do purchase any offered securities, they will purchase all offered securities.

In connection with underwritten offerings of the offered securities and in accordance with applicable law and industry practice, the underwriters in certain circumstances are permitted to engage in certain transactions that stabilize the price of our securities. Such transactions consist of bids or purchases for the purpose of pegging, fixing or maintaining the price of our securities. If the underwriters create a short position in our securities in connection with the offering (*i.e.*, if they sell more securities than are set forth on the cover page of the applicable prospectus supplement), the underwriters may reduce that short position by purchasing our securities in the open market or as otherwise provided in the applicable prospectus supplement. The underwriters may also impose a penalty bid, whereby selling concessions allowed to dealers participating in the offering may be reclaimed if the securities sold by them are repurchased in connection with stabilization transactions. In general, purchases of a security for the purpose of stabilization or to reduce a short position could cause the price of the security to be higher than it might be in the absence of such purchases. The imposition of a penalty bid might also have an effect on the price of our securities to the extent that it were to discourage resales of our securities. The underwriters are not required to engage in these activities and may end any of these activities at any time.

We and/or any selling securityholder may effect sales of securities in connection with forward sale, option or other types of agreements with third parties. Any distribution of securities pursuant to any forward sale agreement may be effected from time to time in one or more transactions that may take place through a stock exchange, including block trades or ordinary broker's transactions, or through broker-dealers acting either as principal or agent, or through privately-negotiated transactions, or through an underwritten public offering, or through a combination of any such methods of sale, at market prices prevailing at the time of sale, prices relating to such prevailing market prices or at negotiated or fixed prices.

The specific terms of the lock-up provisions, if any, in respect of any given offering will be described in the applicable prospectus supplement.

In compliance with the guidelines of the Financial Industry Regulatory Authority, or FINRA, as of the date of this prospectus, the maximum consideration or discount to be received by any FINRA member or independent broker

dealer may not exceed 8.0% of the aggregate amount of the securities offered by this prospectus.

Table of Contents

LEGAL MATTERS

The validity of the securities being offered by this prospectus will be passed upon by Troutman Sanders LLP, Richmond, Virginia.

EXPERTS

The consolidated financial statements of Intrexon Corporation incorporated in this prospectus by reference to the Annual Report on Form 10-K for the year ended December 31, 2013, have been so incorporated in reliance upon the report of PricewaterhouseCoopers LLP, an independent registered public accounting firm, given upon the authority of said firm as experts in auditing and accounting.

The financial statements of ZIOPHARM Oncology, Inc. as of and for the years ended December 31, 2013 and 2012 incorporated in this Prospectus by reference to the Annual Report on Form 10-K for the year ended December 31, 2013, have been audited by McGladrey LLP, an independent registered public accounting firm, as stated in their report incorporated by reference herein, and have been so incorporated in reliance upon such reports and upon the authority of such firm as experts in accounting and auditing.

Table of Contents

Shares

Common Stock

JMP Securities

Stifel