TRANSGENOMIC INC
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PROSPECTUS

Transgenomic, Inc.

1,105,394 Shares of Common Stock

This prospectus relates to the resale by the investors listed in the section of this prospectus entitled “Selling Stockholders”, or the Selling Stockholders, of up to 1,105,394 shares of our common stock, par value $0.01 per share, or the Common Stock. The 1,105,394 shares of Common Stock consist of: (i) up to 730,776 shares of Common Stock, or the Common Shares, and (ii) up to 374,618 shares of Common Stock issuable upon exercise of outstanding warrants, or the Warrants. The Warrants are exercisable for the period from April 22, 2015 through April 22, 2020 and have an exercise price of $4.00 per share of Common Stock. We issued the Common Shares and the Warrants in connection with a private placement offering in October 2014. We are registering the resale of the Common Shares and the shares of Common Stock underlying the Warrants, or the Warrant Shares, as required by the Securities Purchase Agreement we entered into with the Selling Stockholders on October 22, 2014. The Common Shares and the Warrant Shares are sometimes referred to in this prospectus, together, as the Securities.

Our registration of the Securities covered by this prospectus does not mean that the Selling Stockholders will offer or sell any of the Securities. The Selling Stockholders may sell the Securities covered by this prospectus in a number of different ways and at varying prices. For additional information on the possible methods of sale that may be used by the Selling Stockholders, you should refer to the section of this prospectus entitled “Plan of Distribution” on page 7 of this prospectus. We will not receive any of the proceeds from the Securities sold by the Selling Stockholders, other than any proceeds from the cash exercise of Warrants to purchase shares of our Common Stock.

No underwriter or other person has been engaged to facilitate the sale of the Securities in this offering. The Selling Stockholders may be deemed underwriters of the Securities that they are offering. We will bear all costs, expenses and fees in connection with the registration of the Securities. The Selling Stockholders will bear all commissions and discounts, if any, attributable to their respective sales of the Securities.

You should read this prospectus, any applicable prospectus supplement and any related free writing prospectus carefully before you invest.

Investing in our Common Stock involves a high degree of risk. You should review carefully the risks and uncertainties described under the heading "Risk Factors" contained in this prospectus, any applicable prospectus supplement and in any applicable free writing prospectuses, and under similar headings in the documents that are incorporated by reference into this prospectus.

Our Common Stock is currently listed on the NASDAQ Capital Market under the symbol "TBIO". On December 15, 2014, the last reported sales price for our Common Stock was $1.60 per share.

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 December 16, 2014.

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ABOUT THIS PROSPECTUS

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

The Selling Stockholders are offering the Common Stock only in jurisdictions where such issuances are permitted. The distribution of this prospectus and the issuance of the Common Stock in certain jurisdictions may be restricted by law. Persons outside the United States who come into possession of this prospectus must inform themselves about, and observe any restrictions relating to, the issuance of the Common Stock and the distribution of this prospectus outside the United States. This prospectus does not constitute, and may not be used in connection with, an offer to sell, or a solicitation of an offer to buy, the Common Stock offered by this prospectus by any person in any jurisdiction in which it is unlawful for such person to make such an offer or solicitation.

This prospectus is part of a registration statement that we filed with the Securities and Exchange Commission, or the SEC, under which the Selling Stockholders may offer from time to time up to an aggregate of 1,105,394 shares of our Common Stock in one or more offerings. If required, each time a Selling Stockholder offers Common Stock, in addition to this prospectus, we will provide you with a prospectus supplement that will contain specific information about the terms of that offering. We may also authorize one or more free writing prospectuses to be provided to you that may contain material information relating to that offering. We may also use a prospectus supplement and any related free writing prospectus to add, update or change any of the information contained in this prospectus or in documents we have incorporated by reference. This prospectus, together with any applicable prospectus supplements, any related free writing prospectus and the documents incorporated by reference into this prospectus, includes all material information relating to this offering. To the extent that any statement that we make in a prospectus supplement is inconsistent with statements made in this prospectus, the statements made in this prospectus will be deemed modified or superseded by those made in a prospectus supplement. Please carefully read both this prospectus and any prospectus supplement together with the additional information described below under “Important Information Incorporated by Reference”.

SUMMARY

This summary highlights selected information contained elsewhere in this prospectus or incorporated by reference in this prospectus, and does not contain all of the information that you need to consider in making your investment decision. You should carefully read the entire prospectus, any applicable prospectus supplement and any related free writing prospectus, including the risks of investing in our Common Stock discussed under the heading "Risk Factors" contained in any applicable prospectus supplement and any related free writing prospectus, and under similar headings in the other documents that are incorporated by reference into this prospectus. You should also carefully read the information incorporated by reference into this prospectus, including our financial statements, and the exhibits to the registration statement of which this prospectus is a part. Unless otherwise mentioned or unless the context requires otherwise, all references in this prospectus to "Transgenomic", "the Company", "we", "us", "our" or similar references mean Transgenomic, Inc. together with its consolidated subsidiary.

Transgenomic, Inc.

We are a global biotechnology company advancing personalized medicine in the detection and treatment of cancer and inherited diseases through our proprietary molecular technologies and clinical and research services. We have two complementary business segments:

- Laboratory Services. Our laboratories specialize in genetic testing for cardiology, neurology, mitochondrial disorders and oncology. Our Patient Testing laboratories located in New Haven, Connecticut and Omaha, Nebraska are certified under the Clinical Laboratory Improvement Amendment as high complexity labs and our Omaha facility is also accredited by the College of American Pathologists. Our Biomarker Identification laboratory located in Omaha, Nebraska also provides pharmacogenomics research services supporting Phase II and Phase III clinical trials conducted by pharmaceutical companies. Our laboratories employ a variety of genomic testing service technologies, including ICE COLD-PCR technology. ICE COLD-PCR is a proprietary platform technology that can be run in any laboratory with standard PCR technology and that enables detection of multiple unknown mutations from virtually any sample type, including tissue biopsies, blood, cell-free DNA and circulating tumor cells at levels greater than 1,000-fold higher than standard DNA sequencing techniques.

- Genetic Assays and Platforms. Our proprietary product is the WAVE® System, which has broad applicability to genetic variation detection in both molecular genetic research and molecular diagnostics. We also distribute bioinstruments produced by other manufacturers, or OEM Equipment, through our sales and distribution network. Service contracts to maintain installed systems are sold and supported by our technical support personnel. The installed WAVE base and some OEM Equipment platforms generate a demand for consumables that are required for the continued operation of the bioinstruments. We develop, manufacture and sell these consumable products. In addition, we manufacture and sell consumable products that can be used on multiple, independent platforms. These

products include a range of chromatography columns.

For a complete description of our business, financial condition, results of operations and other important information, we refer you to our filings with the Securities and Exchange Commission, or the SEC, that are incorporated by reference in this prospectus, including our Annual Report on Form 10-K for the year ended December 31, 2013. For instructions on how to find copies of these documents, see “Where You Can Find More Information”.

We were incorporated in Delaware on March 6, 1997. Our principal office is located at 12325 Emmet Street, Omaha, Nebraska 68164 and our telephone number is 402-452-5400. Our website address is www.transgenomic.com. Information on our website, or that can be accessed through our website, is not incorporated by reference into this prospectus and does not constitute part of this prospectus.

RISK FACTORS

Investing in shares of our Common Stock involves a high degree of risk. Before making an investment decision, you should carefully consider the risks described under “Risk Factors” in any applicable prospectus supplement and in our most recent Annual Report on Form 10-K, or any updates in our Quarterly Reports on Form 10-Q, together with all of the other information appearing in or incorporated by reference into this prospectus and any applicable prospectus supplement, before deciding whether to purchase any of the Common Stock being offered. Our business, financial condition or results of operations could be materially adversely affected by any of these risks. The trading price of our shares of Common Stock could decline due to any of these risks, and you may lose all or part of your investment.

DISCLOSURE REGARDING FORWARD-LOOKING STATEMENTS

This prospectus and the documents incorporated by reference into this prospectus may contain forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, or the Securities Act, and Section 21E of the Securities Exchange Act of 1934, as amended, or the Exchange Act, about the Company and its subsidiaries. These forward-looking statements are intended to be covered by the safe harbor for forward-looking statements provided by the Private Securities Litigation Reform Act of 1995. Forward-looking statements are not statements of historical fact, and can be identified by the use of forward-looking terminology such as “believes”, “expects”, “may”, “will”, “could”, “should”, “projects”, “plans”, “goal”, “targets”, “potential”, “estimates”, “pro forma”, “seek “anticipates” or the negative thereof or comparable terminology. Forward-looking statements include discussions of strategy, financial projections, guidance and estimates (including their underlying assumptions), statements regarding plans, objectives, expectations or consequences of various transactions, and statements about the future performance, operations, products and services of the Company and its subsidiaries. We caution our stockholders and other readers not to place undue reliance on such statements.

You should read this prospectus and the documents incorporated by reference completely and with the understanding that our actual future results may be materially different from what we currently expect. Our business and operations are and will be subject to a variety of risks, uncertainties and other factors. Consequently, actual results and experience may materially differ from those contained in any forward-looking statements. Such risks, uncertainties and other factors that could cause actual results and experience to differ from those projected include, but are not limited to, the risk factors set forth in Part I - Item 1A, “Risk Factors”, in our Annual Report on Form 10-K for the year ended December 31, 2013, as filed with the SEC on March 27, 2014, and elsewhere in the documents incorporated by reference into this prospectus.

You should assume that the information appearing in this prospectus, any accompanying prospectus supplement, any related free writing prospectus and any document incorporated herein by reference is accurate as of its date only. Because the risk factors referred to above could cause actual results or outcomes to differ materially from those expressed in any forward-looking statements made by us or on our behalf, you should not place undue reliance on any forward-looking statements. Further, any forward-looking statement speaks only as of the date on which it is made. New factors emerge from time to time, and it is not possible for us to predict which factors will arise. In addition, we cannot assess the impact of each factor on our business or the extent to which any factor, or combination of factors, may cause actual results to differ materially from those contained in any forward-looking statements. All written or oral forward-looking statements attributable to us or any person acting on our behalf made after the date of this prospectus are expressly qualified in their entirety by the risk factors and cautionary statements contained in and incorporated by reference into this prospectus. Unless legally required, we do not undertake any obligation to release publicly any revisions to such forward-looking statements to reflect events or circumstances after the date of this prospectus or to reflect the occurrence of unanticipated events.

USE OF PROCEEDS

We will receive no proceeds from the sale of the Securities by the Selling Stockholders. We may, however, receive cash proceeds equal to the total exercise price of any Warrants to the extent that the Warrants are exercised for cash. The exercise price of the Warrants held by the Selling Stockholders is $4.00 per share of our Common Stock. The exercise price and the number of shares of Common Stock issuable upon exercise of the Warrants may be adjusted in certain circumstances, including stock splits, dividends, distributions or reclassifications, and mergers, consolidations, statutory share exchanges or other similar transactions. However, these Warrants contain a “cashless exercise” feature that allows the holders, under certain circumstances, to exercise the Warrants without making a cash payment to us. There can be no assurance that any of these Warrants will be exercised by the Selling Stockholders at all or that these Warrants will be exercised for cash rather than pursuant to the “cashless exercise” feature. To the extent we receive proceeds from the cash exercise of the Warrants, we intend to use such proceeds to provide capital support or for general corporate purposes, which may include, without limitation, supporting asset growth and engaging in acquisitions or other business combinations. We do not have any specific plans for acquisitions or other business combinations at this time. Our management will retain broad discretion in the allocation of the net proceeds from the exercise of the Warrants.

The Selling Stockholders will pay any underwriting discounts and commissions and any similar expenses they incur in disposing of the Securities. We will bear all other costs, fees and expenses incurred in effecting the registration of the Securities covered by this prospectus. These may include, without limitation, all registration and filing fees, printing fees and fees and expenses of our counsel and accountants.

SELLING STOCKHOLDERS

We have prepared this prospectus to allow the Selling Stockholders or their successors, assignees or other permitted transferees to sell or otherwise dispose of, from time to time, up to 1,105,394 shares of our Common Stock. The 1,105,394 shares include the following: (i) 730,776 shares of our Common Stock issued pursuant to the Securities Purchase Agreement dated October 22, 2014; and (ii) 374,618 shares of Common Stock issuable upon exercise of the Warrants issued pursuant to the Securities Purchase Agreement dated October 22, 2014. These Securities were issued in reliance on the exemption from securities registration in Section 4(2) under the Securities Act of 1933, as amended, or the Securities Act, and Rule 506 promulgated thereunder. The Warrants will not become exercisable until April 22, 2015, and therefore, the 374,618 shares of Common Stock issuable upon exercise of the Warrants will not be offered for sale by the Selling Stockholders pursuant until the Warrants are exercisable and exercised by the holder thereof.

The shares of Common Stock to be offered by the Selling Stockholders are “restricted” securities under applicable federal and state securities laws and are being registered under the Securities Act to give the Selling Stockholders the opportunity to sell these shares publicly. The registration of these shares does not require that any of the shares be offered or sold by the Selling Stockholders. Subject to these resale restrictions, the Selling Stockholders may from time to time offer and sell all or a portion of their shares indicated below in privately negotiated transactions or on the NASDAQ Capital Market or any other market on which our Common Stock may subsequently be listed.

The registered shares may be sold directly or through brokers or dealers, or in a distribution by one or more underwriters on a firm commitment or best effort basis. To the extent required, the names of any agent or broker-dealer and applicable commissions or discounts and any other required information with respect to any particular offering will be set forth in a prospectus supplement. See “Plan of Distribution”. The Selling Stockholders and any agents or broker-dealers that participate with the Selling Stockholders in the distribution of registered shares may be deemed to be “underwriters” within the meaning of the Securities Act, and any commissions received by them and any profit on the resale of the registered shares may be deemed to be underwriting commissions or discounts under the Securities Act.

No estimate can be given as to the amount or percentage of Common Stock that will be held by the Selling Stockholders after any sales made pursuant to this prospectus because the Selling Stockholders are not required to sell any of the Securities being registered under this prospectus. The following table assumes that the Selling Stockholders will sell all of the Securities listed in this prospectus.

No Selling Stockholder has had any material relationship with us or any of our affiliates within the past three years other than as a security holder.

We have prepared this table based on written representations and information furnished to us by or on behalf of the Selling Stockholders. Since the date on which the Selling Stockholders provided this information, the Selling Stockholders may have sold, transferred or otherwise disposed of all or a portion of the shares of Common Stock in a transaction exempt from the registration requirements of the Securities Act. Unless otherwise indicated in the footnotes below, we believe that: (1) none of the Selling Stockholders are broker-dealers or affiliates of broker-dealers, (2) no Selling Stockholder has direct or indirect agreements or understandings with any person to distribute their Securities, and (3) the Selling Stockholders have sole voting and investment power with respect to all Securities beneficially owned, subject to applicable community property laws. To the extent any Selling Stockholder identified below is, or is affiliated with, a broker-dealer, it could be deemed to be, under SEC Staff interpretations, an "underwriter" within the meaning of the Securities Act. Information about the Selling Stockholders may change over time. Any changed information will be set forth in supplements to this prospectus, if required.

The following table sets forth information with respect to the beneficial ownership of our Common Stock held, as of November 13, 2014, by the Selling Stockholders and the number of Securities being offered hereby and information with respect to shares to be beneficially owned by the Selling Stockholders after completion of this offering. The percentages in the following table reflect the shares beneficially owned by the Selling Stockholders as a percentage of the total number of shares of Common Stock outstanding as of November 13, 2014. As of such date, 8,084,471 shares of Common Stock were outstanding.

Name	Shares Beneficially Owned Prior to the Offering[1] Number		Percentage		Maximum Number of Shares of Common Stock to be Offered Pursuant to this Prospectus Number	Shares Beneficially Owned After the Offering[2] Number	Percentage	
Dolphin Offshore Partners, L.P.	514,888	(3)	6.2	%	461,538	53,350	*%	
Lincoln Park Capital Fund, LLC	150,000	(4)	1.8	%	150,000	--	--	
Bradley W. Baker#	213,212	(5)	2.6	%	115,386	97,826	1.2	%
Kevin P. Harris#	203,416	(6)	2.5	%	115,386	88,030	1.1	%
Potomac Capital Partners, L.P.	265,386	(7)	3.3	%	115,386	150,000	1.9	%
William F. Hartfiel III#	76,908	(8)	*%		46,155	30,753	*%	
David J. Wambeke#	66,655	(9)	*%		46,155	20,500	*%	
John C. Lipman#	23,079	(10)	*%		23,079	--	--	
James H. Zavoral, Jr.#	33,068	(11)	*%		23,079	9,989	*%	
Dolphin Mgmt. Services, Inc.	9,230	(12)	*%		9,230	--	--	
TOTAL	1,555,842		18.3	%	1,105,394	450,448	5.6	%

* Denotes less than one percent.

\# The Selling Stockholder indicated that he may be deemed to be an affiliate of Craig-Hallum Capital Group LLC, a registered broker-dealer. The Selling Stockholder represented that he acquired the Securities in the ordinary course of business and, at the time of the acquisition of the Securities, had no agreements or understandings, directly or indirectly, with any person to distribute the Securities.

(1) Beneficial ownership is determined in accordance with Rule 13d-3 under the Exchange Act. In computing the number of shares beneficially owned by a person and the percentage ownership of that person, shares of common stock subject to warrants, options and other convertible securities held by that person that are currently exercisable or exercisable within 60 days (of November 13, 2014) are deemed outstanding. Shares subject to warrants, options and other convertible securities, however, are not deemed outstanding for the purpose of computing the percentage ownership of any other person.

(2) Assumes that the Selling Stockholders dispose of all of the shares of Common Stock covered by this prospectus and do not acquire beneficial ownership of any additional shares. The registration of these shares does not necessarily mean that the Selling Stockholders will sell all or any portion of the shares covered by this prospectus.

(3) The number of shares consists of (i) 361,042 shares of Common Stock, and (ii) 153,846 shares of Common Stock issuable upon exercise of warrants that will become exercisable beginning April 22, 2015 and are covered by this prospectus. Dolphin Mgmt. Services, Inc., is the Managing General Partner of Dolphin Offshore Partners, L.P. Peter E. Salas is the President and controlling person of Dolphin Mgmt. Services, Inc. Therefore, Mr. Salas has voting and dispositive power over the shares beneficially owned by Dolphin Offshore Partners, L.P.

(4) The number of shares consists of (i) 100,000 shares of Common Stock, and (ii) 50,000 shares of Common Stock issuable upon exercise of warrants that will become exercisable beginning April 22, 2015 and are covered by this prospectus. Joshua Scheinfeld and Jonathan Cope, each a Founder and Managing Member of Lincoln Park Capital Fund, LLC, share voting and dispositive power over the shares beneficially owned by Lincoln Park Capital Fund, LLC.

(5) The number of shares consists of (i) 167,847 shares of Common Stock, (ii) 6,903 shares of Common Stock issuable upon exercise of warrants that are currently exercisable, and (iii) 38,462 shares of Common Stock issuable upon exercise of warrants that will become exercisable beginning April 22, 2015 and are covered by this prospectus.

(6) The number of shares consists of (i) 158,049 shares of Common Stock, (ii) 6,905 shares of Common Stock issuable upon exercise of warrants that are currently exercisable, and (iii) 38,462 shares of Common Stock issuable upon exercise of warrants that will become exercisable beginning April 22, 2015 and are covered by this prospectus.

(7) The number of shares consists of (i) 226,924 shares of Common Stock, and (ii) 38,462 shares of Common Stock issuable upon exercise of warrants that will become exercisable beginning April 22, 2015 and are covered by this prospectus. Potomac Capital Management, L.L.C. is the General Partner of Potomac Capital Partners, L.P. Paul J. Solit is the Managing Member of Potomac Capital Management, L.L.C. and therefore may be deemed to have voting and dispositive power over the shares beneficially owned by Potomac Capital Partners, L.P.

(8) The number of shares consists of (i) 55,770 shares of Common Stock, (ii) 5,753 shares of Common Stock issuable upon exercise of warrants that are currently exercisable, and (iii) 15,385 shares of Common Stock issuable upon exercise of warrants that will become exercisable beginning April 22, 2015 and are covered by this prospectus.

(9) The number of shares consists of (i) 51,270 shares of Common Stock, and (ii) 15,385 shares of Common Stock issuable upon exercise of warrants that will become exercisable beginning April 22, 2015 and are covered by this prospectus.

(10) The number of shares consists of (i) 15,386 shares of Common Stock, and (ii) 7,693 shares of Common Stock issuable upon exercise of warrants that will become exercisable beginning April 22, 2015 and are covered by this prospectus.

(11) The number of shares consists of (i) 21,636 shares of Common Stock, (ii) 3,739 shares of Common Stock issuable upon exercise of warrants that are currently exercisable, and (iii) 7,693 shares of Common Stock issuable upon exercise of warrants that will become exercisable beginning April 22, 2015 and are covered by this prospectus.

(12) The number of shares consists of 9,230 shares of Common Stock issuable upon exercise of warrants that will become exercisable beginning April 22, 2015 and are covered by this prospectus. Peter E. Salas is the President and controlling person of Dolphin Mgmt. Services, Inc. Therefore, Mr. Salas has voting and dispositive power over the shares beneficially owned by Dolphin Mgmt. Services, Inc.

Indemnification

Under the Securities Purchase Agreement, we have agreed to indemnify the Selling Stockholders and each underwriter of the Securities against certain losses, claims, damages, liabilities, settlement costs and expenses, including liabilities under the Securities Act.

PLAN OF DISTRIBUTION

The Selling Stockholders and any of their pledges, assignees, donees selling shares received from such Selling Stockholders as a gift, and successors-in-interest may, from time to time, sell any or all of their shares of Common Stock on any stock exchange, market or trading facility on which the shares are traded or in private transactions. These sales may be at fixed or negotiated prices. The Selling Stockholders may use any one or more of the following methods when selling shares:

- ordinary brokerage transactions and transactions in which the broker-dealer solicits purchasers;
- block trades in which the broker-dealer will attempt to sell the shares as agent but may position and resell a portion of the block as principal to facilitate the transaction;
- purchases by a broker-dealer as principal and resale by the broker-dealer for its account;
- an exchange distribution in accordance with the rules of the applicable exchange;
- privately negotiated transactions;
- broker-dealers may agree with the Selling Stockholders to sell a specified number of such shares at a stipulated price per share;
- a combination of any such methods of sale; and
- any other method permitted pursuant to applicable law.

The Selling Stockholders may also sell shares under Rule 144 under the Securities Act of 1933, as amended, if available, rather than under this prospectus.

Broker-dealers engaged by the Selling Stockholders may arrange for other broker-dealers to participate in sales. Broker-dealers may receive commissions or discounts from the Selling Stockholders (or, if any broker-dealer acts as agent for the purchaser of shares, from the purchaser) in amounts to be negotiated. The Selling Stockholders do not expect these commissions and discounts to exceed what is customary in the types of transactions involved.

The Selling Stockholders and any broker-dealers or agents that are involved in selling the shares may be deemed to be "underwriters" within the meaning of the Securities Act in connection with such sales. In such event, any commissions received by such broker-dealers or agents and any profit on the resale of the shares purchased by them may be deemed to be underwriting commissions or discounts under the Securities Act.

We are required to pay all fees and expenses incident to the registration of the shares, including certain fees and disbursements of counsel to the Selling Stockholders; provided, however, that a selling stockholder will pay all underwriting discounts and selling commissions, if any. We have agreed to indemnify the Selling Stockholders against certain losses, claims, damages and liabilities, including liabilities under the Securities Act. We may be indemnified by the selling stockholders against civil liabilities, including liabilities under the Securities Act, that may arise from any written information furnished to us by the selling stockholder specifically for use in this prospectus, in accordance with the Securities Purchase Agreement, or we may be entitled to contribution.

To the extent required, we will amend or supplement this prospectus to disclose material arrangements regarding the plan of distribution.

To comply with the securities laws of certain jurisdictions, registered or licensed brokers or dealers may need to offer or sell the shares offered by this prospectus. The applicable rules and regulations under the Securities Exchange Act of 1934, as amended, may limit any person engaged in a distribution of the shares of common stock covered by this prospectus in its ability to engage in market activities with respect to such shares. A selling stockholder, for example, will be subject to applicable provisions of the Exchange Act and the rules and regulations under it, including, without limitation, Regulation M of the Exchange Act, which provisions may limit the timing of purchases and sales of any shares of common stock by that selling stockholder. Regulation M may also restrict the ability of any person engaged in the distribution of the shares of common stock to engage in market-making activities with respect to the shares of common stock. All of the foregoing may affect the marketability of the shares of common stock and the ability of any person or entity to engage in market-making activities with respect to the shares of common stock.

We may suspend the use of this prospectus at any time for up to 60 days if certain material non-public information regarding Transgenomic, Inc. exists.

DESCRIPTION OF CAPITAL STOCK

General Matters

Under our Third Amended and Restated Certificate of Incorporation, as amended from time to time, or the Certificate of Incorporation, we are authorized to issue up to 150,000,000 shares of Common Stock, from time to time, as provided in a resolution or resolutions adopted by the Board of Directors.

Common Stock

As of November 13, 2014, 8,084,471 shares of Common Stock were issued and outstanding, held by approximately 82 stockholders of record, not including beneficial holders whose shares are held in names other than their own.

Dividends, Voting Rights and Liquidation

Holders of Common Stock are entitled to one vote for each share held of record on all matters submitted to a vote of the shareholders and do not have cumulative voting rights. Holders of Common Stock are entitled to receive ratably such dividends, if any, as may be declared from time to time by our Board of Directors out of funds legally available for dividend payments. All outstanding shares of Common Stock are fully paid and non-assessable. The holders of Common Stock have no preferences or rights of conversion, exchange, pre-emption or other subscription rights. There are no redemption or sinking fund provisions applicable to the Common Stock. In the event of any liquidation, dissolution or winding-up of our affairs, holders of Common Stock will be entitled to share ratably in our assets that are remaining after payment or provision for payment of all of our debts and obligations. The rights, preferences and privileges of Common Stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of preferred stock currently outstanding or which we may designate and issue in the future.

Preferred Stock

General Matters

Under the Certificate of Incorporation, we have the authority to issue up to 15,000,000 shares of preferred stock, $0.01 par value per share, or the Preferred Stock, issuable in specified series and having specified voting, dividend, conversion, liquidation and other rights and preferences as our Board of Directors may determine, subject to limitations set forth in the Certificate of Incorporation. The Preferred Stock may be issued for any lawful corporate purpose without further action by our stockholders. The issuance of any Preferred Stock having conversion rights might have the effect of diluting the interests of our other stockholders. In addition, shares of Preferred Stock could be issued with rights, privileges and preferences which would deter a tender or exchange offer or discourage the acquisition of control of the Company.

Of the number of shares of Preferred Stock authorized by our Certificate of Incorporation, as of November 13, 2014 (i) 3,879,307 shares had been designated Series A Convertible Preferred Stock with such rights, privileges and preferences as set forth in the Certificate of Amendment of Certificate of Designation of Series A Convertible Preferred Stock filed with the Secretary of State of the State of Delaware on March 5, 2014, or the Series A Certificate of Designation, and (ii) 1,443,297 shares had been designated Series B Convertible Preferred Stock with such rights, privileges and preferences as set forth in the Certificate of Designation of Series B Convertible Preferred Stock filed with the Secretary of State of the State of Delaware on March 5, 2014, or the Series B Certificate of Designation. As of November 13, 2014, 2,586,205 shares of the Series A Convertible Preferred Stock, or the Series A Preferred, were issued and outstanding and 1,443,297 shares of the Series B Convertible Preferred Stock, or the Series B Preferred, were issued and outstanding. The Series A Preferred and the Series B Preferred are sometimes referred to in this prospectus, together, as the Preferred Shares.

Dividends, Voting Rights and Liquidation

Each of the Series A Certificate of Designation and the Series B Certificate of Designation provides that the holders of Preferred Shares shall be entitled, as a separate voting group, at each annual or special election of directors, to elect two directors of the Company.

Certain rights of the holders of the Series B Preferred are senior to the rights of the holders of Series A Preferred and to the rights of the holders of our Common Stock. The Series B Preferred has a liquidation preference equal to its original price per share, plus any accrued and unpaid dividends thereon. The Series B Preferred accrues cumulative dividends at the rate of 6.0% of the original price per share per annum. Additionally, the Series B Certificate of Designation also contains an optional redemption provision whereby the holders of a majority of the then issued and outstanding Series B Preferred, voting together as a separate class, may, after March 5, 2019, the fifth anniversary of the closing of the private placement in which the shares of Series B Preferred were issued, require the Company to redeem all of the then issued and outstanding shares of Series B Preferred at the initial price per share of the Series B Preferred, as adjusted for any stock dividends, combinations or splits, plus all accrued but unpaid dividends.

Certain rights of the holders of the Series A Preferred are senior to the rights of the holders of our Common Stock. Subject to the liquidation preference of the Series B Preferred, the Series A Preferred has a liquidation preference equal to its original price per share, plus any accrued and unpaid dividends thereon. After the payment of dividends to the holders of Series B Preferred, the Series A Preferred accrues cumulative dividends at the rate of 10.0% of the original price per share per annum.

All outstanding shares of Series B Preferred will be automatically converted into Common Stock, at an initial conversion rate of 1:1, and all outstanding shares of Series A Preferred will be automatically converted into Common Stock, at an initial conversion rate of 4:1, at the election of the holders of a majority of the then-outstanding Preferred Shares, voting together as a single class on an as-converted to Common Stock basis. The initial conversion rate for each of the Series A Preferred and the Series B Preferred is subject to adjustment in the event of certain stock splits, stock dividends, mergers, reorganizations and reclassifications. After giving effect to the one-for-twelve reverse split of the Common Stock effected in January 2014, the conversion rate for the Series A Preferred was adjusted to 1:3.

Generally, the holders of the Preferred Shares are entitled to vote together as a single group with the holders of Common Stock on an as-converted to Common Stock basis. However, each of the Series A Certificate of Designation and the Series B Certificate of Designation provides that we will not perform the following activities, subject to certain exceptions, without the affirmative vote of the holders of at least two-thirds of the outstanding Preferred Shares, voting together as a single class on an as-converted to Common Stock basis:

- authorize, create or issue any other class or series of capital stock having rights, preferences or privileges senior to or in parity with the Preferred Shares;
- alter or change the rights, preferences or privileges of the Preferred Shares or increase or decrease the authorized number of Preferred Shares, Series A Preferred or Series B Preferred;
- authorize or declare any dividends on the shares of Common Stock or any other shares of capital stock other than the Preferred Shares, other than dividends payable solely in shares of Common Stock;
- authorize any offering of equity securities of the Company representing (on a pro forma basis after giving effect to the issuance of such equity securities) the right to receive not less than 10% of any amounts or funds that would, as of immediately following such issuance, be legally available for distribution in connection with a liquidation event;
- redeem any shares of capital stock (other than pursuant to employee agreements or the terms of the capital stock);
- increase or decrease the authorized number of members of the Board;

- enter into any binding agreement with any director, employee or any affiliate of the Company, excluding employment-related and equity award agreements;

- materially change the nature of the Company's business, enter into new lines of business or exit the current line of business or invest in any person or entity engaged in a business that is not substantially similar to the Company's business, or change the location of any permanent location of any part of the Company's business;

- make any loans or advances, individually or in the aggregate in excess of $1,000,000, to, or own any securities of, any subsidiary or other corporation or other entity unless it is wholly owned by the Company;

- make any loan or advance to any natural person, including, without limitation, any employee or director of the Company, except advances and similar expenditures in the ordinary course of business;

- guarantee, directly or indirectly, any indebtedness, except for trade accounts of the Company arising in the ordinary course of business;

- sell or otherwise dispose of any assets of the Company with a value, individually or collectively, in excess of $500,000, other than in the ordinary course of business;

- liquidate, dissolve or wind-up the business and affairs of the Company or effect a change in control or any other liquidation event;

- incur any indebtedness in excess of $1,000,000 in the aggregate, other than trade credit incurred in the ordinary course of business;

- expend funds in excess of $500,000 in the aggregate per year for capital improvements, other than any such expenditure that is consistent with a budget approved by the Board, including the directors elected by the holders of Preferred Shares;

- obligate the Company to make aggregate annual payments in excess of $500,000 or sell, transfer, pledge or license any material technology or intellectual property of the Company, other than a non-exclusive license in the ordinary course of business; or

- increase the number of shares reserved and issuable under any of the Company's equity or option incentive compensation plans.

Anti-Takeover Effects Under Section 203 of the General Corporation Law of the State of Delaware

We are subject to Section 203 of the General Corporation Law of the State of Delaware, or the DGCL, which prohibits a Delaware corporation from engaging in any business combination with any interested stockholder for a period of three years after the date that such stockholder became an interested stockholder, with the following exceptions:

- before such date, the board of directors of the corporation approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder;

- upon completion of the transaction that resulted in the stockholder becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction began, excluding for purposes of determining the voting stock outstanding (but not the outstanding voting stock owned by the interested stockholder) those shares owned (i) by persons who are directors and also officers and (ii) employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or an exchange offer; or

- on or after such date, the business combination is approved by the board of directors and authorized at an annual or a special meeting of the stockholders, and not by written consent, by the affirmative vote of at least $66^2/3\%$ of the outstanding voting stock that is not owned by the interested stockholder.

In general, Section 203 defines "business combination" to include the following:

- any merger or consolidation involving the corporation or any direct or indirect majority owned subsidiary of the corporation and the interested stockholder or any other corporation, partnership, unincorporated association, or other entity if the merger or consolidation is caused by the interested stockholder and as a result of such merger or consolidation the transaction is not excepted as described above;

- any sale, transfer, pledge, or other disposition (in one transaction or a series) of 10% or more of the assets of the corporation involving the interested stockholder;

- subject to certain exceptions, any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder;

- any transaction involving the corporation that has the effect of increasing the proportionate share of the stock or any class or series of the corporation beneficially owned by the interested stockholder; or

- the receipt by the interested stockholder of the benefit of any loss, advances, guarantees, pledges, or other financial benefits by or through the corporation.

In general, Section 203 defines an “interested stockholder” as an entity or a person who, together with the person’s affiliates and associates, beneficially owns, or within three years prior to the time of determination of interested stockholder status did own, 15% or more of the outstanding voting stock of the corporation.

A Delaware corporation may “opt out” of these provisions with an express provision in its original certificate of incorporation or an express provision in its certificate of incorporation or bylaws resulting from a stockholders’ amendment approved by at least a majority of the outstanding voting shares. We have not opted out of these provisions. As a result, mergers or other takeover or change in control attempts of us may be discouraged or prevented.

Anti-Takeover Effects Under Certain Provisions of our Certificate of Incorporation and Bylaws

Our Certificate of Incorporation and our Amended and Restated Bylaws, or the Bylaws, include a number of provisions that may have the effect of deterring hostile takeovers or delaying or preventing changes in control of the management of the Company.

First, our Certificate of Incorporation provides that all stockholder actions must be effected at a duly called meeting of holders and not by a consent in writing.

Second, our Bylaws provide that special meetings of the holders may be called only by the chairman of the Board of Directors, the Chief Executive Officer or our Board of Directors pursuant to a resolution adopted by a majority of the total number of authorized directors.

Third, our Certificate of Incorporation provides that our Board of Directors can issue up to 15,000,000 shares of Preferred Stock without further action by our stockholders, as described under "—Preferred Stock" above.

Fourth, our Certificate of Incorporation and Bylaws provide for a classified Board of Directors in which approximately one-third of the directors are elected each year. Consequently, any potential acquirer would need to successfully complete two proxy contests in order to take control of the Board of Directors. As a result of the provisions of the Certificate of Incorporation and Delaware law, stockholders will not be able to cumulate votes for directors.

Fifth, our Certificate of Incorporation prohibits a business combination with an interested stockholder without the approval of the holders of 75% of all voting shares and the vote of a majority of the voting shares held by disinterested stockholders, unless it has been approved by a majority of the disinterested directors.

Finally, our Bylaws establish procedures, including advance notice procedures, with regard to the nomination of candidates for election as directors and stockholder proposals. These provisions of our Certificate of Incorporation and Bylaws could discourage potential acquisition proposals and could delay or prevent a change in control of the management of our company.

Warrants

In addition to the Warrants to purchase 374,618 of the shares of Common Stock we are registering hereunder, as of November 13, 2014, warrants to purchase 2,376,059 shares of Common Stock with a weighted-average exercise price of $9.24 per share were outstanding, and warrants to purchase 1,293,102 shares of Series A Preferred with an average exercise price of $2.32 per share were outstanding. Except for the Warrants to purchase 374,618 shares of Common Stock that we are registering hereunder, all of the outstanding warrants are currently exercisable, and all outstanding warrants contain provisions for the adjustment of the exercise price in the event of stock dividends, stock splits, reorganizations, reclassifications or mergers. In addition, certain of the warrants contain a “cashless exercise” feature that allows the holders thereof to exercise the warrants without a cash payment to us under certain circumstances.

Listing

Our common stock is listed on the NASDAQ Capital Market under the symbol “TBIO”.

Transfer Agent and Registrar

The transfer agent and registrar for our common stock is Wells Fargo Shareowner Services. Its address is 1110 Centre Pointe Curve, Suite 101, Mendota Heights, MN 55120 and its telephone number is 1-855-217-6361.

LEGAL MATTERS

Unless otherwise indicated in the applicable prospectus supplement, the validity of the Common Stock offered by this prospectus, and any supplement thereto, will be passed upon for us by Paul Hastings LLP, Palo Alto, California.

EXPERTS

The consolidated financial statements of Transgenomic, Inc. included in Transgenomic, Inc.'s Annual Report (Form 10-K) for the year ended December 31, 2013 have been audited by Ernst & Young LLP, independent registered public accounting firm, as set forth in their report incorporated herein by reference. Such financial statements are incorporated herein in reliance upon the report of Ernst & Young LLP pertaining to such financial statements given on the authority of such firm as experts in accounting and auditing.

The audited consolidated financial statements of Transgenomic, Inc. and subsidiary as of December 31, 2012 and December 31, 2011 included in our Annual Report on Form 10-K for the year ended December 31, 2013 incorporated by reference in this prospectus have been audited by McGladrey LLP, independent registered public accounting firm, as stated in their report dated March 14, 2013, which is incorporated by reference herein, and has been so incorporated in reliance upon the report of such firm given upon their authority as experts in accounting and auditing.

WHERE YOU CAN FIND MORE INFORMATION

We are a reporting company and file annual, quarterly and current reports, proxy statements and other information with the SEC. We have filed with the SEC a registration statement on Form S-3 under the Securities Act with respect to the Common Stock being offered under this prospectus. This prospectus does not contain all of the information set forth in the registration statement and the exhibits to the registration statement. For further information with respect to us and the shares of Common Stock being offered under this prospectus, we refer you to the registration statement and the exhibits filed as a part of the registration statement. You may read and copy the registration statement, as well as our reports, proxy statements and other information, at the SEC's Public Reference Room at 100 F Street, N.E., Washington, D.C. 20549. Please call the SEC at 1-800-SEC-0330 for more information about the operation of the Public Reference Room. The SEC maintains an Internet site that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC, including Transgenomic, Inc. The SEC's Internet site can be found at *http://www.sec.gov*.

DISCLOSURE OF COMMISSION POSITION ON INDEMNIFICATION FOR SECURITIES ACT LIABILITIES

Insofar as indemnification for liabilities arising under the Securities Act may be permitted to our directors, officers, and persons controlling us pursuant to the provisions described in Item 15 of the registration statement of which this prospectus is a part or otherwise, we have been advised that in the opinion of the SEC such indemnification is against public policy as expressed in the Securities Act and is therefore unenforceable. In the event that a claim for indemnification against such liabilities (other than our payment of expenses incurred or paid by our directors, officers, or controlling persons in the successful defense of any action, suit, or proceeding) is asserted by our directors, officers, or controlling persons in connection with the common stock being registered, we will, unless in the opinion of our counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Securities Act and will be governed by the final adjudication of the issue.

IMPORTANT INFORMATION INCORPORATED BY REFERENCE

The SEC allows us to "incorporate by reference" information into this prospectus, which means that we can disclose important information to you by referring you to another document filed separately with the SEC. The documents incorporated by reference into this prospectus contain important information that you should read about us.

The following documents are incorporated by reference into this prospectus:

(a) The Registrant's Annual Report on Form 10-K for the fiscal year ended December 31, 2013, filed with the SEC on March 27, 2014, and Amendment No. 1 to the Annual Report on Form 10-K/A for the fiscal year ended December 31, 2013, filed with the SEC on September 5, 2014;

(b) The Registrant's Definitive Proxy Statement on Schedule 14A filed with the SEC on April 24, 2014;

(c) The Registrant's Quarterly Report on Form 10-Q for the quarter ended March 31, 2014, filed with the SEC on May 15, 2014;

(d) The Registrant's Quarterly Report on Form 10-Q for the quarter ended June 30, 2014, filed with the SEC on August 8, 2014;

(e) The Registrant's Quarterly Report on Form 10-Q for the quarter ended September 30, 2014, filed with the SEC on November 12, 2014;

(f) The Registrant's Current Reports on Form 8-K filed with the SEC on (i) January 14, 2014, (ii) January 16, 2014, (iii) January 28, 2014, (iv) March 6, 2014, (v) March 19, 2014, (vi) May 6, 2014, (vii) May 14, 2014, (viii) May 15, 2014, (ix) July 2, 2014, as accepted by the SEC at 4:25 p.m. Eastern time, (x) October 22, 2014, and (xi) November 5, 2014; and

(g) The description of the Registrant's common stock set forth in the Registrant's Registration Statement on Form 8-A (File No. 001-36439), filed with the SEC on May 5, 2014, including any amendments or reports filed for the purpose of updating such description.

We also incorporate by reference any future filings (other than current reports furnished under Item 2.02 or Item 7.01 of Form 8-K and exhibits filed on such form that are related to such items unless such Form 8-K expressly provides to the contrary) made with the SEC pursuant to Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act, including those made after the date of the initial filing of the registration statement of which this prospectus is a part and prior to effectiveness of such registration statement, until we file a post-effective amendment that indicates the termination of the offering of the Common Stock made by this prospectus and will become a part of this prospectus from the respective dates that such documents are filed with the SEC. Any statement contained herein or in a document incorporated or deemed to be incorporated by reference herein shall be deemed to be modified or superseded for purposes hereof or of the related prospectus supplement to the extent that a statement contained herein or in any other subsequently filed document which is also incorporated or deemed to be incorporated herein modifies or supersedes such statement. Any such statement so modified or superseded shall not be deemed, except as so modified or superseded, to constitute a part of this prospectus.

Documents incorporated by reference are available from us, without charge. You may obtain documents incorporated by reference in this prospectus by requesting them in writing or by telephone at the following address:

Transgenomic, Inc.

Attn: Investor Relations

12325 Emmet Street

Omaha, NE 68164

Phone: (402) 452-5400

Fax: (402) 452-5461

E-mail: investorrelations@transgenomic.com

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TRANSGENOMIC, INC.

1,105,394 SHARES OF COMMON STOCK

PROSPECTUS

December 16, 2014

Neither we nor the Selling Stockholders have authorized any dealer, salesperson or other person to give any information or to make any representations not contained in this prospectus or any prospectus supplement. You must not rely on any unauthorized information. This prospectus is not an offer to sell these securities in any jurisdiction where an offer or sale is not permitted. The information in this prospectus is current as of the date of this prospectus. You should not assume that this prospectus is accurate as of any other date.