Synthetic Biologics, Inc.
Form 424B3
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Registration No. 333-207327

Prospectus

1,137,500 Shares

Common Stock

This prospectus relates to the resale by the stockholders listed in the section titled "Selling Stockholders", which we refer to as the "Selling Stockholders" of up to an aggregate of 1,137,500 shares of our common stock, par value $0.001 per share (the "Shares"). The Shares were acquired by the Selling Stockholders in connection with separate private placements transactions completed prior to the filing of the registration statement of which this prospectus forms a part. Of the 1,137,500 shares of common stock being registered for resale: (i) 937,500 shares were issued pursuant to a stock issuance agreement that we entered into on August 10, 2015 with Intrexon Corporation (the "Intrexon Stock Issuance Agreement"), and (ii) 200,000 shares were issued pursuant to a stock purchase agreement that we entered into with Dr. Mark Pimentel and Synthetic Biomics, Inc. on December 5, 2013 (the 'Pimentel Agreement"), as amended on August 29, 2015. We will not receive any proceeds from the disposition of the Shares.

Our common stock is traded on NYSE MKT under the symbol "SYN." On October 6, 2015, the last reported sale price for the common stock was $2.31 per share. We urge prospective purchasers of our common stock to obtain current information about the market prices of our common stock. The prices at which the Selling Stockholders may sell the Shares in this offering will be determined by the prevailing market price for the shares of common stock or in negotiated transactions.

Our executive offices are located at 9605 Medical Center Drive, Suite 270, Rockville, Maryland 20850 and our administrative offices are located at 617 Detroit Street, Suite 100, Ann Arbor, Michigan 48104. Our telephone number is (734) 332-7800.

INVESTING IN OUR COMMON STOCK INVOLVES RISKS. SEE THE "RISK FACTORS" ON PAGE 5 OF THIS PROSPECTUS AND ANY SIMILAR SECTION CONTAINED IN THE DOCUMENTS

INCORPORATED BY REFERENCE INTO THIS PROSPECTUS CONCERNING FACTORS YOU SHOULD CONSIDER BEFORE INVESTING IN OUR COMMON STOCK.

Neither the Securities and Exchange Commission nor any state securities commission has approved or disapproved of these securities or passed upon the accuracy or adequacy of the prospectus. Any representation to the contrary is a criminal offense.

The date of this prospectus is October 15, 2015.

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The registration statement containing this prospectus, including the exhibits to the registration statement, provides additional information about us and the common stock offered under this prospectus. The registration statement, including the exhibits and the documents incorporated herein by reference, can be read on the Securities and Exchange Commission website or at the Securities and Exchange Commission offices mentioned under the heading "Where You Can Find More Information."

ABOUT THIS PROSPECTUS

This prospectus is not an offer or solicitation in respect to these securities in any jurisdiction in which such offer or solicitation would be unlawful. This prospectus is part of a registration statement that we filed with the Securities and Exchange Commission (the "SEC"). The registration statement that contains this prospectus (including the exhibits to the registration statement) contains additional information about our company and the securities offered under this prospectus. That registration statement can be read at the SEC website or at the SEC's offices listed under the heading "Where You Can Find More Information." We have not authorized anyone else to provide you with different information or additional information. You should not assume that the information in this prospectus, or any supplement or amendment to this prospectus, is accurate at any date other than the date indicated on the cover page of such documents.

PROSPECTUS SUMMARY

Our Business

We are a clinical-stage company developing therapeutics to protect the microbiome while targeting pathogen-specific diseases. Our lead candidates in Phase 2 development include SYN-004 which is designed to protect the gut microbiome (gastrointestinal (GI) microflora) from the effects of certain commonly used intravenous (IV) antibiotics for the prevention of *C. difficile* infection and antibiotic-associated diarrhea (AAD), and SYN-010 which is intended to reduce the impact of methane-producing organisms in the gut microbiome to treat the underlying cause of irritable bowel syndrome with constipation (IBS-C). In addition, we are developing a Phase 2 oral estriol drug, Trimesta™, for the treatment of relapsing-remitting multiple sclerosis (MS) and cognitive dysfunction in MS, and in collaboration with Intrexon Corporation (NYSE:XON) ("Intrexon"), a preclinical stage monoclonal antibody combination for the treatment of Pertussis, and novel discovery stage biotherapeutics for the treatment of phenylketonuria (PKU).

Product Pipeline:

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Summary of Microbiome Programs:

***C. difficile* infections (CDI):** We are in clinical development of a novel second-generation oral enzyme, SYN-004, to degrade commonly used IV beta-lactam antibiotics in the GI tract, intended to protect the microbiome and prevent the development of and severe effects from CDI and AAD. CDIs are a leading type of hospital acquired infection (HAI) and are frequently associated with IV antibiotic treatment. Designed to be given orally and co-administered with certain IV beta-lactam antibiotics (e.g., penicillins and cephalosporins), SYN-004 is intended to protect the gut while the IV antibiotics fight the primary infection. SYN-004 is believed to not only have a similar profile to its first-generation predecessor, which demonstrated protection of the microbiome (gut flora) during treatment with certain penicillins, but also has the potential to protect the gut from a broader spectrum of IV beta-lactam antibiotics. Beta-lactam antibiotics are a mainstay in hospital infection management and include the commonly used penicillin and cephalosporin classes of antibiotics. SYN-004's target market is significant and represented by annual U.S. hospitals purchases of approximately 118 million doses of IV beta-lactam antibiotics which are administered to approximately 14 million patients.* Currently there are no approved treatments designed to protect the gut microbiome from the damaging effects of IV antibiotics. This worldwide market could represent a multi-billion dollar opportunity for us. In November 2014, the U.S. Patent and Trademark Office (USPTO) issued Patent No. 8,894,994 that has claims to compositions of matter and pharmaceutical compositions of beta-lactamases, including SYN-004, and carries a patent term to at least 2031. We also have an extensive patent estate on other aspects of this program which includes patent applications that could carry a term to at least 2035. In the fourth quarter of 2014, we initiated our randomized, double-blind placebo-controlled Phase 1a clinical trial, reported positive topline safety and tolerability results from the Phase 1a clinical trial, and initiated the Phase 1b clinical trial evaluating multiple ascending doses of SYN-004. In February 2015, we reported positive topline results from the Phase 1b clinical trial of escalating doses of oral SYN-004, with no safety or tolerability issues reported at dose levels and dose regimens both meeting and exceeding those expected to be studied in upcoming clinical trials. In March 2015, we reported positive pharmacokinetics data from both Phase 1 clinical trials, with supportive evidence that SYN-004 should have no effect on the IV antibiotic in the bloodstream, allowing the antibiotic to fight the primary infection. In March 2015, we also initiated a Phase 2a clinical trial to evaluate the GI antibiotic-degrading effects and the safety of SYN-004. In June 2015, the first participant was dosed in a second Phase 2a clinical trial of SYN-004, to evaluate the GI antibiotic-degrading effects and the safety of SYN-004, in the presence of the proton pump inhibitor (PPI), esomeprazole. Topline data is expected from the first Phase 2a clinical trial when it is available in 2015, and from the second Phase 2a clinical trial during the second half of 2015. In July 2015, we reported data from the first four of 12 expected participants in the first Phase 2a open-label clinical trial; the data showed that SYN-004 degraded IV ceftriaxone in the chyme of the four healthy participants with functioning ileostomies without affecting the ceftriaxone in the bloodstream. In September 2015, we initiated a Phase 2b proof-of-concept clinical trial of SYN-004. This randomized, placebo-controlled clinical trial is expected to enroll approximately 370 patients at up to 75 global clinical sites. An interim analysis of blinded data from the Phase 2b clinical trial is anticipated during the second half of 2015. The initiation of pivotal Phase 3 clinical trial(s) are anticipated during 2016.

* This information is an estimate derived from the use of information under license from the following IMS Health Incorporated information service: CDM Hospital database for full year 2012. IMS expressly reserves all rights, including rights of copying, distribution and republication.

IBS-C: In December 2013, through our majority-owned subsidiary, Synthetic Biomics, Inc., we entered into a worldwide exclusive license agreement with Cedars-Sinai Medical Center (CSMC) for the right to develop products for therapeutic and prophylactic treatments of acute and chronic diseases, including the development of SYN-010 to target IBS-C. SYN-010 is our proprietary modified-release formulation of the classic statin, lovastatin, that is intended to reduce methane-production by certain microorganisms (*M. smithii)* in the gut while minimizing disruption to the microbiome. SYN-010 is intended to act primarily in the intestinal lumen while avoiding systemic absorption, thereby targeting the cause of IBS-C, not just the symptoms. An investigational team led by Mark Pimentel, M.D. at CSMC discovered that lovastatin may reduce the production of methane gas by certain gastrointestinal (GI) microorganisms. Methane produced by these organisms is perceived as an underlying cause of pain, bloating, and constipation associated with IBS-C, and may contribute to the pathology of other diseases. In May 2015, preclinical results were presented in a poster at Digestive Disease Week ® (DDW) 2015 demonstrating that lovastatin prevented proliferation of methanogens in the small intestines of rats with minimal impact on remaining microbiome. In his practice, Dr. Pimentel translated the use of statins to reduce methane in humans by evaluating commercial lovastatin formulations in select IBS-C patients, demonstrating that lovastatin prevented methane production by methanogens in human stool. Using stringent disease diagnosis criteria to ensure market relevance and a population most likely to receive a diagnosis and prescription drug treatment, there are an estimated 40.7 million cases of IBS reported in the U.S., Europe and Japan, and it has been reported that up to 20 percent of all IBS patients have IBS-C. The estimated global sales for IBS therapeutics for 2015 are $669.3 million, and global sales are expected to be greater than $1.5 billion in 2023**. A 505(b)(2) regulatory pathway is anticipated for the development of SYN-010. We licensed an intellectual property portfolio from CSMC including granted use patents and pending patent applications for SYN-010. Additional worldwide patent filings having composition of matter claims, which were recently filed by CSMC and licensed to us, could extend patent protection of SYN-010 to 2035. Our Investigational New Drug (IND) application was submitted to the U.S. Food and Drug Administration (FDA) in May 2015. In June 2015, we initiated our first Phase 2 placebo-controlled clinical trial of SYN-010. This clinical trial is expected to enroll approximately 60 patients who will be randomly assigned in a 1:1:1 ratio to one of three groups, including two different SYN-010 dose groups and a placebo group. Patients are scheduled to receive single oral doses of SYN-010 each day for 28 days. The primary objective of this clinical trial is to evaluate the change from baseline in breath methane, as determined by a lactulose breath test, in methane-positive patients with IBS-C after seven days of treatment with one of two formulations of SYN-010 compared with placebo. Secondary endpoints include Improvement in the number of complete spontaneous bowel movements (CSBM) per week, and improvement in abdominal pain and bloating per standard scales required per FDA guidance. We anticipate reporting topline results from the first Phase 2 clinical trial during the second half of 2015. We also anticipate initiating the second SYN-010 Phase 2 clinical trial during the second half of 2015, with topline results from this trial expected during the first half of 2016. The primary endpoint of the second Phase 2 is to evaluate the ability of SYN-010 to sustain the reduction in breath methane levels, and secondary endpoints include evaluating pain, bloating and CSBM. The initiation of pivotal Phase 3 clinical trial(s) are anticipated during 2016.

**GlobalData, Irritable Bowel Syndrome - Global Drug Forecast and Market Analysis to 2023, December 2014

Summary of Multiple Sclerosis Program:

Relapsing-Remitting MS: We have licensed issued method of treatment patents in the U.S. for MS therapy with estriol and estriol combination therapies (including estriol with Copaxone ®) from University of California, Los Angeles (UCLA). In April 2014, positive Phase 2 topline efficacy and safety results was presented by the lead principal investigator of the UCLA Phase 2 investigator initiated randomized (n=158) double-blinded placebo trial which evaluated our drug candidate, Trimesta, in woman with relapsing remitting MS at 16 sites in the U.S. In September 2014, the lead principal investigator presented additional Phase 2 clinical outcome data, including more detailed results on improvements in cognitive and disability measures, at the 2014 Joint Americas and European Committees for Treatment and Research in Multiple Sclerosis Meeting (ACTRIMS-ECTRIMS) in Boston. The data as reported by the lead principal investigator for the UCLA-led Phase 2 study supported the potential of Trimesta to have a novel dual mechanism of action for both the anti-inflammatory effects that improve relapse rate, and a neuroprotective effect that improves standard measures of disability and cognition. Numerous new provisional patent applications have been filed based on the Phase 2 clinical results. This investigator-initiated Phase 2 clinical trial was supported by grants exceeding $8 million, awarded primarily by the National Multiple Sclerosis Society (NMSS) in partnership with the NMSS's Southern California chapter, and the National Institutes of Health. Annual worldwide sales of MS therapies are forecasted to be approximately $17.8 billion in 2019. In July 2015, through our wholly owned subsidiary, we entered into amended license and clinical trial agreements with The Regents of UCLA. We were also informed by UCLA that MRI analyses are ongoing to evaluate changes in the brain that correlate with improvements seen in clinical outcomes, and we expect to report topline MRI data 30 days following our receipt of this data from UCLA. We continue to engage the neurology community and potential strategic partners, as we determine next steps for Trimesta.

Cognitive Dysfunction in MS: Trimesta is also being developed for the treatment of cognitive dysfunction in female MS patients. This 12-month, UCLA-led, randomized, double-blind, placebo-controlled investigator-initiated Phase 2 clinical trial is being conducted at four sites in the United States. The primary endpoint is the effect on cognitive function as assessed by Paced Auditory Serial Addition Test (PASAT). Patient enrollment is ongoing. The majority of the costs of this trial are being funded by grants from foundations and charitable organizations through direct funding to the lead principal investigator and we have pledged approximately $500,000 to UCLA to partially fund this trial, payable over three years. An estimated 50 - 65% of MS patients are expected to develop disabilities due to cognitive dysfunction and there is currently no approved treatment for this indication.

- **Pertussis:** In December 2012, in collaboration with Intrexon, we initiated development of a monoclonal antibody (mAb) therapy for the treatment of Pertussis infections, more commonly known as whooping cough. Combining two mAbs, SYN-005 is designed to target and neutralize pertussis toxin as a prophylaxis for high-risk newborns and in order to reduce the mortality rate in infected infants. To further the development of this potential therapy for Pertussis, we entered into an agreement with The University of Texas at Austin (UT) to license the rights to certain research and pending patents related to pertussis antibodies. We have patents pending on compositions and uses of SYN-005 and we have an issued U.S. patent on other pertussis mAbs from UT. According to the World Health Organization, each year, *B. pertussis* infection is estimated to cause up to 300,000 deaths worldwide, primarily among unvaccinated infants. Positive preclinical research findings for SYN-005 were reported in April 2014, and again in September 2014, for our proprietary mAb combination therapy for treating Pertussis, in non-human primate studies. In September 2014 we received a U.S. Orphan Drug designation for SYN-005 for the treatment of Pertussis.

In April 2015, positive preclinical findings were reported in two posters at ECCMID 2015 (European Congress of Clinical Microbiology and Infectious Diseases). We are seeking non-dilutive funding to support preclinical and clinical development of SYN-005 for prophylaxis and treatment of Pertussis, including the anticipated filing of an IND application and the anticipated initiation of a Phase 1 clinical trial.

- **Phenylketonuria (PKU):** In August 2015, we entered into a third worldwide exclusive channel collaboration with Intrexon through which we intend to develop and commercialize novel biotherapeutics for the treatment of patients with PKU. We will utilize Intrexon's ActoBiotics™ platform providing a proprietary method of delivering therapeutic protein and peptides to the gastrointestinal tract through food-grade microbes. This program is in the discovery stage.

All of our programs are supported by growing patent estates that we either own or exclusively license. In total, each potential product has issued patents that provide protection, and we have approximately 100 U.S. and foreign patents and over 55 U.S. and foreign patents pending.

Since our inception in January 2001, our efforts and resources have been focused primarily on acquiring and developing our product candidates, our clinical trials, raising capital, manufacturing and recruiting personnel. To date, we have financed our operations primarily through public and private sales of our common stock, and we expect to continue to seek to obtain the required capital in a similar manner. We have incurred an accumulated deficit of $127.0 million through June 30, 2015. We cannot provide any assurance that we will be able to achieve profitability on a sustained basis, if at all, obtain the required funding, obtain the required regulatory approvals, or complete additional corporate partnering or acquisition transactions.

Recent Developments

On September 2, 2015, we paid Intrexon a technology access fee by the issuance of 937,500 shares of common stock, having a value equal to $3 million as of August 7, 2015; the NYSE MKT subsequently approved the issuance of these shares. The fee was paid pursuant to the Exclusive Channel Collaboration Agreement (the "Channel Agreement") that we entered into with Intrexon on August 10, 2015 that governs a "channel collaboration" arrangement in which we will use Intrexon's technology relating to the development and commercialization of novel biotherapeutics (a "Collaboration Product") for the treatment of patients with PKU. In addition, upon the achievement of certain milestones, we agreed to pay Intrexon milestone payments of up to $27 million for each product developed. We will pay Intrexon royalties on annual net sales of Collaboration Products, calculated on a product-by-product basis equal to a percent of net sales (ranging from mid-single digits on the first $100 million of net sales to mid-teen digits on net sales in excess of $750 million).

On August 31, 2015, we issued 1,350,000 shares of our common stock to Dr. Mark Pimentel in exchange for all of the shares of common stock of Synthetic Biomics, Inc. held by Dr. Pimentel, in accordance with the Pimentel Agreement, as amended.

On July 21, 2015, we completed a public offering of 15.3 million shares of common stock, including the fully exercised over-allotment option by the underwriters covering 2.0 million shares, at an offering price of $3.00 per share. The total gross proceeds of the offering, including the exercise in full of the over-allotment option, were approximately $46.0 million. Net proceeds, after deducting the underwriters' discount and other estimated expenses, were approximately $42.6 million.

On July 8, 2015, Putney Drug Corp., our subsidiary, and The Regents of UCLA, entered into an amendment to the License Agreement, dated July 11, 2005 (as amended previously), and an amendment to the Clinical Trial Agreement, dated as of April 29, 2010.

Company History

Our predecessor, Sheffield Pharmaceuticals, Inc., was incorporated in 1986, and in 2006 engaged in a reverse merger with Pipex Therapeutics, Inc., a Delaware corporation formed in 2001. After the merger, we changed our name to

Pipex Pharmaceuticals, Inc., and in October 2008 we changed our name to Adeona Pharmaceuticals, Inc. On October 15, 2009, we engaged in a merger with a wholly owned subsidiary for the purpose of reincorporating in the State of Nevada. After reprioritizing our focus on the emerging area of synthetic biologics and entering into our first collaboration with Intrexon, we amended our Articles of Incorporation to change our name to Synthetic Biologics, Inc. on February 15, 2012.

Corporate Information

Our executive offices are located at 9605 Medical Center Drive, Suite 270, Rockville, Maryland 20850. We also maintain an administrative and finance office at 617 Detroit Street, Suite 100, Ann Arbor, Michigan 48104. Our telephone number is (732) 332-7800, and our website address is *www.syntheticbiologics.com* . The information contained on our website is not part of, and should not be construed as being incorporated by reference into this prospectus supplement. As used in this prospectus supplement, unless the context otherwise requires, references to "Synthetic," "we," "us," "our," and similar references refer to Synthetic Biologics, Inc. and our subsidiaries.

RISK FACTORS

An investment in our common stock involves a high degree of risk. You should consider carefully the risks discussed under the section captioned "Risk Factors" contained in our most recent annual report on Form 10-K and in our subsequent quarterly reports on Form 10-Q, as updated by our subsequent filings under the Securities Exchange Act of 1934, as amended (the "Exchange Act"), each of which is incorporated by reference in this prospectus in its entirety, together with other information in this prospectus, and the information and documents incorporated by reference in this prospectus, and any free writing prospectus that we have authorized for use in connection with this offering before you make a decision to invest in our common stock. If any of these events actually occur, our business, operating results, prospects or financial condition could be materially and adversely affected. This could cause the trading price of our common stock to decline and you may lose all or part of your investment.

SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

Some of the statements contained or incorporated by reference in this prospectus may include forward-looking statements that reflect our current views with respect to our ongoing and planned clinical trials, business strategy, business plan, financial performance and other future events. These statements include forward-looking statements both with respect to us, specifically, and the biotechnology sector, in general. We make these statements pursuant to the safe harbor provisions of the Private Securities Litigation Reform Act of 1995. Statements that include the words "expect,""intend,""plan,""believe,""project,""estimate,""may,""should,""anticipate,""will"and similar statements of a future o forward-looking nature identify forward-looking statements for purposes of the federal securities laws or otherwise.

All forward-looking statements involve inherent risks and uncertainties, and there are or will be important factors that could cause actual results to differ materially from those indicated in these statements. We believe that these factors include, but are not limited to, those factors set forth under the caption "Risk Factors" in this prospectus and under the captions "Risk Factors," "Business," and "Management's Discussion and Analysis of Financial Condition and Results of Operations," in our most recent Annual Report on Form 10-K and our subsequent Quarterly Reports on Form10-Q, all of which you should review carefully. Please consider our forward-looking statements in light of those risks as you read this prospectus supplement and the accompanying prospectus. We undertake no obligation to publicly update or review any forward-looking statement, whether as a result of new information, future developments or otherwise.

If one or more of these or other risks or uncertainties materializes, or if our underlying assumptions prove to be incorrect, actual results may vary materially from what we anticipate. All subsequent written and oral forward-looking statements attributable to us or individuals acting on our behalf are expressly qualified in their entirety by this Note. Before purchasing any shares of common stock, you should consider carefully all of the factors set forth or referred to in this prospectus that could cause actual results to differ.

USE OF PROCEEDS

We will not receive any proceeds from the disposition by the Selling Stockholders of any of the Shares covered by this prospectus.

DIVIDEND POLICY

We have never paid cash dividends on our common stock. Moreover, we do not anticipate paying periodic cash dividends on our common stock for the foreseeable future. We intend to use all available cash and liquid assets in the operation and growth of our business. Any future determination about the payment of dividends will be made at the discretion of our board of directors and will depend upon our earnings, if any, capital requirements, operating and financial conditions and on such other factors as our board of directors deems relevant.

SELLING STOCKHOLDERS

This prospectus covers the disposition by the Selling Stockholders identified below, or their transferee(s), of an aggregate of 1,137,500 shares of our common stock. All of the Shares included in this offering were issued as described below.

Agreements with Intrexon

On August 10, 2015, we expanded our relationship with Intrexon and entered into the Channel Agreement with Intrexon that governs a "channel collaboration" arrangement in which we will use Intrexon's technology for development of Collaboration Products for the treatment of PKU in humans by direct administration of a viral construct containing a gene to alter genetic expression of phenyalanine hydroxylase and/or administration of genetically modified bacteria that express an effector directed to the metabolic conversion of phenyalanine (the "Field"). The Channel Agreement grants us a worldwide exclusive license to use the patents and other intellectual property of Intrexon in connection with the research, development, use, importing, manufacture, sale, and offer for sale of Collaboration Products in the Field.

On August 10, 2015, in connection with the Channel Agreement, we entered into the Intrexon Stock Issuance Agreement pursuant to which we issued to Intrexon 937,500 shares of our common stock, having a value equal to $3 million as of August 7, 2015 (the "Technology Access Shares"), which issuance was paid in partial consideration for the execution and delivery of the Channel Agreement. We also agreed to pay Intrexon, milestone payments of up to $27 million for each product developed, royalties on annual net sales of Collaboration Products and a percentage of quarterly revenue obtained from a sublicensor in the event of a sublicensing arrangement.

In connection with the transactions contemplated by the Stock Issuance Agreement with Intrexon, and pursuant to the Second Amendment to Registration Rights Agreement executed and delivered by the parties at the closing, we agreed to file a "resale" registration statement (the "Registration Statement") registering the resale of the 937,500 shares of our common stock being registered under the registration statement of which this prospectus forms a part as well as any other shares to be issued under the Stock Issuance Agreement. None of the Technology Access Shares to be issued under the Stock Issuance Agreement are required to be registered until 120 days after the date of the Second Amendment to Registration Rights Agreement. Under that agreement, we are obligated to use our reasonable best efforts to cause the "resale" registration statement to be declared effective as promptly as practicable after filing and to maintain the effectiveness of the registration statement until all securities therein are sold or are otherwise can be sold pursuant to Rule 144, without any restrictions.

In December 2013, Intrexon purchased 2,000,000 shares of our common stock in our underwritten public offering and NRM VII Holdings I, LLC, an entity indirectly controlled by Randall J. Kirk, the Chief Executive Officer of Intrexon, purchased 500,000 shares of our common stock in our underwritten public offering.

In October 2012, we consummated a private placement and entered into a stock purchase agreement and registration rights agreement with several persons named therein, including NRM VII Holdings I, LLC. NRM VII Holdings I, LLC acquired 3,125,000 shares of our common stock in our October 2012 private placement, which were registered under our registration statement, that was declared effective May 6, 2013.

On August 6, 2012, we expanded our relationship with Intrexon and entered into the Second Exclusive Channel Agreement (the "Second ECC") with Intrexon that governs a "channel collaboration" arrangement in which we will use Intrexon's technology relating to the identification, design and production of human antibodies and DNA vectors for the development and commercialization of monoclonal antibody therapies for the treatment of certain serious infectious diseases the ("Program") for the treatment of specific target infectious disease indications (the "Second ECC Field"). Our development efforts are targeting Pertussis. Such license is exclusive with respect to any clinical development, selling, offering for sale or other commercialization of our products within the Second ECC Field ("Synthetic Products"), and otherwise is non-exclusive. On October 16, 2012, we issued 3,552,210 shares of our common stock as consideration in connection with the Second ECC and the related Stock Issuance Agreement with Intrexon that we entered into on August 6, 2012 (the "Second Stock Issuance Agreement"). In connection with the transactions contemplated by the Second Stock Issuance Agreement, and pursuant to the First Amendment to Registration Rights Agreement (the "First Amendment to Registration Rights Agreement") executed and delivered by the parties at the closing, we filed a "resale" registration statement registering the resale of the 3,552, 210 shares issued under the Second Stock Issuance Agreement and the resale of 3,123,558 shares of our common stock that we issued to Intrexon in consideration for the execution and delivery of the channel agreement which was entered into on November 18, 2011 and terminated on April 16, 2013. The registration statement was declared effective on May 6, 2013.

Agreement with Dr. Pimentel

On December 5, 2013, we and our newly formed, majority owned subsidiary, Synthetic Biomics, Inc. ("SYN Biomics"), entered into a worldwide exclusive license agreement (the "License Agreement") with Cedars-Sinai Medical Center ("CSMC") for the right to develop, manufacture, use, and sell products for the human and veterinary therapeutic and prophylactic treatments for acute and chronic diseases discovered by an investigational team led by Mark Pimentel, M.D. at CSMC to be associated with pathogenic gastrointestinal microorganisms, including for example, irritable bowel syndrome ("IBS"), obesity and type 2 diabetes. Prior to the execution of the CSMC License Agreement, SYN Biomics issued shares of common stock of SYN Biomics to each of CSMC and Dr. Mark Pimentel (the primary inventor of the intellectual property), representing 11.5% and 8.5%, respectively, of the outstanding shares of SYN Biomics (the "SYN Biomics Shares"). The Pimentel Agreement that was entered into with Dr. Pimentel, as amended on August 29, 2015, provides a right, under certain circumstances in the event that the SYN Biomics Shares are not then freely tradeable, and subject to NYSE MKT, LLC approval, as of the 18 and prior to the 36 month anniversary date of the effective date of the Pimentel Agreement, for Dr. Pimentel to exchange his SYN Biomics Shares for unregistered shares of our common stock, with the rate of exchange based upon the relative contribution of the valuation of SYN Biomics to the public market valuation of us at the time of each exchange. On August 31, 2015, Dr. Pimentel was issued 1,350,000 shares of our common stock in exchange for all of the SYN Biomics Shares held by him.

In April 2014, Dr. Pimentel was appointed as the Chairman of our IBS Clinical Advisory Board. In connection therewith, Dr. Pimentel receives a quarterly cash payment and has been issued an aggregate of options exercisable for 20,000 shares of our common stock.

The Selling Stockholders have indicated to us that neither Intrexon nor any of its affiliates nor has Dr. Pimentel held any position or office or had any other material relationship with us in the past three years except as described in this Registration Statement.

The following table sets forth the number of shares of the common stock owned by the Selling Stockholders as of September 30, 2015 and after giving effect to this offering assuming all of the Shares covered hereby are sold by the Selling Stockholders. The percentage of beneficial ownership is based on 90,810,086 shares of our common stock outstanding as of September 30, 2015.

Selling Stockholders	**Beneficial Ownership Before the Sale of**	**Percentage of Beneficial Ownership**	**Total Shares Offered By Selling**	**Beneficial Ownership After the Sale of all**	**Percentage of Beneficial Ownership**

	all Shares Covered by this Prospectus	**Before the Sale of all Shares Covered by this Prospectus**		**Stockholder in the Offering Covered by this Prospectus**	**Shares Covered by this Prospectus(1)**	**After the Sale of all Shares Covered by this Prospectus**	
Intrexon Corporation(2)	9,613,268	10.6	%	937,500	8,675,768	9.6	%
Mark Pimentel, M.D. (3)	1,360,000	1.5	%	200,000	1,160,000	1.3	%
Total	10,973,268	12.1	%	1,137,500	9,835,768	10.8	%

(1) These numbers assume the Selling Stockholders sell all of the Shares being registered in this prospectus, which are being registered in this prospectus.

(2) Randall J. Kirk, the Chief Executive Officer of Intrexon, directly and through certain affiliates has voting and dispositive power over a majority of the outstanding capital of Intrexon. The address for Intrexon Corporation is 20358 Seneca Meadows Pkwy, Germantown, Maryland 20876. Does not include 3,625,000 shares of common stock held by NRM VII Holdings I, LLC.

(3) The address of Dr. Pimentel is c/o Cedars Sinai Medical Center, 8700 Beverly Boulevard, Los Angeles, California 90048-1865. Includes 10,000 shares of common stock issuable upon the exercise of options held by Dr. Pimentel that are exercisable within the 60-day period following September 30, 2015.

PLAN OF DISTRIBUTION

We are registering the Shares previously issued to the Selling Stockholders to permit the resale of these shares of common stock by the Selling Stockholders from time to time after the date of this prospectus. We will not receive any of the proceeds from the sale by the Selling Stockholders of the shares of common stock. We will bear all fees and expenses incident to our obligation to register the shares of common stock.

The Selling Stockholders, or his, its or their pledges, donees, transferees, or any of its successors in interest selling shares received from the Selling Stockholders as a gift, partnership distribution or other non-sale related transfer after the date of this prospectus, may sell all or a portion of the Shares beneficially owned by them and offered hereby from time to time directly or through one or more underwriters, broker-dealers or agents. If the shares of common stock are sold through underwriters or broker-dealers, the Selling Stockholders will be responsible for underwriting discounts or commissions or agent's commissions. The Shares may be sold in one or more transactions at fixed prices, at prevailing market prices at the time of the sale, at varying prices determined at the time of sale, or at negotiated prices. The Selling Stockholders will act independently of us in making decisions with respect to the timing, manner and size of each sale. These sales may be affected in transactions, which may involve crosses or block transactions:

- on any national securities exchange or quotation service on which the securities may be listed or quoted at the time of sale;
- in the over-the-counter market;
- in transactions otherwise than on these exchanges or systems or in the over-the-counter market;
- through the writing of options, whether such options are listed on an options exchange or otherwise;
- 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;
- short sales;
- through the distribution of the common stock by any Selling Stockholders to its partners, members or stockholders;
- through one or more underwritten offerings on a firm commitment or best efforts basis;
- sales pursuant to Rule 144;
- 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 transfer the Shares by gift. The Selling Stockholders may engage brokers and dealers, and any brokers or dealers may arrange for other brokers or dealers to participate in effecting sales of the Shares. These brokers, dealers or underwriters may act as principals, or as an agent of a Selling Stockholders.

Broker-dealers may agree with the Selling Stockholders to sell a specified number of the Shares at a stipulated price per security. If the broker-dealer is unable to sell the Shares acting as agent for the Selling Stockholders, it may purchase as principal any unsold Shares at the stipulated price. Broker-dealers who acquire Shares as principals may thereafter resell the Shares from time to time in transactions in any stock exchange or automated interdealer quotation system on which the Shares are then listed, at prices and on terms then prevailing at the time of sale, at prices related to the then-current market price or in negotiated transactions. Broker-dealers may use block transactions and sales to and through broker-dealers, including transactions of the nature described above.

The Selling Stockholders may also sell the Shares in accordance with Rule 144 under the Securities Act, rather than pursuant to this prospectus, regardless of whether the Shares are covered by this prospectus.

If the Selling Stockholders effect such transactions by selling Shares to or through underwriters, broker-dealers or agents, such underwriters, broker-dealers or agents may receive commissions in the form of discounts, concessions or commissions from the Selling Stockholders or commissions from purchasers of the shares of common stock for whom they may act as agent or to whom they may sell as principal (which discounts, concessions or commissions as to particular underwriters, broker-dealers or agents may be in excess of those customary in the types of transactions involved). In connection with sales of the Shares or otherwise, the Selling Stockholders may enter into hedging transactions with broker-dealers, which may in turn engage in short sales of the Shares in the course of hedging in positions they assume. The Selling Stockholders may also sell Shares short and deliver Shares covered by this prospectus to close out short positions and to return borrowed shares in connection with such short sales. The Selling Stockholders may also loan or pledge Shares to broker-dealers that in turn may sell such shares.

The Selling Stockholders may pledge or grant a security interest in some or all of the Shares owned by it and, if it defaults in the performance of its secured obligations, the pledgees or secured parties may offer and sell the Shares from time to time pursuant to this prospectus or any amendment to this prospectus under Rule 424(b) or other applicable provision of the Securities Act amending, if necessary, the list of Selling Stockholders to include the pledgee, transferee or other successors in interest as Selling Stockholders under this prospectus. The Selling Stockholders also may transfer and donate the Shares in other circumstances in which case the transferees, donees, pledgees or other successors in interest will be the selling beneficial owners for purposes of this prospectus.

In addition, the Selling Stockholders may, from time to time, sell the Shares short, and, in those instances, this prospectus may be delivered in connection with the short sales and the Shares offered under this prospectus may be used to cover short sales.

The Selling Stockholders and any broker-dealer participating in the distribution of the Shares may be deemed to be "underwriters" within the meaning of the Securities Act, and any commission paid, or any discounts or concessions allowed to, any such broker-dealer may be deemed to be underwriting commissions or discounts under the Securities Act. At the time a particular offering of the Shares is made, a prospectus supplement, if required, will be distributed which will set forth the aggregate amount of Shares being offered and the terms of the offering, including the name or names of any broker-dealers or agents, any discounts, commissions and other terms constituting compensation from the Selling Stockholders and any discounts, commissions or concessions allowed or reallowed or paid to broker-dealers. The Selling Stockholders may indemnify any broker-dealer that participates in transactions involving the sale of the Shares against certain liabilities, including liabilities arising under the Securities Act.

Under the securities laws of some states, the Shares may be sold in such states only through registered or licensed brokers or dealers. In addition, in some states the Shares may not be sold unless such shares have been registered or qualified for sale in such state or an exemption from registration or qualification is available and is complied with.

There can be no assurance that the Selling Stockholders will sell any or all of the Shares registered pursuant to the registration statement, of which this prospectus forms a part.

The Selling Stockholders and any other person participating in such distribution will be subject to applicable provisions of the Exchange Act and the rules and regulations thereunder, including, without limitation, Regulation M of the Exchange Act, which may limit the timing of purchases and sales of any of the shares of common stock by the Selling Stockholders and any other participating person. Regulation M may also restrict the ability of any person engaged in the distribution of the Shares 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 and the ability of any person or entity to engage in market-making activities with respect to the Shares.

The Shares offered hereby were originally issued to the Selling Stockholders pursuant to an exemption from the registration requirements of the Securities Act. We agreed to register the Shares under the Securities Act. We will pay all expenses of the registration of the Shares estimated to be $30,000 in total, including, without limitation, SEC filing fees.

Once sold under the registration statement, of which this prospectus forms a part, the Shares will be freely tradable in the hands of persons other than our affiliates.

DESCRIPTION OF CAPITAL STOCK

Authorized Capital

Our authorized capital consists of 250 million shares of common stock, par value $0.001 per share, and 10 million shares of preferred stock, par value $0.001 per share. As of September 30, 2015, 90,891,568 of common stock were issued and 90,810,086 were outstanding, and no shares of preferred stock were issued and outstanding.

Common Stock

We may issue shares of our common stock from time to time. Holders of shares of common stock have the right to cast one vote for each share of common stock in their name on our books, whether represented in person or by proxy, on all matters submitted to a vote of holders of common stock, including election of directors. There is no right to cumulative voting in election of directors. Except where a greater requirement is provided by statute, by our articles of incorporation, or by our bylaws, the presence, in person or by proxy duly authorized, of the one or more holders of a majority of the outstanding shares of our common stock constitutes a quorum for the transaction of business. The vote by the holders of a majority of outstanding shares is required to effect certain fundamental corporate changes such as liquidation, merger, or amendment of our articles of incorporation. Upon our liquidation, dissolution or winding up, holders of our common stock are entitled to share ratably in all assets remaining after payment of liabilities and the liquidation preferences of any outstanding shares of preferred stock.

There are no restrictions in our articles of incorporation or bylaws that prevent us from declaring dividends. We have not declared any dividends, and we do not plan to declare any dividends in the foreseeable future.

Holders of shares of our common stock are not entitled to preemptive or subscription or conversion rights, and no redemption or sinking fund provisions are applicable to our common stock. All outstanding shares of common stock are, and the shares of common stock sold in the offering will when issued be fully paid and non-assessable.

Future Potential Stock Issuances

On August 10, 2015, we entered into the Channel Agreement with Intrexon. On September 2, 2015, we issued 937,500 shares of our common stock to Intrexon, which issuance is deemed paid in consideration for the execution and delivery of the Channel Agreement. We also agreed to pay Intrexon milestone payments of up to $27 million for each product developed as follows: (i) $2 million upon first doing of a patient in a Phase 1 clinical trial upon commencement of an IND, payable in stock or cash at our option; (ii) 30 days after achievement of the first commercial sale of a Collaboration Product in the United States or approval of a New Drug Application and/or Biologics License Application for a Collaboration Product by the U.S. Food and Drug Administration; and (iii) 30 days after achievement of the first commercial sale of a Collaboration Product in a nation subject to the authority of the European Medicines Agency (the “EMA”) or approval of a Marketing Authorization Application for a Collaboration Product by the EMA.

On August 6, 2012, we entered into the Second ECC with Intrexon. On October 16, 2012, we issued 3,552,210 shares of our common stock to Intrexon, which issuance is deemed paid in consideration for the execution and delivery of the Second Channel Agreement. We also agreed upon the filing of an Investigational New Drug application with the U.S. Food and Drug Administration for a Synthetic Product (as defined in the agreement), or alternatively the filing of the first equivalent regulatory filing with a foreign regulatory agency (both as applicable, the “IND Milestone Event”), to pay Intrexon either (i) $2 million in cash, or (ii) that number of shares of common stock having a fair market value equaling $2 million where such fair market value is determined using published market data of the share price for common stock at the close of market on the business day immediately preceding the date of public announcement of attainment of the IND Milestone Event. We also agreed upon the first to occur of either first commercial sale of a Synthetic Product in a country or the granting of the regulatory approval of that Synthetic Product (both as applicable, the “Approval Milestone Event”), to pay to Intrexon either (i) $3 million in cash, or (ii) that number of shares of common stock having a fair market value equaling $3 million where such fair market value is determined using published market data of the share price for common stock at the close of market on the business day immediately preceding the date of public announcement of attainment of the Approval Milestone Event.

On December 5, 2013, we and SYN Biomics entered into the License Agreement with CSMC. The License Agreement also provides for the payment of certain milestone payments, at our option, in cash or shares of our

common stock. In addition, the Stock Purchase Agreement for the SYN Biomics Shares that was entered into with CSMC also provides for the right under certain circumstances for CSMC to exchange a portion of its SYN Biomics shares for unregistered shares of our common stock.

Outstanding Warrants

As of September 30, 2015, we had issued and outstanding a total of 7,908,899 warrants to purchase our common stock outstanding at a weighted-average price of $1.79.

Outstanding Options

As of September 30, 2015, we had issued and outstanding a total of 7,451,929 options to purchase our common stock outstanding at a weighted-average price of $2.01.

LEGAL MATTERS

Parsons Behle & Latimer, Reno, Nevada will pass upon certain legal matters relating to the issuance and sale of the common stock offered hereby. Additional legal matters may be passed upon for us or any underwriters, dealers, of agents, by counsel that we will name in the applicable prospectus supplement.

EXPERTS

The financial statements of Synthetic Biologics, Inc. as of December 31, 2014 and 2013 and for each of the three years ended in the period ended December 31, 2014 and management’s assessment of the effectiveness of internal control over financial reporting as of December 31, 2014 incorporated by reference in this prospectus have been so incorporated in reliance on the reports of BDO USA, LLP, an independent registered accounting firm, incorporated herein by reference, given on authority of said firm as experts in auditing and accounting.

WHERE YOU CAN FIND MORE INFORMATION

We file annual, quarterly and special reports, proxy statements and other information with the SEC. You may read and copy any document we file 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. Our public filings are also available to the public at the SEC's web site at http://www.sec.gov.

This prospectus is part of a registration statement on Form S-3 that we have filed with the SEC under the Securities Act. This prospectus does not contain all of the information in the registration statement. We have omitted certain parts of the registration statement, as permitted by the rules and regulations of the SEC. You may inspect and copy the registration statement, including exhibits, at the SEC's public reference room or Internet site.

INCORPORATION OF CERTAIN DOCUMENTS BY REFERENCE

The SEC allows us to "incorporate by reference" the information we file with it which means that we can disclose important information to you by referring you to those documents instead of having to repeat the information in this prospectus. The information incorporated by reference is considered to be part of this prospectus, and later information that we file with the SEC will automatically update and supersede this information. We incorporate by reference the documents listed below and any future filings made with the SEC (other than any portions of any such documents that are not deemed "filed" under the Exchange Act in accordance with the Exchange Act and applicable SEC rules) under Sections 13(a), 13(c), 14 or 15(d) of the Exchange Act between the date of this prospectus and the termination of the offering:

- Our annual report on Form 10-K for the fiscal year ended December 31, 2014 filed with the SEC on March 16, 2015 (File No. 001-12584);
- Our quarterly report on Form 10-Q for the quarter ended March 31, 2015 filed with the SEC on May 11, 2015 and our quarterly report on Form 10-Q for the quarter ended June 30, 2015 filed with the SEC on August 10, 2015 (File No. 001-12584);
- Our current reports on Form 8-K filed with the SEC on January 12, 2015, March 19, 2015, May 4, 2015, May 18, 2015, June 16, 2015, July 9, 2015, July 17, 2015, August 10, 2015 and September 3, 2015 (File No. 001-12584);
- Our definitive proxy statement on Schedule 14A filed with the SEC on April 13, 2015 (File No. 001-12584); and

- The description of our common stock set forth in our registration statement on Form 8-A12B, filed with the SEC on June 20, 2007 (File No. 000-12584).

You may obtain, free of charge, a copy of any of these documents (other than exhibits to these documents unless the exhibits are specifically incorporated by reference into these documents or referred to in this prospectus) by writing or calling us at the following address and telephone number: Synthetic Biologics, Inc., 617 Detroit Street, Suite 100 Ann Arbor, Michigan 48104. (734) 332-7800.

DISCLOSURE OF THE SECURITIES AND EXCHANGE COMMISSION POSITION ON INDEMNIFICATION FOR SECURITIES ACT LIABILITIES

Our amended and restated bylaws and Articles of Incorporation contain provisions that permit us to indemnify our directors and officers to the full extent permitted by Nevada law, and our Articles of Incorporation, as amended, contains provisions that eliminate the personal liability of our directors in each case for monetary damages to us or our stockholders for breach of their fiduciary duties, except to the extent that Nevada law prohibits indemnification or elimination of liability. These provisions do not limit or eliminate our rights or the rights of any stockholder to seek an injunction or any other non-monetary relief in the event of a breach of a director's or officer's fiduciary duty. In addition, these provisions apply only to claims against a director or officer arising out of his or her role as a director or officer and do not relieve a director or officer from liability if he or she engaged in willful misconduct or a knowing violation of the criminal law or any federal or state securities law.

The rights of indemnification provided in our amended and restated bylaws are not exclusive of any other rights that may be available under any insurance or other agreement, by vote of stockholders or disinterested directors or otherwise.

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

1,137,500 Shares

Common Stock

You should rely only on the information contained or incorporated by reference in this prospectus. We have not authorized anyone to provide you with different information. You should not assume that the information contained or incorporated by reference in this prospectus is accurate as of any date other than the date of this prospectus. We are not making an offer of these securities in any state where the offer is not permitted.