MARRONE BIO INNOVATIONS INC
Form 10-K
March 29, 2019

UNITED STATES

SECURITIES AND EXCHANGE COMMISSION

Washington, D.C. 20549

FORM 10-K

(Mark One)

[X] **ANNUAL REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the fiscal year ended December 31, 2018

or

[ ] **TRANSITION REPORT PURSUANT TO SECTION 13 OR 15(d) OF THE SECURITIES EXCHANGE ACT OF 1934**

For the transition period from _____ to _____

Commission File Number: 001-36030

Marrone Bio Innovations, Inc.

(Exact name of registrant as specified in its charter)

Delaware	**20-5137161**
(State or other jurisdiction of incorporation or organization)	**(I.R.S. Employer Identification No.)**

1540 Drew Avenue, Davis, California 95618

(Address of principal executive offices and zip code)

(530) 750-2800

(Registrant's telephone number, including area code)

Securities registered pursuant to Section 12(b) of the Act:

Class	**Exchange on which registered**
Common Stock, $0.00001 par value	**Nasdaq Capital Market**

Securities registered pursuant to Section 12(g) of the Act: None

Indicate by check mark if the registrant is a well-known seasoned issuer, as defined in Rule 405 of the Securities Act.

Yes [ ] No [X]

Indicate by check mark if the registrant is not required to file reports pursuant to Section 13 or Section 15(d) of the Act. Yes [ ] No [X]

Indicate by check mark whether the registrant (1) has filed all reports required to be filed by Section 13 or 15(d) of the Securities Exchange Act of 1934 during the preceding 12 months (or for such shorter period that the registrant was required to file such reports), and (2) has been subject to such filing requirements for the past 90 days. Yes [X] No [ ]

Indicate by check mark whether the registrant has submitted electronically every Interactive Data File required to be submitted pursuant to Rule 405 of Regulation S-T (§ 232.405 of this chapter) during the preceding 12 months (or for such shorter period that the registrant was required to submit such files). Yes [X] No [ ]

Indicate by check mark if disclosure of delinquent filers pursuant to Item 405 or Regulation S-K (§ 229.405 of this chapter) is not contained herein, and will not be contained, to the best of the registrant's knowledge, in definitive proxy or information statements incorporated by reference in Part III of this Form 10-K or any amendment to this Form 10-K. [ ]

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

Large accelerated filer	[ ]	Accelerated filer	[X]
Non-accelerated filer	[ ]	Smaller reporting company	[X]
Emerging growth company	[ ]		

If an emerging growth company, indicate by check mark if the registrant has elected not to use the extended transition period for complying with any new or revised financial accounting standards provided pursuant to Section 13(a) of the Exchange Act. [ ]

Indicate by check mark whether the registrant is a shell company (as defined in Rule 12b-2 of the Act). Yes [ ] No [X]

As of June 30, 2018, the last day of the registrant's most recently completed second quarter, the aggregate market value of the registrant's voting and non-voting common stock held by non-affiliates was $99,473,099 based upon the closing price of the common stock as reported on the Nasdaq Capital Market. This calculation excludes the shares of

common stock held by each officer, director and holder of 5% or more of the outstanding common stock as of June 30, 2018. This calculation does not reflect a determination that such persons are affiliates for any other purposes.

Indicate the number of shares outstanding of each of the issuer's classes of common stock, as of the latest practicable date.

Class	**Shares Outstanding at March 18, 2019**
Common Stock, $0.00001 par value	110,690,532

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's Proxy Statement for its 2018 Annual Meeting of Stockholders are incorporated by reference in Part III of this Annual Report on Form 10-K where indicated. Such proxy statement is expected to be filed with the Securities and Exchange Commission within 120 days of the registrant's fiscal year ended December 31, 2018.

TABLE OF CONTENTS

Special Note Regarding Forward-Looking Statements and Trade Names

This Annual Report on Form 10-K includes a number of forward-looking statements that involve many risks and uncertainties. Forward-looking statements may be identified by the use of the words “would”, “could”, “will”, “may”, “expect” “believe”, “should”, “anticipate”, “outlook”, “if”, “future”, “intend”, “plan”, “estimate”, “predict”, “potential”, “targets”, “seek similar words and phrases, including the negatives of these terms, or other variations of these terms, that denote future events. These forward-looking statements include: our plans to target our existing products or product variations for new markets and for new uses and applications; our plans and expectations with respect to growth in sales of our product lines; our ability and plans to develop, register and commercialize additional new product candidates and bring new products to market across multiple categories faster and at a lower cost than other developers of pest management products, including research, development and field trial plans; our expectations regarding registering new products and new formulations and expanded use labels for existing products; our belief that challenges facing the use of conventional chemical pesticides will continue to grow; our beliefs regarding the growth of markets for, and unmet demand for, bio-based products; our beliefs regarding market adoption of our products and our ability to compete in our target markets; our intention to maintain existing, and develop new, supply, sales and distribution channels and extend market access; expectations regarding potential future payments under strategic collaboration and development agreements; our plans and expectations relating to our debt agreements; management’s belief regarding our access to capital resources through equity offerings, debt financings, strategic collaborations or other means; our plans to grow our business while improving efficiency, including by focusing on a limited number of product candidates, taking measures to reduce expenses and expanding our sales and marketing team; our plans and expectations with respect to manufacturing and production; our plans to seek third-party collaborations to develop and commercialize more early stage product candidates; our intention to continue to devote significant resources toward our proprietary technology and research and development; our expectations that sales will be seasonal and the impact of weather-related conditions; our ability to protect our intellectual property in the United States and abroad; our beliefs regarding the effects of the outcome of certain legal matters; our anticipated impact of certain accounting pronouncements; our ability to use carryforwards; our expectations regarding market risk, including interest rate changes, foreign currency fluctuations and commodity price changes; our expectations with respect to future regulatory restrictions on competing products or product ingredients and our future expenditures, available cash and other financial and operating results. These statements reflect our current views with respect to future events and our potential financial performance and are subject to risks and uncertainties that could cause our actual results and financial position to differ materially and adversely from what is projected or implied in any forward-looking statements included in this Annual Report on Form 10-K. These factors include, but are not limited to, the risks described under Part I–Item 1A—”Risk Factors,” Part II–Item 7—”Management’s Discussion and Analysis of Financial Condition and Results of Operations,” elsewhere in this Annual Report on Form 10-K and those discussed in other documents we file with the U.S. Securities and Exchange Commission (“SEC”). We make these forward-looking statements based upon information available on the date of this Annual Report on Form 10-K, and we have no obligation (and expressly disclaim any such obligation) to update or alter any forward-looking statements, whether as a result of new information or otherwise except as otherwise required by securities regulations.

As used herein, “MBI”, the “Company”, “we”, “our” and similar terms refer to Marrone Bio Innovations, Inc., unless the context indicates otherwise.

Except as context otherwise requires, references in this Annual Report on Form 10-K to our product lines, such as Regalia, refer collectively to all formulations of the respective product line, such as Regalia Maxx, Regalia Rx or Regalia SC, and all trade names under which our distributors sell such product lines internationally, such as Sakalia TM, Sentry® or Milsana®. Our logos, Grandevo®, Regalia®, Venerate®, Zequanox®, Haven®, Majestene®, Stargus®, Zelto®, Amplitude™, Enoble ™ and other trade names, trademarks or service marks of Marrone Bio Innovations, Inc. appearing herein are the property of Marrone Bio Innovations, Inc. This Annual Report on Form 10-K contains additional trade names, trademarks and service marks of other companies, such as Bio-Tam ® 2.0 and Jet-Ag ®. We do not intend our use or display of other companies' trade names, trademarks or service marks to imply relationships with, or endorsement or sponsorship of us by, these other companies.

PART I

ITEM 1. BUSINESS

We make bio-based pest management and plant health products. Bio-based products are comprised of naturally occurring microorganisms, such as bacteria and fungi, and plant extracts. Our current products target the major markets that use conventional chemical pesticides, including certain agricultural and water markets, where our bio-based products are used as alternatives for, or mixed with, conventional chemical pesticides. We also target new markets for which (i) there are no available conventional chemical pesticides, (ii) the use of conventional chemical pesticides may not be desirable (including for organically certified crops) or permissible either because of health and environmental concerns or (iii) because the development of pest resistance has reduced the efficacy of conventional chemical pesticides. Six of our seven product lines are approved by the United States Environmental Protection Agency ("EPA") and registered as "biopesticides." Our first non-EPA product is Haven, a plant health product that is a "biostimulant," which only requires state registration. We believe our current portfolio of products and our pipeline address the growing global demand for effective, efficient and environmentally responsible products to control pests, increase crop yields and reduce crop stress.

We primarily sell our products to the crop protection market and also have one plant health product, Haven, that reduces plant stress in drought and intense sunlight. Our five commercially available crop protection product lines are Regalia, for controlling plant disease and increasing plant health, Grandevo and Venerate, each for insect and mite control, Majestene and its turf and ornamentals counterpart brand Zelto, for nematode control and Stargus and its row crop counterpart brand Amplitude, for downy mildew and white mold control. These products can be used in both conventional and organic crop production, and historically have been primarily sold to growers of specialty crops such as grapes, citrus, tomatoes, vegetables, nuts, leafy greens and ornamental plants. In January 2017, we entered into a strategic collaboration with Albaugh, LLC ("Albaugh"), to reach the seed treatment platform with our Venerate product, which expanded our reach to row crops including cotton, soybeans and corn. In May 2017, we entered into an agreement with Jet Harvest Solutions to distribute Jet-Ag biofungicide and disinfectant in certain regions of the United States. We believe that these existing crop protection and plant health products, or variations thereof, such as Zelto (launched in January 2018), can also be specifically targeted for industrial and institutional, turf and ornamental, home and garden, or animal health uses such as controlling grubs, ants, flies and mosquitoes in and around schools, parks, golf courses and other public-use areas.

We have also developed Zequanox, a commercially available product line that we sell to the water treatment market. Zequanox selectively controls invasive mussels that cause significant infrastructure and ecological damage across a broad range of in-pipe and open-water applications, including hydroelectric and thermoelectric power generation, industrial applications and recreation. We continue to work with power and industrial plants to treat mussel infestations and have also received continued interest from government agencies to use Zequanox to assist in rehabilitating mussel-infested Great Lakes ecosystems.

We continue to execute on our strategic plan, which focuses our resources on improving and promoting our commercially available products, advancing product candidates that are expected to have the greatest impact on near-term growth potential and expanding our international presence and international commercialization of our products. We also continue to focus on finding ways to reduce expenses, conserve cash and improve operating efficiencies, to extract greater value from our products and product pipeline and to improve our support of the global sustainability movement that is core to our cultural values.

In connection with this strategy, we are concentrating new headcount on sales and marketing, with increased focus on large growers in our top target crops, on-farm demonstrations, trainings and education on our products, while continuing to provide our product development staff with responsibility for technical sales support, field-trials and demonstrations to promote sales growth. For markets other than high-value specialty crops, such as row crops and seed treatments, we are seeking to expand our network of distribution partners, focusing on regional and national distributors operating in the United States, Canada and other countries that present a significant opportunity for near-term revenue generation. Our research and development efforts are focused on supporting existing commercial products with a focus on reducing cost of product revenues, further understanding the modes of action, manufacturing support and improving formulations. Accordingly, while we believe that we have developed a robust pipeline of novel product candidates, we are currently limiting our internal development efforts to two product candidates since launching Haven and Stargus/Amplitude in 2017 and Zelto in 2018: MBI-014, a bioherbicide that is based on the same microorganism in Venerate and Majestene/Zelto, which we submitted to the EPA in August 2018 and MBI-601 (Ennoble), a biopesticide that produces gaseous natural compounds that function as a “biofumigant,” which was approved by the EPA in November 2016. Simultaneously, we are seeking collaborations with third parties to develop and commercialize early stage pipeline candidates on which we have elected not to currently expend significant internal resources. We believe that, collectively, these measures will best position us to continue to respond to business challenges while remaining committed to our long-term, global vision.

Industry Overview

Pest management and plant health is an important global industry. Phillips McDougall, an independent advisory firm, estimates the 2017 world agrichemical market (crop protection) at the distributor level at $54.2 billion, increasing 2.5% from 2016, with Asia first at $16.3 billion in sales, followed by Latin America at $12.7 billion, Europe at $12.4 billion, the NAFTA region at $10.7 billion and the Middle East and Africa at $2.1 billion. The total agrichemical market including non-crop pesticides increased by 2.6% to $61.5 billion. The cost and time to bring one new chemical pesticide to market is estimated at over $286.0 million and an average of 11 years.

While industry estimates vary, our research shows that the global seed treatment market, which we entered in 2017 through our strategic partner Albaugh, was approximately $5 billion in 2017, and is projected to increase at a compound annual growth rate of approximately 8-10% over the next five years. This crop protection category is expected to be the fastest growing segment over the next several years with insecticides currently the largest share of this segment.

Most of the markets we currently target or plan to target primarily rely on conventional chemical pesticides, plant growth regulators and plant health products, supplemented in certain agricultural markets by the use of genetically modified crops. Generally, conventional chemical pesticides are synthetic materials that directly kill or inactivate pests. Some chemicals can also increase or regulate plant growth and have other plant health effects in the absence of pests and plant diseases.

Demand for effective and environmentally responsible bio-based products continues to expand as growers increasingly see how bio-based products can enhance their return on investment. The global market for biopesticides, which control pests by non-toxic mechanisms including inhibiting feeding, stopping development or disrupting mating, was valued at $4.5 billion in 2017 and has been projected to grow to $8.7 billion in 2022, reflecting a 14.0% compound annual growth rate over the period, according to BCC Research, an independent market research firm. DunhamTrimmer, a market research company, estimates the 2017 biocontrol (or pesticides) market at $3.3 billion, with a compound annual growth rate of more than 17% through 2020, compared to less than 6% compound annual growth rate for the conventional global crop protection (or synthetic pesticide) market. Similarly, the biostimulant market, which we entered in 2017 with Haven, is growing about 12-15% annually. We believe these trends will continue as the benefits of using bio-based pest management and plant health products become more widely known.

Crop Protection

Conventional Production. Growers are constantly challenged to supply the escalating global demand for food, while reducing the negative impact of crop protection and production practices on consumers, farm workers and the

environment. The dominant technologies for crop protection are conventional chemical pesticides and genetically modified crops. Major agrichemical companies have invested billions of dollars to develop genetically modified crops that resist pests or have high tolerance to conventional chemical pesticides. The market for genetically modified crop seeds was estimated at $21.4 billion in 2017, up 6.9% from 2016, according to Phillips McDougall. In addition, according to the International Service for the Acquisition of Agri-biotech Applications, a third-party not-for-profit organization, in 2017, 189.8 million hectares (469 million acres) were planted with genetically modified crops in 24 countries, with the United States, Brazil, Argentina, Canada and India planting the most (in that order). Soybean, corn, cotton and canola plantings have made the greatest inroads.

Conventional chemical pesticides and genetically modified crops have historically been effective in controlling pests. However, there are increasing challenges facing the use of conventional chemical pesticides such as pest resistance and environmental, consumer and worker safety concerns. Governmental agencies are further pressuring growers, distributors and manufacturers by restricting or banning certain forms of conventional chemical pesticide usage. In the European Union ("EU"), some conventional chemical pesticide products have been phased out, as well as at local levels, where many city and county governments have prohibited the sale of certain conventional chemical pesticide products, magnifying the complexity of agrichemical companies' distribution and regulatory compliance. Consumers, scientists and environmental groups have also voiced concerns about the unintended effects of genetically modified crops, including pest resistance and contamination of non-genetically modified crops. In response to consumer and environmental group concerns and restrictions by importing countries, several large-scale food purchasers have demanded that their contract growers supply them only non-genetically modified crops and a significant number of supermarket chains, food processors and key purchasers of specialty fruits, nuts and vegetables are imposing synthetic chemical residue restrictions, limiting pesticide options available to growers close to harvest.

In response, an increasing number of growers are implementing integrated pest management ("IPM") programs that, among other things, combine bio-based pest management products and crop cultivating practices and techniques such as crop rotation, with conventional chemical pesticides and genetically modified crops. Bio-based pest management products are becoming a larger component of IPM programs due in part to continued challenges associated with conventional chemical pesticides and genetically modified crops.

Organic Production. Certified organic crops such as food, cotton and ornamental plants, are produced without the use of synthetic chemicals, genetic modification or any other bioengineering or adulteration. As such, organic growers are limited in the number of alternatives for pest management. The U.S. Department of Agriculture, or the USDA, approved national production and labeling standards for organic food marketed in the United States in late 2000. These standards have contributed to the growth of organic food consumption in the United States, and other countries have implemented similar programs. According to the Organic Trade Association, a trade association of organic suppliers, in 2017, U.S. organic sales of food and fiber were $49.4 billion, of which $45.2 billion were organic food sales, representing 5.5% of all food sales. In 2017, organic food sales grew 6.4% compared to only 1.1% growth for total food sales. Organic fruits and vegetables comprised $16.5 billion of sales in 2017, up 5.3% from 2016. Globally, organic food sales reached $97 billion in 2017, with 69.8 million hectares planted, according to a study by the Research Institute of Organic Agriculture performed on behalf of the International Foundation for Organic Agriculture. We believe this growing demand is primarily driven by concerns about food safety and the adverse environmental effects of conventional chemical pesticides and genetically modified crops.

Water Treatment

Global demand for water treatment products was estimated to be $30.6 billion in 2017, rising 5.3% annually, according to The Freedonia Group, an independent market research firm. Demand for water treatment chemicals in the United States is forecast to rise 3.2% per year to $7.5 billion in 2019, with volume reaching 15.5 billion pounds. Invasive and native pest species are increasingly a concern in diverse applications such as hydroelectric and

thermoelectric power generation, industrial applications, drinking water, aquaculture, irrigation and recreation. However, discharge of water treatment chemicals to target these pests is highly regulated, and in many cases, such as with management of open waters and sensitive environmental habitats, use of conventional chemicals is prohibited.

One particular area of concern has been the damage caused by invasive zebra and quagga mussels, which clog pipes, disrupt ecosystems, encrust infrastructure and blanket beaches with razor-sharp shells. These species initially infested the Great Lakes region and have spread across the United States. Industry reports estimate that these mussels cause approximately $1.0 billion in damage and associated control costs annually in parts of the United States alone. There are limited treatment options available, many of which are toxic to aquatic flora and fauna. To date, most treatment options have been focused either on manual removal of the mussels, which is time consuming and costly, or conventional chemical treatments, which potentially jeopardize the environment and are thus heavily controlled by regulatory agencies.

The water treatment market also includes products to control algae, aquatic weeds and unwanted microorganisms. For example, one of the most effective and popular methods for controlling algae and unwanted microorganisms is chlorination. One of the major concerns in using chlorination in surface water supplies is that chlorine combines with various organic compounds to form by-products, some of which are considered possible carcinogens.

Other Target Markets

We are also taking steps through strategic collaborations to commercialize our existing crop protection products, or variations thereof, for other markets. Although conventional chemical pesticides have traditionally serviced the industrial and institutional, professional turf and ornamental, home and garden and animal health markets, governmental regulations are restricting their use, and reports indicate that end users increasingly value environmentally friendly products, with some households willing to forego pest control treatments entirely if alternatives to conventional chemical pesticides are not available.

Benefits of Bio-Based Pest Management and Plant Health Products

While conventional chemical pesticides are often effective in controlling pests, some of these chemicals are acutely toxic, some are suspected carcinogens, and some can have other harmful effects on the environment and other animals. Health and environmental concerns have prompted stricter legislation around the use of conventional chemical pesticides, particularly in Europe, where the use of some highly toxic or endocrine-disrupting chemical pesticides is banned or severely limited and the importation of produce is subject to strict regulatory standards on pesticide residues. In addition, the EU has passed the Sustainable Use Directive, which requires EU-member countries to reduce the use of conventional chemical pesticides and to use alternative pest management methods, including bio-based pest management products. Over the past two decades, U.S. regulatory agencies have also developed stricter standards and regulations. Furthermore, a growing shift in consumer preference towards organic and sustainable food production has led many large, global food retailers to require their supply chains to implement these practices, including the use of bio-based pest management and fertilizer solutions, water and energy efficiency practices and localized food product sourcing.

Aside from the health and environmental concerns, conventional chemical pesticide users face additional challenges such as pest resistance and reduced worker productivity as workers may not return to the fields for a certain period of time after treatment. Similar risks and hazards are also prevalent in the water treatment market, as chlorine and other chemicals used to control invasive water pests contaminate and endanger natural waterways. Costs of using conventional chemical pesticides are also increasing due to a number of factors, including raw materials costs, stringent regulatory requirements and pest resistance to conventional chemical pesticides, which requires increasing application rates or the use of more expensive alternative products.

As the cost of conventional chemical pesticides increases, the use of conventional chemical pesticides and genetically modified crops meets increased opposition from government agencies and consumers, and the efficacy of bio-based pest management and plant health products becomes more widely recognized among growers, bio-based pest management products are gaining popularity and represent a strong growth sector within the market for pest management technologies. Growers are increasingly incorporating bio-based pest management products into IPM

programs as they recognize that bio-based products can make their programs better by increasing yields and quality and return on investment. Bio-based pest management products help create the type of sustainable agriculture programs that growers and food companies increasingly emphasize.

The EPA registers biopesticides in two major categories: (i) microbial pesticides, which contain a microorganism such as a bacterium or fungus (dead or living) as the active ingredient and (ii) biochemical pesticides, which are naturally occurring substances such as insect mating disruption pheromones, certain plant extracts and fatty acids that have a non-toxic mode of action. Biostimulants, which are not registered by the EPA absent additional pest control usages, are microorganisms or natural substances derived from microorganisms or plants that growers use to reduce plant stress, stimulate plant physiology to increase yield, manage pest resistance and reduce chemical residues.

Many bio-based pest management products can perform as well as or better than conventional chemical pesticides. When used in rotation or in spray tank mixtures with conventional chemical pesticides, bio-based pest management products can increase crop yields and quality over chemical-only programs. Agricultural industry reports, as well as our own research, indicate that bio-based pest management products can affect plant physiology and morphology in ways that may improve crop yield and can increase the efficacy of conventional chemical pesticides. In addition, pests rarely develop resistance to bio-based pest management products due to their complex modes of action. Likewise, bio-based pest management products have been shown to extend the product life of conventional chemical pesticides and limit the development of pest resistance, a key issue facing users of conventional chemical pesticides, by eliminating pests that survive conventional chemical pesticide treatments. Most bio-based pest management products are listed for use in organic farming, providing those growers with compelling pest control options to protect yields and quality. Given their generally lower toxicity compared with many conventional chemical pesticides, bio-based pest management products can add flexibility to harvest timing and worker re-entry times and can improve worker safety. Many bio-based pest management products are also exempt from regulations limiting residues that apply to conventional chemical pesticides. Bio-based pest management products may not be subject to restrictions by food retailers and governmental agencies limiting chemical residues on produce (“exempt from tolerance”), which enables growers to export to wider markets. In addition to performance attributes, bio-based pest management products registered with the EPA as biopesticides can offer other advantages over conventional chemical pesticides. From an environmental perspective, biopesticides have low toxicity, posing low risk to most non-target organisms, including humans, other mammals, birds, fish and beneficial insects. Biopesticides are biodegradable, resulting in less risk to surface water and groundwater and generally have low air-polluting volatile organic compound content. Because biopesticides tend to pose fewer risks than conventional pesticides, the EPA offers a more streamlined registration process for these products, which generally requires significantly less toxicological and environmental data and a lower registration fee. As a result, both the time and money required to bring a new product to market are reduced.

Our Solution

We produce bio-based pest management and plant health products that are effective and generally designed to be compatible with existing pest control equipment and infrastructure. This allows them to be used as alternatives to, or mixed with, conventional chemical pesticides, as well as in markets for which there are no available conventional chemical pesticides, or the use of conventional chemical products may not be desirable or permissible because of health and environmental concerns. We believe that compared with conventional chemical pesticides, our products:

- can be competitive in both price and efficacy;
- are exempt from residue restrictions applicable to conventional chemical pesticides in both the agriculture and water markets;
- provide viable alternatives where conventional chemical pesticides and genetically modified crops are subject to regulatory restrictions;
- meet stringent organic farming requirements;
- comply with market-imposed requirements for pest management programs by food processors and retailers;
- improve worker productivity by shortening field re-entry times after spraying and allowing spraying up to the time of harvest;
- are less likely to result in the development of pest resistance; and
- are environmentally and bee friendly.

In addition, our experience has shown that when our products are mixed with conventional chemical pesticides, they can:

- increase the effectiveness of conventional chemical pesticides while reducing their required application levels;
- increase levels of pest control and consistency of control;
- increase crop yields;
- increase crop quality, including producing crops with higher levels of protein, better taste and color and more attractive flowers; and
- delay the development of pest resistance to conventional chemical pesticides.

We believe that the benefits of our products will encourage sustained adoption by end users. For example, we have seen that growers that have used our products on a trial basis in one year have generally continued to use our products in higher levels in subsequent years.

Our Competitive Strengths

Focus on Bio-Based Products

Our belief in and commitment to our vision is our greatest strength. We believe that the world needs more organic and sustainable products and practices, and our goal is to champion that cause. Our experience has shown that by using bio-based pest management and plant health products, growers can benefit the environment and produce more healthy food while improving yields. However, bio-based products have application methods and modes of action that differ fundamentally from conventional chemical products. While major agrichemical companies sell bio-based products, we do not believe that those companies have sufficiently prioritized bio-based products or invested in the internal and external education that is essential to successfully promote these products, and those companies are often conflicted when marketing both conventional chemical products and bio-based products. In contrast, we believe MBI has long been recognized as a thought leader in the bio-based product industry, and we have consistently sought to educate growers in the use and benefits of these products, both alone and mixed with conventional chemical products. We believe our drive to convert acres to these sustainable practices will make us disruptive.

Commercially Available Products

We have seven commercially available product lines including five crop protection lines (Regalia, Grandevo, Venerate, Majestene/Zelto and Stargus/Amplitude), our plant health product Haven, and Zequanox for water treatment. All of our products requiring EPA registration have been approved. Haven, which is a plant health product designed to increase yield and quality, is not subject to EPA registration. Regalia is also approved in Canada, ten Latin American countries (including Mexico, Brazil and Chile), South Africa, Turkey and Morocco. As of May 2016, Grandevo and Venerate are also registered in Mexico. In December 2018, Stargus' and Haven's registration submission were approved in Canada, and both registration decisions have been published by Canadian regulatory authorities for public comment, which is the final step before the expected clearance for commercial sales of each product, which management is expecting will occur during 2019. Zequanox is approved in Canada for hydropower facilities, with a label expansion to other industrial and open water uses pending and is the only product EPA-approved for open water application other than copper, which is rarely used due to its negative environmental effects and uneven efficacy in open water applications. All seven of these commercialized lines are subject to patents and trade secrets related to the work we have done to characterize, formulate, develop and manufacture marketable products. In addition, in January 2017, we entered into a strategic collaboration with Albaugh, to reach the seed treatment platform with our Venerate product, which expanded our reach to row crops including cotton, soybeans and corn, and in May 2017, we entered into an agreement with Jet Harvest Solutions for us to distribute their Jet-Ag biofungicide/disinfectant in most of the United States. We believe these product lines, along with our other EPA-approved and EPA-submitted products and other pipeline product candidates, provide us with the foundation for continuing to build the leading portfolio of bio-based pest management and plant health products.

Robust Pipeline of Novel Product Candidates

Our pipeline of early-stage discoveries and new product candidates extends across a variety of product types for different end markets, including herbicides, fungicides, nematicides, insecticides, algaecides (for algae control), molluscicides (for mussel and snail control) and plant growth and plant stress regulators. Our product candidates are developed both internally and sourced from third parties. Our research and development process enables us to discover, source and develop multiple products in parallel, which keeps our pipeline robust. From one microorganism a *Burkholderia rinojensis* bacterium that we isolated using our discovery process, we have three major product lines, two of which are already commercial (Venerate for insect control and Majestene/Zelto for nematode control) and one that is in development (MBI-014, a bioherbicide for weed control, submitted to the EPA in August 2018). We also have additional product candidates at various other stages of development, including MBI-601, a fungus that produces volatile compounds and works as a soil biofumigant, which was approved by the EPA in November 2016. We previously received EPA approval of MBI-011, a weed-controlling biochemical, sarmentine, discovered and isolated from a pepper plant species, and we are currently pursuing third-party manufacturers to synthesize a “nature identical” sarmentine compound at a cost that would allow us to introduce the product to the market in the future.

Rapid and Efficient Development Process

We believe we can develop and commercialize novel and effective products faster and at a lower cost than many other developers of pest management products. For example, we have moved each of Regalia, Grandevo, Venerate, Majestene/Zelto, Stargus/Amplitude, Haven and Zequanox through development, EPA approval and first U.S. launch in approximately four years or less at a cost of $3.0 million to $6.0 million. Thereafter, we have continued to develop and refine these products, reducing manufacturing costs, producing new formulations, applying for expanded use labels and seeking new markets, in each case at a cost of less than $10.0 million per product line. In comparison, a report from Phillips McDougall shows that the average cost for major agrichemical companies to bring a new crop protection product to market has been over $286.0 million, and these products have historically taken an average of eleven years to move through development, regulatory approval and market launch.

Proprietary Discovery Process

Our discovery process allows us to efficiently discover microorganisms and plant extracts that produce or contain compounds that display a high level of pesticidal activity against various pests and target specific unmet market needs. After we identify pesticidal activity, we subject the microorganisms and plant extracts to tests to determine effects on plant growth, nutrient uptake and stress from drought and salt. We then use various analytical chemistry techniques to identify and characterize the natural product chemistry of the compounds produced by the microorganisms, which we optimize and patent. Four of our pipeline product candidates, one of which is EPA-approved, are what we believe to be newly identified microorganism species. We believe that five of our products produce novel compounds that we identified, and five of our products have been found to have, or produce compounds with, a novel mode of action. Our proprietary discovery process is protected by patents on the microorganisms, their natural product compounds and their uses for pest management, as well as a patent application we have received on a screening process to identify enzyme-inhibiting herbicides. We also maintain trade secrets related to the discovery, formulation, process development and manufacturing capabilities. By conducting our own discovery with a focus on unmet market needs, as well as working with outside collaborators, we are able to access the broadest range of products for commercialization, giving us an advantage over other natural bio-based pest management companies. For example, we identified Stargus/Amplitude in our discovery screen by targeting downy mildews, a problem for which there are few biological and chemical solutions.

Management Team with Significant Industry Experience

Our management team has extensive experience in bio-based pest management products and the broader agriculture industry. Our chief executive officer and other key employees each average over 30 years of experience in their respective field of expertise and include individuals who have led agrichemical sales and marketing organizations, top scientists and industry experts, some of whom have served in leadership roles at large multinational corporations and governmental agencies, commercialized multiple products, brought multiple products through EPA, state and foreign

regulatory processes, filed patent applications and received patents, led groundbreaking research studies and published numerous scientific articles. In addition, our chief financial officer brings over 30 years of financial management experience spanning a variety of industries, including over 15 years of service as several public companies' chief financial officer. Our general counsel has over 30 years of experience, including over 25 years with public companies, in senior legal, sales and operating roles, including general counsel, vice president of sales and chief operating officer.

Our Growth Strategy

Increase Market Penetration of New Products, Product Applications and Product Lines by Providing a Full Suite of Products per Crop

Our goal is to provide growers of specialty and row crops with complete and effective solutions to a broad range of pest management and plant health needs. Due to the competitive nature of the industry and the seasonality of crop growing, speed is essential to ensure widespread adoption. Accordingly, we have launched targeted placements of our products with early adopters in the United States relatively early in the product commercialization cycles and for a limited number of crop and pest applications. These growers, many of whom have unmet market needs, help us to troubleshoot and refine our products and to maximize their value proposition, enabling us to efficiently develop new formulations and expand uses and market penetration with minimal up-front capital investment per product line. We also believe we will be able to leverage growers' positive experiences using our Regalia, Grandevo, Venerate and Majestene/Zelto product lines to accelerate adoption of new products, product applications and product lines, including Stargus/Amplitude and Haven. We believe a product portfolio that encompasses a range of grower needs from planting to bloom to harvest allows us to compete with larger companies, to strengthen relationships with growers and distributors and to not be dependent on any one product or product category and to grow faster. Further, by offering and developing multiple products simultaneously, we believe we can gain the benefits of increased momentum with distributors and end users. We will continue to target early adopters of new pest management and plant health products with controlled product launches and educate growers and water resource managers about the benefits of bio-based pest management products through demonstrations to accelerate commercial adoption of our products.

Deliberately Expand Applications of Our Product Lines

We want growers to know and trust that our products work. Although our initial EPA-approved master labels cover our products' anticipated crop-pest use combinations, we launch early formulations of our pest management and plant health products to targeted customers under commercial labels that list a limited number of crops and applications that our initial efficacy data can best support. We then gather new data from experiments, field trials and demonstrations, gain product knowledge and get feedback to our research and development team from customers, researchers and agricultural agencies. Based on this information, we enhance our products, refine our recommendations for their use in optimal IPM programs, expand our commercial labels and submit new product formulations to the EPA and other regulatory agencies. For example, we began sales of Regalia SC, an earlier formulation of Regalia, in the Florida fresh tomatoes market in 2008, while a more effective formulation of Regalia with an expanded master label, including listing for use in organic farming, was under review by the EPA. When approved, we launched this new formulation into the Southeast United States in 2009 and nationally in 2010. In 2011, we received EPA approval of a newly expanded Regalia master label covering hundreds of crops and various new uses for applications to soil and through irrigation systems, and we expanded Regalia for use in large-acre row crops as a plant health product, in addition to its beneficial uses as a fungicide. Similarly, ongoing field development research on the microbe used in our insecticide product Venerate led to our October 2015 registration of Majestene as a nematicide. In addition, in 2017, our strategic partner, Albaugh, deployed the microbe in Venerate as part of their BIOST® Seed Treatment Technology Platform ("BIOST") for cotton, corn and soybean crops, and in January 2018, we launched a formulation of Majestene as Zelto for turf and ornamental pests. In 2018 we launched the CG (Cultivated Garden) line for Regalia, Grandevo and Venerate, which is targeted for cannabis growers, greenhouse flower and vegetable growers, gardeners and small farmers. We believe we will continue to have opportunities to broaden the commercial applications and expand the use of our existing products lines into several key end markets, including large-acre row crop applications, seed treatment, turf, cannabis, forestry and public health to help drive significant growth for our company.

Leverage one Microbe into Multiple Product Categories

We discover and develop more than one product line based on the same technology. For example, the *Burkholderia rinoiensis* microbe on which Venerate is based is also active against a broad range of nematodes, enabling development as our bionematicide product, Majestene/Zelto, and, when fermented under different conditions, produces several herbicidal compounds, enabling development as our bioherbicide product candidate, MBI-014. In addition, the *Chromobacterium* species on which Grandevo is based may also yield a promising bionematicide product, which we have developed as MBI-304 with positive results, both as a seed treatment and with in-furrow applications, over the course of three growing seasons. Developing multiple products based on the same microbe allows for a more efficient use of research, development and manufacturing resources and enables us to leverage capital invested in existing technologies.

Target International Markets

Expanding international sales is an important component of our growth strategy, but the global markets for pest management products are intensely competitive and highly regulated. Our plan is to focus on key countries and regions with the largest and fastest growing biopesticide and plant health product markets for specialty crops and select row crops. We are working with regional distributors and distributors in key countries who have brand recognition and understand how to test and market biopesticides.

Leverage Our Technology in Adjacent Markets through Collaborations

Our microbial collection is rich with candidates that can be deployed as products for improving fertilizer efficiency and reducing salt and drought stress. Our discovery screen has identified at least four microbes that display activity against blue-green algae associated with toxic algal blooms, which have resulted in seasonal closures of some drinking water supplies in the Great Lakes region. Two companies with established expertise in the water treatment sector are testing these microbes in consideration of a possible collaboration; one has confirmed activity against algae and the other is in progress.

Leverage Manufacturing Capabilities

We initially used third-party manufacturers to produce all of our products on a commercial scale. In 2014, we completed the repurpose of a manufacturing facility that we purchased in July 2012 by installing three 20,000-liter fermentation tanks and constructing a dedicated building to house them, which has enabled us to manufacture in-house certain of our products. In 2017, we completed a medium-scale granulation line for Grandevo WDG. We have shown that greater control of our own manufacturing capacity allows us to scale-up processes and institute process changes more quickly and efficiently while ultimately lowering manufacturing costs over time to achieve desired margins and protecting the proprietary position of our products. We continue to use third party manufacturers for Venerate, Majestene/Zelto and Haven and for spray-dried powder formulations of Grandevo and Zequanox. We are also developing plans to expand our manufacturing facility capacity in order to handle increased production volumes for increased sales.

Our Products

Commercially Available Products

The table below summarizes our current portfolio of commercially available biopesticide products, which have been able to move through development, EPA approval and first U.S. market launch in four years or less and at a cost of $3.0 million to $6.0 million. We have continued to develop and refine these products after initial launch, producing new formulations, applying for expanded use labels and seeking new markets.

NAME	MARKET	TARGET	USE	STATUS
Regalia				

(liquid formulations)	Crop Protection, Home and Garden, Turf and Ornamentals	Plant Disease/Plant Health	Protects against fungal and bacterial diseases and enhances yields/quality	Commercially Available Domestically and Internationally
Grandevo (dry formulations)	Crop Protection, Home and Garden, Turf and Ornamentals, Public Health, Forestry, Seed Treatment	Insects and Mites	Controls a broad range of sucking and chewing insects through feeding	Commercially Available Domestically and Mexico; International Expansion Efforts Underway
Venerate (liquid formulation)	Crop Protection, Home and Garden, Turf and Ornamentals, Animal Health, Forestry, Seed Treatment	Insects and Mites	Controls sucking and chewing insects on contact	Commercially Available Domestically and Mexico; International Expansion Efforts Underway
Majestene (liquid formulation)	Crop Protection, Turf and Seed Treatment	Plant Parasitic Nematodes	Controls soil-dwelling nematodes by preventing and reducing root galls, and by reducing adult reproduction and egg hatch	Commercially Available Domestically, International Expansion Efforts Underway
Stargus (liquid formulation)	Crop Protection, Home and Garden, Turf and Ornamentals, Forestry, Seed Treatment	Plant Disease/Plant Health	Protects against fungal and bacterial diseases and enhances yields	Commercially Available Domestically and in Canada anticipated in 2019; Pending in Mexico; International Expansion Efforts Underway

Haven (liquid formulation)	Crops, Home and Garden, Turf and Ornamentals	Sun stress/Plant Health/Quality	Reduces sun stress and dehydration and increases yields and quality	Commercially Available Domestically and in Canada anticipated in 2019
Amplitude (liquid formulation)	Row Crop, Crop Protection, Seed Treatment	Plant Disease/Plant Health	Protects against white molds, soil diseases and other fungal and bacterial diseases and enhances yields	Commercially Available Domestically International Expansion Underway
Zequanox (dry formulation)	Water Treatment	Invasive Mussels (In-Pipe and Open Water Habitat Restoration)	Controls invasive mussels that restrict water flow in industrial and power facilities and harm recreational waters	Commercially Available Domestically and in Canada

Regalia

Biofungicide
Crop Protection, Home and Garden, Turf: Controls Plant Diseases, Improves Plant Health, Increases Yields
Commercially Available Domestically and Internationally

13

Regalia, a plant extract-based fungicidal biopesticide, or "biofungicide," is EPA-registered for crop and non-crop uses and approved for use on foliage and roots in all states in the United States, including California and Florida, where the majority of the specialty crops are grown. It is also approved for sale in Mexico (citrus and tree fruit, berries, tomatoes, peppers, potatoes, cucurbits, flowers, potatoes, mangoes, apples, avocado, citrus, papaya and grapes), Canada (tomatoes, grapes, strawberries, cucurbits, apples, turf, blueberries, hops (emergency use), ornamental plants and wheat, with cannabis pending for 2019 approval), Brazil (tomatoes, potatoes, dried beans, and melons, with lettuce, carrot, papaya, mango, watermelon, sweet pepper and grape pending for 2019 approval), Chile (table and wine grapes, blueberries and walnuts with tomato, strawberry, peach, onion and lettuce pending), Turkey (covered vegetables), Peru (grapes and quinoa), South Africa (grapes), Morocco (cucurbits, tomatoes and grapes), Tunisia (tomatoes), Ecuador (flowers), and Panama, Dominican Republic, El Salvador, Guatemala, Nicaragua and Honduras (potatoes, tomatoes, peppers, tobacco, cucurbits, beans, avocados, citrus, peanuts, papayas, coffee and strawberries). Registration efforts are currently underway in China, with Regalia demonstrating efficacy in multiple government-conducted trials over a two- year period on tomatoes, cucurbits, strawberries and grapes. University researchers have extensively tested the product against several important plant diseases, especially against mildews. We, and our commercial partners, have also conducted hundreds of trials in the United States and abroad, including five years of crop trials in Europe. The data show that Regalia is an effective addition to a disease management program against a broad range of diseases and can increase yields in crops such as strawberries, tomatoes, potatoes, soybeans, rice, wheat, alfalfa, sugarcane and corn.

Regalia is made from an extract of the giant knotweed plant and acts by turning on a plant's "immune system," a process called induced systemic resistance. Regalia also enhances the efficacy of major conventional chemical fungicides, and we have received issued patents on this synergism. Regalia also is effective for seed treatment of soybean, corn and cotton, for which we have filed a patent application, and we have received an issued patent on the effects on root growth and yield when Regalia is applied to the seed or as a root stimulant.

We obtained an exclusive license relating to the technology used in our Regalia product line while Regalia was in the process development and formulation stage of product development. In addition to developing the supply chain to commercially market the product, using our natural product chemistry expertise, we developed an analytical method to measure and characterize the key compounds in the plant extract, and we improved the bioavailability these compounds several times in subsequent, new formulations, providing Regalia with a broader spectrum of activity and better efficacy than the original licensed product. In addition, we improved the physical properties of our Regalia formulations and developed four formulations that meet organic farming standards. We have filed several patent applications with respect to these innovations. In addition, we have received a U.S. patent for modulating plant growth by treating roots of plants with Regalia (or other compounds or extracts of knotweed) and transplanting the plants into soil. The European Patent Office (EPO) has granted a patent relating to the use of *Reynoutria sachalinensis* as either a plant or seed growth promoter. We have also received a patent on the synergistic combination of Regalia or knotweed extract and some important chemical fungicides.

We launched Regalia SC, an earlier formulation of Regalia, into the Florida fresh tomatoes market in December 2008. This formulation had a limited label with a few crops and uses on the label but was not compliant for organic listing. We later received a revised, broader label with hundreds of crops for a new organic formulation, which we subsequently launched into the Florida vegetables and Arizona leafy greens markets. In January 2010, we received

state approval in California and immediately launched Regalia into the leafy greens and walnuts markets. Key markets include vegetables in the southeast, citrus in Florida, leafy greens and vegetables in California and Arizona, walnuts and stone fruit in California and pome fruit and grapes in California and the Pacific Northwest. In December 2011 and August 2012, we received EPA approval and California regulatory approval, respectively, for an expanded Regalia label that includes new soil applications, instructions for yield improvement in corn and soybeans and additional crops and target pathogens. Our product for row crops is sold separately as Regalia Rx and for international markets, where the Regalia trademark is allowed, as Regalia Maxx. While we previously submitted Regalia for registration in the EU, which is one of the largest fungicide markets in the world, we recently withdrew the EU application due to Brexit and plan to resubmit using the Netherlands rather than the United Kingdom ("UK") as the designated rapporteur. In 2013, 2014 and 2015, we received EPA approval for three new formulations (12%, 16% and 5%). A new 5% formulation, with better mixing and handling properties, was launched in the United States in 2016. The 12% and 16% may be used for market segmentation in the future. The new alternative formulation of Regalia 5% eliminated a solvent that is difficult to source and is likely to experience future regulatory restrictions. This new formulation disperses better in water and is easier to mix and rinse from containers and spray equipment. In 2018, we launched Regalia CG for home gardeners, small farmers and cannabis growers.

Regalia, Regalia Maxx and Regalia Rx are USDA National Organic Program compliant and OMRI-USA/OMRI-Canada listed.

Grandevo

Bioinsecticide
Crop Protection, Home and Garden, Turf and Ornamentals, Public Health, Forestry, Seed Treatment: Targets Insects and Mites
Commercially Available Domestically and in Mexico, International Expansion Efforts Underway

Grandevo is based on a new species of microorganism, *Chromobacterium subtsugae*, which was discovered by a scientist at the USDA in Beltsville, Maryland, and which we have licensed and commercialized. Grandevo is a powerful feeding inhibitor: insects and mites become agitated when encountering it and will not feed and starve, or, if they do ingest it, die from disruption to their digestive system. Grandevo also has repellent effects on and reduces egg hatching and reproduction of target insects and mites. Grandevo is particularly effective against chewing insects (such as caterpillars and beetles) and sucking insects (such as stinkbugs and mealybugs, as well as thrips and psyllids, which are respectively known as “corn lice” and “plant lice”) and some flies, such as the spotted wing Drosophila larvae. Trials to date and reports from grower use have shown instances of commercial levels of efficacy as good as the leading conventional chemical pesticides on a range of chewing and sucking insect and mite pests, including two invasive species of psyllid affecting citrus and potato crops. Grandevo has also shown significant control of other pests such as plant-feeding fly larvae, mosquitoes, white grubs in turf grass, “leafmining” caterpillar larvae and other leaf-eating caterpillars. Grandevo has also shown efficacy against corn rootworm, a major pest of corn, which has reportedly been resistant to corn engineered for rootworm control. Grandevo has shown efficacy against other soil pests, including wireworms, root maggots and nematodes. Field trials are ongoing to further characterize Grandevo’s activity against new foliar and soil-borne pests in international markets where there are often different but related pests.

We obtained a co-exclusive license for the bacterial strain used in our Grandevo product line while Grandevo was undergoing primary screening as a potential product candidate. However, as of January 2018, the USDA has indicated that we are the only current licensee. Since licensing the microorganism, we completed the testing and development necessary to produce and commercialize an EPA-approved product and have filed our own patent applications with respect to the microorganism, including its genome, synergistic combinations with conventional chemical pesticides, product formulations containing the bacterial strain as well as the chemistry produced by the microorganism upon which Grandevo is based. We have issued U.S. patents on one of these novel compounds produced by the bacteria and novel insecticidal and nematicidal uses.

We placed a prototype liquid formulation of Grandevo on a targeted basis under a limited label into the Florida citrus crop market in 2011. Commencing in the summer of 2012, we launched a dry formulation of Grandevo in markets across the United States where state registrations have been approved, targeting key markets, including citrus, tomatoes, peppers, strawberries, potatoes, leafy greens and other fruits and vegetables. This dry formulation was

approved by the EPA in May 2012 and has been registered in all 50 states as well as Puerto Rico. In May 2013, we received EPA approval for a revised label reflecting Grandevo's safety for bees. In May 2016, Grandevo was approved in Mexico for use on tomatoes, peppers, potatoes, tobacco and berries, and local sales and label expansion efforts have since commenced under a distribution partnership with AgriStar. Recently completed trials in Mexico and Brazil against Asian citrus psyllid, the vector for citrus greening disease, demonstrate that Grandevo is an effective tool for the citrus industry, and with this data completed, MBI has applied for a label expansion for this crop-pest combination in Mexico. Grandevo CG was launched in 2018 for small farmers, home gardeners and cannabis growers in the United States.

Grandevo has received completeness determination from the European Commission and the process began for the evaluation for Annex 1 listing and commercialization in the EU, with a draft decision completed by the Netherlands in 2016 that recommended some new toxicology and product characterization studies that were completed in 2018 and 2017. With new studies recently completed, MBI is currently working with the Netherlands to finalize the risk assessment for Annex 1 listing of the active ingredient in Grandevo and to advance the product for review by the European Food Safety Authority.

A June 2015 policy decision by the European Commission, the European Food Safety Authority and a Working Group of EU Member States has allowed Grandevo, which contains only non-viable *Chromobacterium subtsugae* cells, to be evaluated as a microbial pesticide. Until this recent EU decision, only pesticides containing live microbes could be evaluated under EU regulation. Grandevo is being assessed under the Netherlands Government's "Green Deal" Initiative, which has been created with an aim to "speed up the sustainability of PPPs (plant protection products) in agriculture and horticulture by facilitating the authorization of green PPPs with a low risk for humans, animals and the environment." Efficacy trials recently completed in Europe will be used to support uses of Grandevo for the control of whitefly and thrips in Solanaceae (tomato, pepper and aubergine) and Cucurbitaceae (melon, cucumber and squash) crops.

The additional studies being conducted to support EU registration was also used to support Grandevo registration in Canada and Brazil.

Grandevo is USDA National Organic Program compliant and OMRI-USA/OMRI-Canada listed.

Venerate

Bioinsecticide
Crop Protection, Home and Garden, Turf and Ornamentals, Animal Health, Forestry: Targets Insects and Mites
Commercially Available Domestically and in Mexico, International Expansion Efforts Underway

Venerate is based on a microbial fermentation of a new bacterial species we isolated using our proprietary discovery process. We have identified compounds produced by the microorganism in Venerate that control a broad range of chewing and sucking insects and mites, as well as flies and plant parasitic nematodes, on contact, which is complementary to the anti-feeding effects of Grandevo. In addition, because we currently sell Venerate in a liquid formulation and Grandevo in a powder formulation, we are seeking to exploit opportunities for market segmentation, including for combinations with liquid fertilizer and for low-volume aerial applications. Venerate was approved by the EPA in February 2014, and we began to sell Venerate in May 2014. Venerate was approved in Mexico and along with Grandevo, is being distributed by AgriStar. As with Grandevo, Venerate has also shown to be effective against Asian citrus psyllid in citrus, and AgriStar and MBI has accordingly, have applied for an expansion of the Mexican label for Venerate beyond its current uses in tomatoes, peppers, strawberries, cole crops and potatoes. Venerate CG was launched in 2018 for small farmers, home gardeners and cannabis growers in the United States.

We have conducted field trials on several crops and insects and mites, many of which show efficacy as good as leading conventional chemical pesticides. Venerate has shown positive results in field trials against soil insects of corn, wheat and soybeans applied both in-furrow and as seed treatments, and has shown broad spectrum activity across a wide range of pests, including Asian citrus psyllid, corn rootworm, stinkbugs, caterpillars and weevils. Field

trials of both Grandevo and Venerate again conducted in 2017 and 2016 indicated good control of corn rootworms and nematodes in corn and soybeans.

We have received notice of allowance for a U.S. patent on the microorganism and received a patent on the natural product compounds that demonstrate insecticidal and nematicidal activity, and have filed applications on product formulations containing the microorganism.

In August 2016, we entered into a strategic collaboration with Albaugh to expand our reach into the row crop market, including crops such as cotton, soybeans and corn, through Albaugh's BIOST platform. The BIOST platform delivers a broad portfolio of highly effective and proven biological seed treatments through proprietary formulations that utilize our Venerate product. We supply Albaugh with Venerate, and Albaugh is responsible for the promotion, sale and services related to BIOST products.

Venerate is USDA National Organic Program compliant and OMRI-USA/OMRI-Canada listed.

Majestene and Zelto

Bionematicide
Crop Protection, Ornamentals and Turf, Seed Treatment; Targets Plant Parasitic Nematodes
Commercially Available Domestically

Majestene/Zelto is a bionematicide we have developed based on the microorganism used in Venerate. This nematicide is active against a broad range of nematodes, and in field trials it has been as effective as or better than the leading conventional chemical nematicide against soybean cyst, root knot, lesion, stunt, reniform, lance and burrowing nematodes. Crops tested include soybean, corn, cotton, strawberry, turf, tomato, pepper, squash, potato and banana. Usage for Majestene/Zelto as a nematicide was approved by the EPA in connection with its approval of the labels for Venerate in 2014, and a modified label with refined rates, nematode species and crops was approved in October 2015. We have been issued a U.S. patent for use of the bacterial strain in Majestene/Zelto for use as a nematicide. We conducted a targeted placement of Majestene with key, early adopter growers in 2015, with our first sales in January 2016, and launched the Zelto brand for turf and ornamentals in January 2018.

Stargus and Amplitude

Biofungicide and Plant Health
Crop Protection, Home and Garden, Turf and Ornamentals, Forestry, Row Crops: Targets Plant Disease, Improves Plant Health
Commercially Available Domestically, Approved in Canada with commercialization anticipated in 2019; International Expansion Efforts Underway

Stargus/Amplitude is based on microbial fermentations of a newly identified *Bacillus nakamurai* strain we isolated using our proprietary screening platform with the “Stargus” brand targeted to most applications and “Amplitude” targeted at row crops. Stargus/Amplitude is a biofungicides, targeting difficult to control plant diseases such as *Sclerotinia* white molds, gray mold/bunch rot and downy mildews. We have identified different compounds, some of which are novel, produced by the microorganism in Stargus/ Amplitude that control a broad range of plant diseases. We have filed a U.S. patent application covering fungicidal uses and have been issued a U.S. patent on related claims. We received the EPA registration of Stargus/Amplitude in October 2017 and started sales in December 2017 in the Southeast United States and also in Arizona. Several field trials were conducted in Europe in 2014 and the United States in 2013 and 2014 that showed good efficacy against white molds and downy mildews. Trials since that time continue to confirm efficacy against these diseases. We have also completed sufficient field trials in Europe to support uses on potatoes, grapes and sugar beets, and anticipate submitting Stargus/Amplitude to the Netherlands, as our EU rapporteur member state, in 2020. We are producing Stargus/Amplitude with a third-party manufacturer. Registrations

are pending in California and Mexico. Registration in Canada was approved in December 2018, and the PMRA decision has been published for public comment. Commercial sales in Canada are expected to commence in 2019, once the public comment period closes and PMRA stamps the final product label.

Haven

Plant Health
Crops, Turf and Ornamentals: Increases Yields and Quality
Commercially Available Domestically and Approved in Canada; International Expansion Efforts Underway

Haven is a plant health product that is applied to the leaves of plants to reduce sun stress. In stressful environments, such as intense sunlight or drought, crops lose yield and quality. Haven is based on a technology of naturally-derived, plant-based compounds that we licensed from Kao Corporation for use in the United States. The licensed patents are directed to methods of promoting plant growth and increasing biomass and crop yield. Haven reflects light and heat from leaves, which lowers plant temperatures, resulting in less stress to the crops and higher yields and quality. Field trials in 2014 in the United States and Chile demonstrated a reduction in sun-stressed fruit and an increase in quality characteristics on citrus, apples and grapes, increased yields on walnuts, almonds and wheat, often equal to or better than the commercial standard, and increased turf growth. Unlike competing products, Haven does not leave an undesirable deposit or residue on crops. Field trials in 2018 and 2016 demonstrated increased yields, plant growth and/or quality of almonds, walnuts, apples, corn, tomatoes, blackberries, grapes and citrus. As a biostimulant, Haven did not require EPA registration, but state submissions were made in the first quarter of 2017 and we launched Haven commercially in March 2017. We received California approval in January 2018 and CFIA approval for Canada in December 2018, with the decision currently out for public comment. Commercialization efforts are also underway in the European Union and Brazil.

Zequanox

Biomolluscicide
Water Treatment: Targets Invasive Mussels (In-Pipe and Open Water Habitat Restoration)
Commercially Available in United States and Canada, International Expansion Underway
USDA “BioPreferred” Program Certified Product

Zequanox addresses the problem of invasive zebra and quagga mussels, which clog pipes, disrupt ecosystems, encrust infrastructure and blanket beaches with razor-sharp shells. These mussels cause approximately $1.0 billion in damage and associated control costs annually in parts of the United States alone. There are limited treatment options available, many of which are time-consuming and costly, or harm aquatic flora and fauna. Zequanox is a biomolluscicide derived from a common microbe found in soil and water bodies, *Pseudomonas fluorescens*. Zequanox is an environmentally friendly, bio-based pest management product that is designed to kill over 75% of invasive mussels in treated pipe systems without causing collateral ecological damage. In July 2012, we conducted an open water trial in Deep Quarry Lake, Illinois, where the Zequanox treatment killed more than 90% of the tested mussels on the lake bed. This level of control in open water treatments was repeated in 2013. We generated revenues for treating an Oklahoma Gas & Electric facility in 2012 and 2013 and a First Light & Power facility along the Housatonic River in Connecticut in 2014. In addition, Zequanox was used by the Minnesota Department of Natural Resources and the Minnehaha Creek Watershed District’s Aquatic Invasive Species Program in 2014 to treat an infestation of these invasive mussels in Christmas Lake, resulting in 100% control of the mussels in the tested area. Zequanox is approved in Canada and is the only product EPA-approved for open water application in the United States other than copper, which is rarely used due to its negative environmental effects. In 2017, we successfully treated a power plant in Illinois with periodic low dose applications that generated gross profit.

At recommended application rates, Zequanox is not toxic to other aquatic life, including ducks, fish, crustaceans and other bivalve species such as native clams or mussels. Zequanox is safe to workers, less labor intensive and requires shorter treatment times as compared to conventional chemical pesticides. Zequanox can be used by power plants and raw water treatment facilities as an alternative to conventional chemical treatments such as chlorine, or as a complement to those products.

We entered into a license agreement with The University of the State of New York pursuant to which we were granted an exclusive license under the University’s rights relating to the bacterial strain used in our Zequanox product line while the product’s natural product chemistry was still under investigation. Since then, we have developed dry powder formulations, significantly improved the fermentation process for higher cell yield, allowing us to increase manufacturing scale, and filed patent applications relating to natural product compounds in the Zequanox cells we have identified and product formulations we have developed. In addition, we received $1.1 million in grants from the National Science Foundation for work needed to commercialize the bacterial strain in Zequanox, which is currently being marketed and sold directly to U.S. power and industrial companies. Recently, we implemented a new process at our manufacturing plant that reduced the cost of product revenues to be more competitive with other mussel treatment chemicals.

Due to our prioritization plan, we have not committed sufficient new development resources to Zequanox to market it full-scale and ramp revenues to their full potential. We are working with selected power and industrial customers for in-pipe treatments. In addition, we continue to work with state, federal and bi-national partners via the Great Lakes Commission's Invasive Mussel Collaborative and the EPA's Great Lakes Restoration Initiative ("GLRI") to further develop Zequanox in the Great Lakes/Upper Mississippi River Basin as a habitat restoration tool and potential harmful algal bloom management tool as zebra and quagga mussels selectively feed on beneficial algae while rejecting toxic blue-green algae. In 2016, the GLRI awarded a grant of more than $600,000 to support a 2017 large-scale, open water evaluation of Zequanox in Michigan. This "Tip of the Mitt" project is being jointly administered by the U.S. Geological Survey and state and local government agencies in Michigan, with MBI serving as a technical collaborator and provider of Zequanox to continue the project in 2019. In November 2017, we signed an exclusive distribution agreement with Solenis. LLC, a large water treatment company, to distribute Zequanox for in-pipe treatments in the United States and Canada. This agreement was not renewed in 2018.

Product Pipeline

Our pipeline consists of product candidates in various stages of development, including products submitted to the EPA for registration as well as other early-stage discoveries. We have implemented a prioritization plan for our pipeline candidates, focusing first on those that are expected to have the greatest near-term growth potential. We are seeking collaborations with third parties to develop and commercialize more early stage candidates.

Under Development

MBI-601(Ennoble)

Biofumigant
Crop Protection, Home, Industrial: Targets Plant Disease, Nematodes and Insects
Under Development

MBI-601 is a biofumigant based on a novel and proprietary genus of fungus, *Muscodor,* which was discovered by a professor at Montana State University. We obtained a co-exclusive license for several strains and species of this fungus, which produces a suite of gaseous natural product compounds that have been shown to control certain species of harmful fungi (e.g., *Fusarium, Verticillium* and *Sclerotinia*) and bacteria that cause plant diseases and to control nematodes and some insect species.

We believe that MBI-601 may be used for agricultural and industrial applications, including post-harvest control of fruit and flower decay and pre-planting control of plant diseases and nematodes as a viable alternative to methyl bromide and other chemical fumigants, which are subject to significant regulatory restrictions and for which few effective, non-toxic alternatives are available. We submitted MBI-601 to the EPA in April 2014 and received approval in November 2016. The product, Ennoble, is now registered in several states and approval is pending in California. In 2014, we obtained a license to an artificial mixture of the gaseous compounds produced by the *Muscodor* fungus, which extends the potential uses of this technology by enabling development of products at a potentially lower cost and better shelf stability than versions using the living fungus. In 2018 and 2017, field trials on strawberry, celery and lettuce were successful, showing efficacy as good as or better than commercial standards such as Piclor, a chemical fumigant. We are currently conducting additional field additional trials and demos in selected crops where we see the best initial fit for commercial launch. In 2018, an organic strawberry grower confirmed the yield increase in an on-farm demonstration with MBI-601. Our research and development team is continuing to work on reducing the application rate in the field and reduce the manufacturing cost.

MBI-014

Bioherbicide
Crop Protection, Home and Garden, Turf: Targets Weeds
Under Development

MBI-014 (formerly referred to as MBI-010) is based on the same species of bacteria used to produce Venerate and Majestene/Zelto, which we isolated using a proprietary discovery process that identifies herbicides that inhibit a certain plant enzyme. MBI-014 produces several herbicidal compounds, some of which are novel, which can kill the weeds when applied to the foliage or taken up by the roots or seeds. We are focusing MBI-014 on post-emergence applications (sprayed on the weeds after they emerge) against a range of weeds, including palmer amaranth and water hemp that are resistant to leading conventional chemical herbicides, such as plyphosate. MBI-014 has also demonstrated a novel mode of action (inhibiting histone deacetylase enzymes and disrupting the splicing of at least two genes involved in RNA transcription), and some of its active compounds are transmitted systemically through the vascular structure of weeds. These compounds were found by our USDA collaborators to be orders of magnitude more active than glyphosate, glufosinate and several other chemical herbicide chemistries. We have filed a patent application with respect to the MBI-014 formulation uses and its associated natural product compounds as an herbicide. We also received an issued U.S. patent on the process we used to discover MBI-014 and certain other bioherbicides. In 2016, we confirmed that MBI-014 can enhance glyphosate (the active ingredient in Monsanto Company’s widely-distributed herbicide, Roundup), providing better control than glyphosate alone on glyphosate-resistant Palmer Amaranth, otherwise known as pigweed. In August 2018, our application of MBI-014 to the EPA was submitted. Due to the large market potential of MBI-014, our research and development team is working on new versions that are even more effective and lower cost. Additional toxicology studies are also in progress. After an initial review, EPA requested additional information and testing before advancing MBI-014 through its review process. We are currently conducting the additional studies necessary to address EPA questions and will submit these data to EPA in 2019 or early 2020.

Other Products and Candidates

In May 2017, pursuant to an agreement with Jet Harvest Solutions, we began distributing Jet-Ag by Jet Harvest Solutions in most regions of the United States. Jet-Ag is a sanitizer and biochemical fungicide that works on contact against numerous fungal and bacterial plant pathogens.

We have also developed patented technology relating to a number of other product candidates, including MBI-304, a bionematicide product candidate based on the microorganism used in Grandevo; MBI-011 and MBI-005, bioherbicides that have received EPA approval; and MBI-302, a bionematicide candidate. We are also developing Stargus/Amplitude in combination with Regalia and a pre-mixture combination of reduced risk fungicides with Regalia. We are seeking collaborations with third parties to develop and commercialize some of these and other promising early-stage candidates, but as resources permit, we may choose to move some of these product candidates forward internally.

We have also discovered several microorganisms with algaecidal activity, certain of which are being tested by third-party collaborators for efficacy, and over 25 additional fungicide, herbicide, insecticide and nematicide candidates using our proprietary screening platform. In addition, we have produced a collection of microorganisms from taxonomic groups that research suggests may enhance nutrient uptake in plants, reduce stress and otherwise increase plant growth.

Our Discovery and Product Development Process

Our proprietary technology comprises a sourcing process for microorganisms and plant extracts, an extensive proprietary microorganism collection, microbial fermentation technology, screening technology and a process to identify and characterize natural compounds with pesticidal activity. Our technology enables us to isolate and screen naturally occurring microorganisms and plant extracts in an efficient manner and to identify those that may have novel, effective and safe pest management or plant health promoting characteristics. We then analyze and characterize the structures of compounds either produced by selected microorganisms or found in plant extracts to identify product candidates for further development and commercialization. We have screened more than 18,000 microorganisms and 350 plant extracts, and we have identified multiple product candidates that display significant levels of activity against insects, nematodes, weeds, plant diseases and invasive species such as zebra and quagga mussels, aquatic weeds and algae. We also have produced a collection of microorganisms from taxonomic groups that may enhance nutrient uptake in plants, reduce stress and otherwise increase plant growth. Our product candidates come primarily from our own discovery and development, as well as in-licensed technology from universities, corporations and governmental entities.

Our proprietary product development process includes several important components. For all of our product candidates, we develop an analytical method to detect the quantity of the active natural product compounds that are produced by the microorganism or that are extracted from plants. For microbial products, we develop unique proprietary fermentation processes that increase the active natural compounds produced by the microorganisms. We also scale-up fermentation volumes to maximize yields consistently in each batch. Similarly, for our plant extract-based products, we develop a manufacturing process that increases the amount of active natural compounds extracted from plant materials.

Our deep understanding of natural product chemistry allows us to develop fermentation and formulations that optimize the concentrations, efficacy and stability of compounds produced by microorganisms or plants. These methods allow us to produce products that are highly effective and of a consistent quality on a commercial scale. With the successful commissioning of our manufacturing facility, we have added a wealth of know-how and have demonstrated an ability to manufacture products that are effective and of a consistent quality on a commercial scale.

Our commercial products are sold in various formulations and are tailored to meet customers' needs and display performance characteristics such as effectiveness, shelf life, compatibility with other pesticides and ease of use. Our senior management's numerous years of experience in the development of commercial products and formulations have resulted in a highly efficient product development process.

Our discovery and development process is illustrated in the following diagram:

Discovery

We have found over 25 candidates for commercial development from our proprietary discovery process, including Venerate, a new bacterial species and bioinsecticide, MBI-011, a burndown bioherbicide, MBI-014, a systemic bioherbicide, MBI-302 and MBI-303, bionematicides, MBI-110, a biofungicide, as well as several bioalgaecides, additional biofungicides, bioherbicides, bionematicides and plant growth enhancers. Key aspects of our discovery process include:

Collection and isolation. Using our years of experience, we target selected habitats and niches of high biodiversity to collect soil, compost, insects, flowers or other biological matter from which we isolate our proprietary microorganisms on proprietary media. We capture information in a microorganism database such as taxonomic groups, geographical locations, types of samples, niches and habitats where collected and biological activity. We also isolate microorganisms that improve the efficiency of plants to uptake nitrogen and phosphorous. In addition to isolating our own microorganisms, which make up approximately 90% of our collection, we have engaged in collaborations to source microorganisms.

Fermentation. For our microbial products, before testing the selected microorganisms for activity against pests, we ferment them to produce sufficient quantities for testing. We grow the selected microorganisms in proprietary media, which maximizes their pesticidal properties. In addition, we use proprietary fermentation processes that are designed to replicate those that would be required for large-scale fermentation and commercial production, avoiding the time and expense of an unsuccessful scale-up.

Primary screening. We use automated, miniaturized biological assays to test the selected microorganism's or plant extract's effectiveness against several weed, insect and nematode pests and plant pathogens and algae. We compare those results to conventional chemical pesticide standards. When a microorganism shows a high level of pesticidal activity, we conduct further tests to determine the spectrum of activity, mode of action, stability and activity on plants. We also test for the microorganisms' ability to reduce plant stress and promote growth.

Novel and proprietary screening methods for weeds and nematodes. We have used proprietary assays based on specific enzymes that find systemic herbicidal compounds from microorganisms, one of which is the subject of an issued patent covering identification of compounds that act systemically through plants' vascular systems. We have developed a rapid, efficient method to find microorganisms that produce compounds with a high level of activity against plant parasitic nematodes.

Natural product chemistry. Using high-performance liquid chromatography ("HPLC") with diode array detection technology, liquid chromatography-mass spectroscopy ("LCMS"), gas chromatography-mass spectroscopy ("GC-MS") and nuclear magnetic resonance ("NMR"), we compare the natural product compounds produced by each of the selected microorganisms with known compounds. This allows us to eliminate those microorganisms that produce known toxins and to select those that we believe are novel and safe. From the selected microorganisms, we identify and characterize the natural product compounds responsible for their pesticidal activity by using HPLC, LCMS, GC-MS and NMR equipment. We then develop analytical methods to measure the quantity of these compounds in individual fermentation batches, determine the quantities needed to maximize efficacy and to ensure consistent levels of these compounds from batch to batch.

Genetic identification and genomics. After confirming pesticidal activity during our primary screen, we perform the initial genetic identification of the microorganisms. Further characterization of the genome of our early stage candidates is contracted with one of several genome sequencing service companies. This characterization allows us to determine novelty compared to discoveries from others, the relatedness to human or animal pathogens, genes for compounds that are not expressed in fermentation or detected by our chemists, potential effects of our products on target crops and information about the possible mode of action on the target pest, which helps us better inform our customers how our products work. We also file additional patent applications based on the results of these genetic identification processes.

Product Development

We believe that by maintaining a strong reputation in the industry, many opportunities come to us for development in addition to our own discoveries from our in-house efforts. Once we discover or are brought an opportunity, we make a preliminary assessment of the commercial potential of a natural product determined through laboratory, greenhouse and initial field tests. We then select product candidates we have discovered in-house or in-licensed for further development. Key aspects of our product development process include:

Development of the manufacturing process that maximizes the active natural product compounds. For our microbial biopesticide products, we develop proprietary processes that increase the yield of both the microorganism and the active natural product compounds produced by the microorganism during fermentation. Similarly, for our plant extract-based products, we develop proprietary processes that increase the amount of active natural compounds extracted from plant materials. This process development allows us to produce products that have superior performance. For our microbial products, we then scale-up these proprietary processes in progressively larger fermentation tanks. We develop quality control methods based on the active natural product compounds rather than just the microorganisms or plant extracts. This approach results in a more consistent and effective product.

Formulation. We are able to develop proprietary wettable powder, liquid and granule formulations that allow us to tailor our products to customers' needs. This allows us to develop product formulations with enhanced performance characteristics such as effectiveness, value, shelf life, suitability for organic agriculture, water solubility, rain resistance, compatibility with other pesticides and ease of use. Formulation is critical to ensuring a bio-based pest management and plant health product's performance. Our understanding of the natural product chemistry allows us to develop formulations that maximize the effectiveness and stability of the compounds produced by the microorganisms or plants.

Field testing. We conduct numerous field trials for each product candidate that we develop. These field trials are conducted in small plots on commercial farms or research stations by our own field development specialists as well as private and public researchers to determine large-scale effectiveness, use rates, spray timing and crop safety. We conduct crop protection product field trials globally in both hemispheres to accelerate the results of our field trials and provide alternate season learning opportunities. As the crop protection product candidate nears commercialization, we conduct demonstration trials on the farm. These trials are conducted with distributors, crop consultants, influential growers and food processors on larger acreages. For Zequanox, we worked with large power and industrial customers both in the United States and Canada to obtain field trial data to help with product commercialization efforts and to obtain efficacy data.

Sales, Marketing and Distribution

In the United States, we sell our products through our own internal sales force, which consists of 8 employees focused on managing distributor relationships and creating grower demand for our products. In addition, a dedicated team of 6 employees provide technical service support to both our customers and sales representatives on the use of our products in IPM programs, both for conventional growers as well as for an expanding number of organic growers. Our sales force covers all major regions in the United States, including California and the Pacific Northwest, the Southeast, the Northeast, the Mid-Atlantic and the Great Lakes regions, with an emphasis on high-value specialty crops (fruits, nuts and vegetables). We currently sell our crop protection product lines, Regalia, Grandevo, Venerate, Majestene/Zelto and Stargus/Amplitude, as well as Haven, through leading agricultural distributors, such as Nutrien Ag, Helena Chemical, Simplot, Wilbur Ellis and Aligned Ag Distributors. These are the same distribution partners that most major agrichemical companies use for delivering solutions to growers across the country. We use Albaugh for distribution of a version of Venerate for the seed treatment market in the United States and Canada. During 2016 through January 2018, we had an exclusive distribution agreement with Koch Agronomic Services to distribute Regalia Rx in the United States and Canada. For our water treatment product line, Zequanox, is currently being marketed and sold directly to a selected group of U.S. power and industrial companies. We will continue to work with federal, state and regional agencies for open water use of Zequanox and may consider working with private, commercial companies in the future.

With respect to sales outside of the United States, we have exclusive legacy international distribution agreements for Regalia with major international distributors such as FMC (for certain markets in Latin America) and Syngenta (for specialty crop markets in Europe). Our current strategy is to work with regional distributors and distributors in key

countries who have brand recognition, established customer bases, who can effectively conduct field trials and grower demonstrations with biopesticides and lead or assist in regulatory processes and market development. As such, we have signed a number of distribution agreements: Agristar (for Grandevo and Venerate in Mexico), Nufarm (for Grandevo for certain markets in New Zealand and Australia), Joacanima (for Regalia, Grandevo, Venerate and Majestene in the Philippines), Elephant Vert and Kenya Biologics (for Regalia, Venerate, Grandevo and Majestene in certain parts of Africa), Hoptri (Vietnam), Lidorr (Israel), AMC/Agrimatco (Turkey), Disagro (for a Regalia brand in certain countries in Central America) and Kyung Nong Corporation (South Korea for Majestene and Venerate). We also distribute Jet-Ag by Jet Harvest Solutions in most regions of the United States. We believe we can leverage our existing sales, marketing and distribution network to bring in additional revenues from sales of these products, while enhancing our overall product portfolio.

We derived approximately 93% and 87% of our total revenues from Regalia, Grandevo and Venerate for the years ended December 31, 2018 and 2017, respectively. In addition, we currently rely, and expect to continue to rely, on a limited number of distributors for a significant portion of our revenues since we sell through highly concentrated, traditional distribution channels. For the year ended December 31, 2018, our top two distributors accounted for 52% of our total revenues.

While the biopesticide industry has been growing, customers in the crop production and water treatment sectors are generally cautious in their adoption of new products and technologies and may perceive bio-based pest management products as less attractive than conventional chemical pesticides. Growers often require on-farm demonstrations of a given pest management or plant health product, and given the relative novelty of our water treatment products, consumers of those products will continue to require education on their use. We are implementing the following strategies to accelerate adoption rates and promote sales of our bio-based pest management and plant health products:

Maintain a focused and effective sales and marketing team that shares our values. We were significantly negatively impacted by the tenure of our former chief operating officer, who led our sales and marketing teams, and the departure of significant members of our sales staff in the third quarter of 2014, as well as further departures in late 2017 and early 2018 due primarily to concerns about our financial viability, we have rebuilt our sales and marketing teams, including hiring a highly experienced national sales director to train and coach our sales force. In addition, we are now more effectively organizing the data and educational material that we have amassed over ten years of operations on our bio-based products as well as organic and sustainable agricultural practices in order to train and equip our sales staff to communicate and educate distributors and growers. We believe that hiring and training sales and marketing staff with a high level of technical expertise and knowledge regarding the capabilities of our bio-based products is essential to expanding adoption of our products by growers and sales to distributors. In addition, we have invested in our field development team to include more technical service activities to support sales. These concerted efforts to rebuild and train our sales and marketing teams are yielding positive results, including growth in sales.

Develop an extensive demonstration program. We believe that for growers to be convinced that a bio-based pesticide or plant health product works, they often must see it for themselves. Growers risk their crop each time they try a new product, and often produce only one crop per year on any given plot of land. Further, bio-based pesticide and plant health products are often applied differently and at different times than conventional chemical pesticides and so may be used incorrectly by an inexperienced grower or advisor, decreasing efficacy. We typically conduct on-farm demonstrations with growers in the first year they try one of our products on smaller plots of land to ensure successful application, promoting the continued use of our products in future years across more acres. In addition, we work with distributors to determine which crops to emphasize in a given year and which area to maximize the effectiveness of our demonstration program.

Target early adopters of new pest management technologies. For crop protection products, we target large commercial growers in the United States, who generally set industry standards through more widespread adoption of new pest management technologies they initially test on portions of their crops. We also target organic growers, who are more willing to take risks on new products as they have had few alternatives and great demand for increased yields. We plan to continue to recruit these growers and their consultants to participate in demonstrations and field trials, enabling them to become familiar with our bio-based pest management and plant health products, to experience their benefits firsthand and to promote the use of our products with other growers in their regions. For Zequanox, we have developed strategic relationships with early adopters in the power generation business to do efficacy demonstrations while perfecting the formulations and application of the product.

Educate growers and water resource managers about the benefits of our bio-based pest management products. We will continue to perform on-farm and in-facility demonstrations and provide field data packages to support and validate our product claims. We will also continue to participate in trade shows and conferences to educate growers, their licensed pest control advisors and water resource managers about the benefits of our bio-based pest management products. When in the field, our sales and technical service team members have access to a wealth of information regarding our products and on pre-loaded tablet computers to assist in solving growers' and distributors' problems real-time. We have provided a free application for mobile phone users to assist in calculating tank mix quantities, as well as webinars, podcasts, teach-ins, by-line articles and an online course on bio-based pest management products, which can be taken by growers for continuing education credit to maintain crop protection product applicator licenses.

Develop and leverage relationships with key industry influencers. We will continue to develop relationships early in the product development process with influential members within our target markets, including large innovative growers, technical experts at leading agricultural universities, licensed pest control advisors, wineries, food processors, produce packers, retailers and power facilities. We believe that educating industry influencers about the benefits of Regalia, Grandevo, Venerate, Majestene/Zelto, Haven, Stargus/Amplitude, and Zequanox and our future products increases the likelihood that they will recommend our products to our distributors and end users.

Focus our own sales and marketing on the United States, while signing strategic agreements for international markets, turf, ornamental plants and consumer retail. Because of the concentration of large growers in the United States, we can access these customers through our own sales force. For Regalia, Grandevo, Venerate, Majestene/Zelto, Stargus/Amplitude and Haven we have distribution agreements with leading agrichemical companies and national and regional distributors. For future products, distribution agreements will be developed with regional and national distributors or large multinationals on a case-by-case basis, depending on their expertise in the regions. We have engaged distributors that are selling Regalia in Canada for specialty crops and in parts of the Midwestern United States and Canada for row crops and Venerate in the United States one of our nematicide/insecticides for seed treatment. For the fast-growing Cannabis market, we have set up several specialty distributors and expect to add more. We also are in discussions with consumer home and garden companies to distribute our products.

Manufacturing

Our manufacturing processes are developed in-house at our Davis, California research and development facilities and transferred to our Bangor, Michigan facility, which was formerly used as a biodiesel plant prior to our acquisition in July 2012. Biopesticide formulation, microbial fermentation and product packaging are among the facility's core competencies. We believe in-house manufacturing enhances control and flexibility in production, ensuring quality, strengthening intellectual property security and lowering manufacturing costs over time to achieve desired margins. The facility has room for expansion to install larger drying capacity and larger fermenters to accommodate production of multiple products at significantly higher volumes. In 2017, we added a granulation line for Grandevo WDG and purchased a packaging line, which was placed into service in the first half of 2018.

We currently ferment our Grandevo and Zequanox products in our manufacturing facility but continue to use a third-party contractor for formulating them into spray-dried powders. The facility also accommodates full-scale production of Regalia. While we have the ability to produce the majority of our products using our own manufacturing capacity, we currently exclusively use third parties to manufacture Venerate, Majestene/Zelto, Stargus/Amplitude and Haven as a result of regulatory requirements that would require additional capital investment to produce these products in-house. With necessary permitting now in place, we are currently working on designs to adapt our fermenters to comply with regulatory requirements that will allow us to commence manufacturing Venerate and Majestene/Zelto at our Bangor plant using existing capacity. Stargus/Amplitude is also made at a third-party vendor because the *Bacillus* bacteria produce spores that are hard to contain and could contaminate our Grandevo and Venerate fermentations. We intend to have fermentation of *Bacillus* at our plant at some point in the future, but will require a separate facility from our other products.

We anticipate ramping up production volumes as we expand the facility in the future. We expect to continue to utilize third-party manufactures in North America and the EU for supplemental production capacity to meet excess seasonal demand. As needed, we will also use our own facility or third parties to package and label products. We currently engage toll manufacturers to produce Haven (launched in March 2017), Stargus/Amplitude (first sales in December 2017), and MBI-601 (for field and demonstration trials). The active ingredient in our Regalia product line is derived from the giant knotweed plant, which is a food and medicinal plant native to China and Japan. We have scaled

production of Regalia using a reliable, single supplier that acquires raw knotweed from numerous regional sources and performs an extraction process on this plant, following our specification. The resulting dried extract is shipped to our manufacturing plant for formulations, production and packaging. We do not maintain a long-term supply contract with this supplier. While there can be no assurance that we will continue to be able to obtain dried giant knotweed plant extract from our supplier in China at a competitive price point, we estimate that our current supply of the ingredient will be sufficient to manufacture product to meet the next 6 months' demand. Should we elect or be required to do so, we do not believe that we would have substantial difficulty in finding alternative suppliers as we have identified and received quality knotweed from a number of new possible suppliers, in the event additional inventory or diversified sourcing is necessary.

Research and Development

As of December 31, 2018, we had 38 full-time equivalent employees dedicated to research and development and patent related activities, 7 of whom hold Ph.D. degrees, plus 6 field development personnel who focus on technical support and demonstration and research field trials. Our research and development team has technical expertise in microbiology, molecular biology, natural product and analytical chemistry, biochemistry, fermentation, entomology, nematology, weed science, plant physiology, plant pathology and aquatic sciences. Our research and development activities include discovery, product development, product support, regulatory, patent and field trial activities, which are principally conducted at our Davis, California facility as well as by our field development specialists on crops and mussel-infested facilities in their respective regions. We have reduced the size of our research and development staff compared to prior periods as part of our measures to streamline business operations, but we have made, and will continue to make, substantial investments in research and development. Our research and development expenses, including patent expenses, were $10.7 million and $10.8 million for the years ended December 31, 2018 and 2017, respectively.

Intellectual Property Rights

We rely on patents and other proprietary right protections, including trade secrets and proprietary know-how, to preserve our competitive position. As of December 31, 2018, we had 42 issued U.S. patents and 294 issued foreign patents (of which 3 U.S. patents and 45 foreign patents were in-licensed), 19 pending U.S. provisional and non-provisional patent applications (of which 1 was in-licensed), and 93 pending foreign patent applications (of which 5 were in-licensed) relating to microorganisms and natural product compounds, uses and related technologies. As of December 31, 2018, we have received 8 copyright registrations. As of December 31, 2018, we had received 19 U.S. trademark registrations and had 14 trademark applications pending in the United States. As of December 31, 2018, we also had received 121 trademark registrations and had 48 trademark applications pending in various other countries.

When we find a microbial product in our screen that kills or inhibits one or more pests or pathogens in at least three replicated tests and identify the microorganism and its associated chemistry, we file a patent application claiming any one or more of the following:

- the microorganism, its DNA products, as well as mutations and other derivatives;
- the use of the microorganism for pest management;
- novel natural product compounds, their analogs and unique mixtures of compounds produced by the microorganism;
- the new use of known natural product compounds for pest management;
- formulations of the microorganism or compounds; and
- synergistic mixtures of the microorganism or compounds with conventional chemical or other pesticides.

One of our commercially available products and certain of our lead product candidates are based on microbes we have identified using our proprietary discovery process, including Venerate, Majestene/Zelto and MBI-014, which are based on a *Burkholderia* bacterium, with respect to which we have 51 issued patents and 17 pending patent applications (both U.S. and foreign), and MBI-110 and MBI-507, which are based on a *Bacillus* strain, with respect to which we have 6 issued patents and 7 pending patent applications (both U.S. and foreign).

We have also entered into in-license and research and development agreements with respect to the use and commercialization of Regalia, Grandevo and Haven, as well as certain products under development, including MBI-601. Under the licensing arrangements for our commercially available products, we are obligated to pay royalty fees between 2% and 5% of net sales of these products, subject in certain cases to aggregate dollar caps. The exclusivity and royalty provisions of these agreements are generally tied to the expiration of underlying patents. For Regalia, the licensed patent was related to a method of extraction of knotweed. The patents we acquired or in-licensed for Regalia and Zequanox expired in 2017, such that we are no longer required to pay royalties on sales of these products. We have filed separate patent applications with respect to both product lines and have been issued four U.S. patents with respect to Regalia and five for Zequanox. In addition, the in-licensed U.S. patent for Grandevo is expected to expire in or around 2024, but there are pending patent applications relating to Grandevo that could expire later than 2024, and we have also filed separate patent applications for Grandevo of which six have been issued on a novel compound and uses for nematodes, corn rootworm and a variety of insects.

While third parties thereafter may develop products using the technology under the expired patents, we do not believe that they can produce competitive products without infringing other aspects of our proprietary technology, and we therefore do not expect the expiration of the patents or the related exclusivity obligations to have a significant adverse financial or operational impact on our business. Certain additional information regarding the intellectual property associated with commercially available products based in part on in-licensed technology follows:

Regalia. We entered into an exclusive license agreement with a company co-founded by Dr. Hans von Amsberg, a former employee of German chemical producer BASF, in May 2007 for U.S. and limited international use of a U.S. patent and technology used in our Regalia product line. Two U.S. patents have been issued on the synergistic combinations with biopesticides and conventional chemical pesticides, one patent has been issued on the new uses for soil and roots, and one patent has been issued on the new formulations of Regalia. The European Patent Office (EPO) has granted claims relating to the use of *Reynoutria sachalinensis* as either a plant or seed growth promoter.

Grandevo. We entered into a co-exclusive license agreement with the USDA in November 2007 for the use in the United States of a U.S.-issued patent and a U.S. patent application relating to the *Chromobacterium subtsugae* bacteria used in our Grandevo product line. We have filed patent applications on the compounds produced in the bacterial cells, gene sequences and new uses for the *Chromobacterium subtsugae* bacteria, and for new uses and new formulations of our Grandevo product line. Five U.S. patents have been issued on a novel compound produced by the bacteria for uses on a variety of insects, use for corn rootworm populations and for nematode control. The USDA informed us that we are the only current licensee for the patent with respect to the *Chromobacterium subtsugae* bacteria.

Zequanox. We entered into a license agreement with The University of the State of New York in December 2009 pursuant to which we were granted an exclusive license under the University’s rights for the worldwide use of a U.S.-issued patent and a Canadian-issued patent relating to the *Pseudomonas fluorescens* bacteria used in our Zequanox product line. Four U.S. patents have been issued on the natural, mussel-killing compounds in the bacteria, and we have filed patent applications relating to various Zequanox active ingredients.

Regulatory Considerations

Our activities are subject to extensive federal, state, local and foreign governmental regulations. These regulations may prevent us or our collaborators from developing or commercializing products in a timely manner or under technically or commercially feasible conditions and may impose expenses, delays and other impediments to our product development and registration efforts. In the United States, the EPA regulates our bio-based pest management products under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), the Federal Food, Drug and Cosmetics Act (FFDCA) and the Food Quality Protection Act (FQPA). In addition, some of our plant health products are regulated as fertilizers, auxiliary plant substances, soil amendments, beneficial substances and/or biostimulants in each of the fifty states.

In 2004, the United States Congress passed the Pesticide Registration Improvement Renewal Act, which was reauthorized in 2007 and 2012, a result of efforts from an industry coalition of pesticide companies and environmental groups, to codify pesticide approval times in return for user fees. This law facilitates faster approval times for biopesticides, with EPA approvals typically received within 16 to 24 months, compared with 36 months or longer for conventional chemical pesticides. Registration processes for state and foreign governments vary between jurisdictions and can take up to 12 months for state governments, such as California and New York, and up to 36 months or more for foreign governments. In some instances, California and Canada will conduct joint reviews with the EPA, which allows some pesticides to receive concurrent approvals in California, Canada and the United States. However, in most instances, most foreign government submissions will not occur until after a U.S. registration has been secured. To register a crop protection product with the EPA, companies must demonstrate the product is safe to mammals, non-target organisms, endangered species and the environment. To demonstrate the bio-based pest management product’s safety, required studies must be conducted that evaluate mammalian toxicology, toxicological effects to non-target organisms in the environment (ecotoxicological exposures) and physical and chemical properties of the product. The registration dossier is subject to both scientific and administrative reviews by EPA scientists and management before registration approval. The scientific review involves thorough evaluation of submitted data and completion of risk assessments for human dietary and ecotoxicological exposures. Upon completion of this process, the registration package, including the proposed label, is sent to the Office of General Council for legal review. The final step in the registration process is administrative sign-off by the EPA director of the Biopesticides and Pollution Prevention Division.

In addition to EPA approval, we are required to obtain regulatory approval from the appropriate state regulatory authority in individual states and foreign regulatory authorities before we can market or sell any pest management product in those jurisdictions. Foreign governments typically require up to two seasons of locally generated field efficacy data on crop-pest combinations before a product dossier can be submitted for review. California and foreign jurisdictions also require us to submit product efficacy data, which the EPA historically has not required, but may request.

We also generally pursue organic certification, including USDA National Organic Program, Organic Materials Review Institute (OMRI), EcoCert and Control Union, for our product portfolio. These certifications often entail a two to four-month review process and, in many instances, require annual or semi-annual audits.

While these regulations substantially increase the time and cost associated with bringing our products to market, we believe that our management team's significant experience in bringing our and other companies' technologies through EPA, state and foreign regulatory approval, efficient development process and ability to leverage our strategic collaborations to assist with registrations, particularly in Europe and Latin America, have and will continue to enable us to overcome these challenges.

Since our plant health products (which are classified by the EPA as biostimulants) are not used to control pests, they currently fall outside the legal scope of FIFRA, FFDCA and FQPA and, therefore, we do not need to submit applications for EPA registrations for such products. However, we must still submit state registrations for our plant health products, including Haven, for which registrations were submitted in the first quarter of 2017, and those containing microbes of foreign origin may also need to be "deregulated" (or determined not to be a plant pest) under the Plant Protection Act by the USDA Animal and Plant Health Inspection Service prior to use in field trials or for large scale release. Nevertheless, the regulatory process is significantly accelerated compared to that for biopesticides.

Regalia. The EPA granted approval for the Regalia SC formulation in August 2008, for the Regalia 5% ("Regalia") formulation in May 2009, for the Regalia 20% ("Regalia Maxx") formulation in January 2010 and for a "ready to use" consumer formulation in January 2010. In January 2016, we launched a new formulation of Regalia disperses better in water and is easier to mix and rinse from containers and spray equipment. Regalia is currently registered in all U.S. states and Puerto Rico. We have also registered Regalia Maxx in Brazil, Mexico, Canada, Chile, Columbia, South Africa, Ecuador, Turkey, Panama, El Salvador, Guatemala, Nicaragua, Honduras, Peru, the Dominican Republic, Morocco and Tunisia.

In November 2011, we submitted an Annex 1 registration dossier to the EU. Our Regalia registration package completed initial review by regulatory authorities in the UK, which was serving as lead for completing the Annex 1 (active substance) listing of Regalia for the EU. Because the UK has indicated its intention to leave the EU, we have withdrawn the Regalia dossier and will resubmit it using the Netherlands as the lead (rapporteur) country to continue the EU process. The EU regulatory process remains unpredictable and slow, but recent EU decisions on guidance for

botanical pesticides and a proposed new process for biopesticide approvals in recent months indicate that the EU may become more invested in expediting the approvals of reduced risk biopesticides. Regalia Maxx would be marketed as “Sakalia” by Syngenta throughout Europe and certain parts of the Middle East and Africa.

In 2016, we successfully completed regulatory field trials China, with good results on the targeted crops of grapes, strawberries, cucurbits and tomatoes. A required second season of repeat field trials were conducted successfully in 2017, and we are currently seeking a commercial partner in China to continue with the regulatory submission in China. Similarly, regulatory field trial efforts to support product approvals or label expansions are underway by MBI or with our distribution partners in South Africa, Kenya, Israel, Turkey, the Philippines and Vietnam. We continue to discuss additional distribution partnerships with other countries in Asia, Africa and the Middle East.

Grandevo. In August 2011 and May 2012, the EPA granted approval for the Grandevo insecticide "technical grade active ingredient" and a wettable powder formulation, respectively. The wettable powder formulation is registered in all 50 states as well as Puerto Rico and the District of Columbia. In May 2013, we received EPA approval for a revised label reflecting Grandevo's safety for bees. In addition, in 2016, we received approval for registration dossier for Grandevo in Mexico. We conducted field trials for Grandevo in Brazil, the Philippines, Vietnam, Australia, New Zealand, South Africa and certain West African countries, allowing us to prepare the dossiers for submission in those countries. We have submitted Grandevo to the Netherlands for Annex 1 listing review for Europe, and are working with the Netherlands to address issues raised in their science review to allow them to complete their draft risk assessment and forward the Grandevo dossier to the European Food Safety Authority for EU-wide review and approval. Additional studies and data generation to support the EU review will be conducted in 2019. Also, in 2017-2018, we conducted several successful field trials in Brazil on a variety of insect pests, thus allowing us to submit the dossier to regulatory authorities. We intend to submit Grandevo to Brazilian authorities in 2019.

Venerate. In February 2014, the EPA granted approval for Venerate. Venerate is currently registered in 48 states and Puerto Rico, with registration pending in Hawaii. Seed treatment uses are approved and sold under Albaugh's BIOST brand. In 2014, we submitted Venerate registration dossiers in Canada and Mexico, receiving approval in Mexico in 2016. We conducted field trials for Venerate in Brazil, the Philippines, Vietnam, New Zealand, South Africa, and certain West African countries, allowing us to prepare the dossiers for submission in those countries. Several key regulatory efficacy trials to support Venerate Annex 1 listing in Europe have been completed and ongoing work, including additional toxicology studies we expect will be required will enable us to submit a dossier for Venerate in 2018. We have conducted field trials in Brazil on a variety of insect pests are scheduling additional field trials in 2019 and plan to submit a dossier to regulatory authorities in 2020.

Majestene/Zelto. In October 2015, the EPA granted product registration for Majestene. Majestene/Zelto is currently registered in almost all 50 states, including key states of California, New York, Florida, Georgia, South Carolina, North Carolina, Wisconsin, Idaho, Washington and Oregon. With additional efficacy trial data generated in 2016, we gained approval of an expanded crop label from most states in 2017. We are conducting field trials to expand the crops uses in California to fruit trees and vines.

Stargus/Amplitude. In October of 2017, the EPA granted approval for Stargus and Amplitude. They are registered in almost every United States, with California pending. Canadian authorities announced their intention to approve Stargus in December 2018, and the decision is now posted for public comment, with product registration anticipated in 2019. Stargus is pending in Mexico with regulatory authorities there recently confirming (February 2019) that the product has been granted reduced-risk, "fast track" review status. We are completing the dossier for EU submission of Stargus, as we have already conducted several efficacy trials and are completing additional toxicology and physical-chemical testing needed to support the EU dossier. We anticipate submitting Stargus to the Netherlands for Annex 1 listing review in 2020.

Haven. Haven is registered by states but not the EPA. Haven has been cleared for commercialization and sale in all targeted states in the United States for use on nut crops, grapes, berries, pome fruit, stone fruit, citrus, fruiting

vegetables, bulb vegetables, cucurbits, brassicas, leafy vegetables, strawberries and asparagus. In late December 2018, the Canadian Food Inspection Agency announced its intent to approval Haven for use on grapes, tree fruit, nut crops and fruiting vegetables. MBI is also working on commercialization of Haven in several EU countries and Brazil.

Zequanox. In July 2011, the EPA granted a conditional approval of the “technical grade active ingredient” in an early formulation of Zequanox. A spray-dried powder formulation, which is an improvement over the “end product” approved in July 2011, was approved with an unconditional registration in March 2012, and this formulation is now commercially available. We also received approval for Zequanox for use in hydroelectric plants in Canada in November of 2012. We received EPA approval for open water uses in June 2014. Currently, Zequanox is being evaluated by several U.S. and Canadian federal, state and provincial entities as an invasive mussel eradication, native mussel habitat restoration and harmful algal bloom prevention tool in the Great Lakes region under the auspices of government programs. In-pipe and open water labels have been approved in all targeted states, with the exception of California where in-pipe uses are currently registered and the open water use label is under evaluation.

As with any pesticide, our pest management products will continue to be subject to review by the EPA and state regulatory agencies. The EPA has the authority to revoke the registration or impose limitations on the use of any of our pest management products if we do not comply with the regulatory requirements, if unexpected problems occur with a product or if the EPA receives other newly discovered adverse information. See Part I-Item 1A-"Risk Factors—Risks Relating to Our Business and Strategy—Our inability to obtain regulatory approvals, or to comply with ongoing and changing regulatory requirements, could delay or prevent sales of the products we are developing and commercializing." Our research and development activities are also subject to federal, state and local worker safety, air pollution, water pollution and solid and hazardous waste regulatory programs and periodic inspection. We believe that our facilities are in substantial compliance with all applicable environmental regulatory requirements.

Competition

For pest management products, performance and value are critical competitive factors. To compete against manufacturers of conventional chemical pesticides and genetically modified crops, we need to demonstrate the advantages of our products over these more established pest management products. Many large agrichemical companies are developing, and have introduced, new conventional chemical pesticides and genetically modified products that they believe are safer and more environmentally friendly than older conventional chemical products.

The pest management market is very competitive and is dominated by multinational chemical and life sciences companies such as UPL/Arysta, BASF, Bayer, Corteva Agriscience (owned by DowDuPont), FMC, Monsanto (acquired by Bayer), Sumitomo Chemical and Syngenta (acquired by ChemChina). Universities, research institutes and government agencies may also conduct research, seek patent protection and, through collaborations, develop competitive pest management products. Other companies, including bio-specialized biopesticide businesses such as AgraQuest (owned by Bayer), Certis USA (owned by Mitsui & Co), Novozymes (in a joint venture with Monsanto) and Valent Biosciences (subsidiary of Sumitomo Chemical) may prove to be significant competitors in the bio-based pest management and plant health market. In addition, we could face competition in the future from new, well-financed start-up companies such as AgBiome and Indigo.

In many instances, agrichemical companies have substantially greater financial, technical, development, distribution and sales and marketing resources than we do. Moreover, these companies may have greater name recognition than we do and may offer discounts as a competitive tactic. There can be no assurance that our competitors will not succeed in developing pest management products that are more effective or less expensive than ours or that would render our products obsolete or less competitive. Our success will depend in large part on our ability to maintain a competitive position with our technologies and products.

Employees

As of December 31, 2018, we had 113 full-time equivalent employees, of whom 12 hold Ph.D. degrees. Approximately 38 employees are engaged in research and development and patent related activities, 21 in sales and marketing (including 6 sales and field development personnel who focus on technical support and demonstration and research field trials), 36 in operations, including manufacturing, supply chain and quality assurance, and 19 in management, accounting/finance and administration. None of our employees are represented by a labor union.

Corporate Information

We were originally incorporated in the State of Delaware in June 2006 as Marrone Organic Innovations, Inc. Our principal executive offices are located at 1540 Drew Avenue, Davis, CA 95618. Our telephone number is (530) 750-2800. Our website address is www.marronebioinnovations.com.

ITEM 1A. RISK FACTORS

Our operations and financial results are subject to various risks and uncertainties, including those described below, which could adversely affect our business, financial condition, results of operations, cash flows, growth prospects and the trading price of our common stock.

Risks Relating to Our Business and Strategy

We have incurred significant losses to date and anticipate continuing to incur losses in the future, and we may not achieve or maintain profitability.

We have incurred operating losses since our inception in June 2006, and we expect to continue to incur operating losses for the foreseeable future. As of December 31, 2018 and 2017, we had an accumulated deficit of $283.5 million and $265.6 million, respectively. For the years ended December 31, 2018 and 2017, we had a net loss attributable to common stockholders of $20.2 million and $30.9 million, respectively. As a result, we will need to generate significant revenues to achieve and maintain profitability, and we may not be able to achieve profitability in the near future or at all, which may depress our stock price.

Through December 31, 2018, we have derived substantially all of our revenues from sales of Regalia, Grandevo and Venerate. In addition, we have derived revenues from strategic collaboration and development agreements for the achievement of testing validation, regulatory progress and commercialization events, and from sales of other products. Accordingly, there is only a limited basis upon which to evaluate our business and prospects. Our future success depends, in part, on our ability to market and sell other products, such as Zequanox, Majestene/Zelto, Haven, and Stargus/Amplitude as well as our ability to increase sales of Regalia, Grandevo and Venerate and introduce new products. An investor in our stock should consider the challenges, expenses and difficulties we will face as a company seeking to develop and manufacture new types of products in a relatively established market. We expect to derive future revenues primarily from sales of our crop protection and plant health products, but we cannot guarantee the magnitude of such sales, if any. We expect to continue to devote substantial resources to expand our research and development activities, further increase manufacturing capabilities and expand our sales and marketing activities for the further commercialization of our crop protection and plant health products and other product candidates. We expect to incur additional losses for the foreseeable future, including at least the next several years, and may never become profitable.

There is uncertainty about our ability to continue as a going concern.

Our historical operating results as of December 31, 2018 indicate substantial doubt exists related to our ability to continue as a going concern for the 12 months from the issuance of the accompanying financial statements. However, we believe that our existing cash and cash equivalents and restricted cash of $19.8 million at December 31, 2018, together with expected revenues, net proceeds from expected future debt or equity financings, and continued cost management will be sufficient to fund operations as currently planned for at least one year from the date of the issuance of the accompanying financial statements. However, we cannot predict, with certainty, the outcome of actions to grow revenues, obtain financing and/or manage or reduce costs. We have based this belief on assumptions and estimates that may prove to be wrong, and we could spend our available financial resources less or more rapidly than currently expected. We may continue to require additional sources of cash for general corporate purposes, which

may include operating expenses, working capital to improve and promote our commercially available products, advance product candidates, expand international presence and commercialization, general capital expenditures and satisfaction of debt obligations. Management may seek additional capital through debt financings, collaborative or other funding arrangements with partners, or through other sources of financing. Should we seek additional financing from outside sources, we may not be able to raise such financing on terms acceptable to us or at all. The actions discussed above cannot be considered probable of occurring and mitigating the substantial doubt raised by our historical operating results and satisfying our estimated liquidity needs for 12 months from the issuance of the accompanying financial statements. If we become unable to continue as a going concern, we may have to liquidate our assets, and stockholders may lose all or part of their investment in our common stock.

We expect to require additional financing in the future to meet our business requirements and to service our debt. Such capital raising may be costly, difficult or not possible to obtain and, if obtained, could significantly dilute current stockholders' equity interests, and we may be unable to repay our secured indebtedness.

We expect to continue to incur significant losses until we are able to significantly increase our revenue. Accordingly, we expect to need significant additional financing to maintain and expand our business, including, for example, costs associated with increased headcount, potential capital expenditures to grow capacity at our Bangor manufacturing facility and potential acquisitions of complementary technologies, as well as to meet the financial covenants of and pay the principal and interest under our debt agreements, under which approximately $21.4 million of principal and deferred interest payments remained outstanding as of March 18, 2019. We intend to seek additional funds from public or private equity offerings, debt financings, strategic collaborations involving up-front cash payments or other means. Additional capital may not be available on terms acceptable to us, or at all. Any additional equity financing may be significantly dilutive to stockholders or, in some cases, require us to seek stockholder approval for the financing, and debt financing, if available, may include restrictive covenants and bear high rates of interest. In addition, our existing loan agreements contain certain restrictive covenants that either limit our ability to or require a mandatory prepayment if we incur additional indebtedness and liens and enter into various specified transactions. We therefore may not be able to engage in any of the foregoing transactions unless we obtain the consent of our lenders or prepay the outstanding amounts under the debt agreements, which could require us to pay additional prepayment penalties. In addition, we may incur substantial costs in pursuing future capital financing, including investment banking fees, legal fees, accounting fees, securities law compliance fees, printing and distribution expenses and other costs. We also may be required to recognize non-cash expenses in connection with certain securities we issue, such as warrants, which may adversely impact our financial results.

Certain of our debt agreements also contain financial covenants, including maintaining minimum current, debt-to-worth and loan-to-value ratios and provisions providing for an event of default if there is a material adverse change in our financial condition or if we are in default under certain of our other agreements. We are not in compliance with certain of these covenants and have received waivers from our lenders, none whom have previously declared an event of default on our indebtedness. Breach of covenants included in our debt agreements, which could result in the lenders demanding payment of the unpaid principal and interest balances. If we fail to pay any principal or interest under our indebtedness when due, or are otherwise in violation of certain covenants under our debt agreements, this may result in the acceleration of our indebtedness, which would have a material adverse effect upon our business and would likely require us to seek to renegotiate these debt arrangements with the lenders, as we may not have sufficient funds to repay that indebtedness.

If we cannot raise more money when needed, or are unable to use our future working capital, borrowings or equity financing to repay or refinance the amounts outstanding under our debt agreements or to renegotiate our debt arrangements with lenders, we may have to reduce our capital expenditures, scale-back our development of new products, reduce our workforce or license to others products that we otherwise would seek to commercialize ourselves. Any of these eventualities would likely have a material adverse impact on our value and the value of our equity.

Our business may fail if we are not able to increase sales.

Our future success will depend on our ability to significantly increase sales from the bio-based pest management products we have commercialized, both domestically and abroad. Our initial sales of our primary formulation of Regalia and our initial formulation of Grandevo occurred in the fourth quarter of 2009 and the fourth quarter of 2011, respectively. We began selling Zequanox in the second half of 2012, Venerate in May 2014, Majestene in December 2015, Haven in March 2017 and Stargus/Amplitude in December 2017. However, while we have invested considerable resources in the launch of our products, various factors have impeded higher growth in sales of these products.

For example, we believe adverse conditions in the U.S. agricultural industry, including low commodity prices, may have reduced demand for our products. Further delays in regulatory approvals of certain of our products in Europe and other jurisdictions may slow international growth, and any delay in a product launch that causes us to miss a growing season may require us to wait a year to enter that market. The extended drought in California and other markets reduced demand for our products as fewer acres are planted, changes in weather patterns in Florida resulted in a shortened bloom cycle for the citrus market and few pesticide and plant health products being used, and certain of our strategic collaborations have not resulted in significant increases in sales of Regalia in row crops and outside of the Unites States. Due to our strategic plan, we have not committed sufficient resources to Zequanox in order to market it full-scale, and our collaboration efforts with regard to this product may not result in increased sales. In addition, the departures of our former chief operating officer and significant members of our sales staff in the third quarter of 2014 and subsequent turnover in our sales and marketing department disrupted the 2014 launch of Venerate as well as growth in sales of our other commercialized products, including Regalia and Grandevo. Further, we believe that

following the announcement of the matters relating to our 2015 financial restatement, some customers and potential customers were concerned about our reported investigation efforts, and therefore, were reluctant to do business with us until after we had reached a settlement with the SEC.

Lower than expected sales growth may result in an increase in write-offs and inventory obsolescence if we are not be able to use raw materials or sell finished goods before they expire, and may result in higher proportional operating expense levels, increases in our cost of product revenues and decreases in product margins as we are unable to manufacture products as efficiently at low volumes and underutilization of our Bangor, Michigan manufacturing facility results in increased relative overhead and operating costs in addition to decreased allocation of depreciation and other costs to production and inventory. If we are unable to establish a successful sales and marketing infrastructure internally and increase sales of our commercialized products, our financial results will be adversely affected, our available cash and ability to raise additional capital will decrease and our business may fail.

We have limited experience in marketing and selling our products and will need to continue expanding our sales and marketing infrastructure.

We currently have limited sales and marketing experience and capabilities. As of December 31, 2018, we employed 21 full-time equivalent sales and marketing personnel, 6 of whom focus on technical support and demonstration and conducting field trials and 7 of which focus on marketing. The majority of these sales personnel were hired following the departures in the third quarter of 2014, including our former chief operating officer, who led our sales and marketing teams, and significant members of our sales staff. In addition, we believe that prior to the financing transactions we completed in the first half of 2018, concerns and rumors about our ability to continue operations led to some turnover of our sales and marketing team, which we believe impacted our sales during that quarter and could impact our sales in the near-term. New personnel require significant training to attain a high level of technical expertise and knowledge regarding the capabilities of our bio-based products compared with conventional chemical pest management products and techniques in order to educate growers and independent distributors on the uses and benefits of our products. We will need to further develop our sales and marketing capabilities and find partners in order to successfully increase sales of our commercially available products and to commercialize other products we are developing, which may involve substantial costs. There can be no assurance that our field development specialists and other members of our sales and marketing team will successfully compete against the sales and marketing teams of our current and future competitors, many of which may have more established relationships with distributors and growers. Our inability to recruit, train and retain sales and marketing personnel, or their inability to effectively market and sell the products we are developing, could impair our ability to gain market acceptance of our products and cause our sales to suffer.

If we are unable to maintain and further establish successful relations with the third-party distributors that are our principal customers, or they do not focus adequate resources on selling our products or are unsuccessful in selling them to end users, sales of our products will be adversely affected.

In the United States, we rely on independent distributors of agrichemicals to distribute and assist us with the marketing and sale of Regalia, Grandevo, Venerate, Majestene/Zelto, Haven, Stargus/Amplitude and other products we are developing. We also are leveraging these relationships to sell Jet-Ag in most U.S. regions. These distributors are our principal customers, and revenue growth will depend in large part on our success in establishing and maintaining this sales and distribution channel. However, there can be no assurance that our distributors will be

successful in selling our products to end users, or will focus adequate resources on selling them, and they may not continue to purchase or market our products for a number of reasons.

For example, many distributors lack experience in marketing bio-based pest management and plant health products, which generally must be used differently than conventional chemical pesticides. Distributors may not continue to market our products if they receive negative feedback from end users and key influencers (pest control advisors and university researchers), or if we believe our products are being blamed for damage to treated plants caused by other pesticides with which our products have been combined (whether properly or improperly). In addition, many of our distributors are in the business of distributing and manufacturing other, possibly competing, pest management and plant health products, including internally developed and commercialized bio-based products as well as bio-based products developed by larger agrichemical companies that negotiate to "bundle" such specialty products with other high demand products. For example, a portion of our sales of Venerate are tied to Albaugh's promotion, sales and services related to products under its BIOST platform, in addition to the effectiveness of their proprietary blend, which while containing Venerate, is developed by Albaugh and not by us. To the extent our distributors are unsuccessful in selling our products to end users, or in marketing their own products that incorporate our products, they may purchase lower volumes from us, which could have a material adverse effect on our business. In addition, our distributors may earn higher margins by selling competing products or combinations of competing products. If we are unable to establish or maintain successful relationships with independent distributors, we need to further develop our own sales and demand creation capabilities, which would be expensive and time-consuming, and the success of which would be uncertain.

We depend on a limited number of distributors.

Our current revenues are derived from a limited number of key customers, each of which serves as a third-party distributor to our products' end users. For the years ended December 31, 2018 and 2017, our top two distributors accounted for 52% and 33% of our total revenues, respectively. We expect a limited number of distributors to continue to account for a significant portion of our total revenues for the foreseeable future. This customer concentration increases the risk of quarterly fluctuations in our revenues and operating results. The loss or reduction of business from one or a combination of our significant distributors could materially adversely affect our revenues, financial condition and results of operations.

The product candidates we select for development and commercialization may fail to generate significant revenues, and we may not be able to successfully enter into strategic collaborations with respect to our other product candidates.

Our internal development efforts are limited to two product candidates: MBI-014, a bioherbicide that is based on the same microorganism in Venerate and Majestene/Zelto, which we submitted to the EPA in August 2018; and MBI-601, a biopesticide that produces gaseous natural compounds that functions as a "biofumigant," which received EPA approval in November 2016. We are now focusing on the MBI-014 submission and reducing the manufacturing cost of MBI-601. Simultaneously, we are seeking collaborations with third parties to develop and commercialize early stage candidates on which we have elected not to expend significant internal resources.

Successful development of product candidates will require significant additional investment, including costs associated with research and development, completing field trials and obtaining regulatory approval, as well as the ability to manufacture our products in large quantities at acceptable costs while also preserving high product quality. Difficulties often encountered in scaling up production include problems involving production yields, quality control and assurance, shortage of qualified personnel, production costs and process controls. In addition, we are subject to inherent risks associated with new products and technologies. These risks include the possibility that any product candidate may:

- be found unsafe;
- be harmful to consumers, growers, farm workers or the environment;
- be harmful to crops when used in connection with conventional chemical pesticides;
- cause a major crop failure;
- be ineffective or less effective than anticipated;
- be displaced by new technologies;
- fail to receive or take longer to receive necessary regulatory approvals;
- be difficult to competitively price relative to alternative pest management solutions;
- be difficult or impossible to manufacture on an economically viable scale;

be subject to supply chain constraints for raw materials;
fail to be developed and accepted by the market prior to the successful marketing of similar products by competitors;
be impossible to market because it infringes on the proprietary rights of third parties; or
be too expensive for commercial use.

Our decisions regarding which product candidates to pursue may cause us to fail to capitalize on product candidates that could have given rise to viable commercial products and profitable market opportunities. In addition, we may not be successful in entering into new arrangements with third parties, on favorable terms or at all, with respect to product candidates we do not pursue internally.

If our ongoing or future field trials are unsuccessful, we may be unable to obtain regulatory approval of, or commercialize, our products on a timely basis.

The successful completion of multiple field trials in domestic and foreign locations on various crops and water infrastructures is critical to the success of our product development and marketing efforts. If our ongoing or future field trials are unsuccessful or produce inconsistent results or unanticipated adverse side effects on crops or on non-target organisms, or if we are unable to collect reliable data, regulatory approval of our products could be delayed, or we may be unable to commercialize our products. In addition, more than one growing or treatment season may be required to collect sufficient data and we may need to collect data from different geographies to prove performance for customer adoption. Although we have conducted successful field trials on a broad range of crops, we cannot be certain that additional field trials conducted on a greater number of acres, or on crops for which we have not yet conducted field trials, will be successful. Moreover, the results of our ongoing and future field trials are subject to a number of conditions beyond our control, including weather-related events such as drought or floods, severe heat or frost, hail, tornadoes and hurricanes, or low or no natural occurrence of the pests intended for testing. Generally, we pay third parties, such as growers, consultants and universities, to conduct field tests on our behalf. Incompatible crop treatment practices or misapplication of our products by these third parties or lack of sufficient occurrence of the identified pests in nature for a particular trial could impair the success of our field trials.

Our inability to obtain regulatory approvals, or to comply with ongoing and changing regulatory requirements, could delay or prevent sales of the products we are developing and commercializing.

The field testing, manufacture, sale and use of pest management products, including Regalia, Grandevo, Zequanox, Venerate, Majestene/Zelto, Stargus/Amplitude and other products we are developing, are extensively regulated by the EPA and state, local and foreign governmental authorities. These regulations substantially increase the time and cost associated with bringing our products to market. If we do not receive the necessary governmental approvals to test, manufacture and market our products, or if regulatory authorities revoke our approvals, do not grant approvals in a timely manner or grant approvals subject to restrictions on their use, we may be unable to sell our products in the United States or other jurisdictions, which could result in a reduction in our future revenues.

We have received approval from the EPA for the active ingredients and certain end product formulations for Regalia, Grandevo, Zequanox, Venerate, Majestene/Zelto, Stargus/Amplitude, MBI-601, MBI-005 and MBI-011. As we introduce new formulations of and applications for our products, we need to seek EPA approval prior to commercial sale. For any such approval, the EPA may require us to fulfill certain conditions within a specified period of time following initial approval. We are also required to obtain regulatory approval from other state and foreign regulatory authorities before we market our products in their jurisdictions, some of which have taken, and may take, longer than anticipated.

Some of these states and foreign countries may apply different criteria than the EPA in their approval processes. Although federal pesticide law preempts separate state and local pesticide registration requirements to some extent, state and local governments retain authority to control pesticide use within their borders.

There can be no assurance that we will be able to obtain regulatory approval for marketing our additional products or new product formulations and applications we are developing. Although the EPA has in place a registration procedure for biopesticides like Regalia and Grandevo that is streamlined in comparison to the registration procedure for conventional chemical pesticides, there can be no assurance that all of our products or product extensions will be eligible for this streamlined procedure or that additional requirements will not be mandated by the EPA that could make the procedure more time consuming and costly for our future products.

Additionally, for California state registration and registration in jurisdictions outside of the United States, all products need to be proven efficacious for each proposed crop-pest combination, which can require costly field trial testing, and a favorable result is not assured. Because many of the products that may be sold by us must be registered with one or more government agencies, the registration process can be time consuming and expensive, and there is no guarantee that the product will obtain all required registrations. We have intentionally obtained registration in some jurisdictions and not in others. California is one of the largest and most important producers of agricultural products in the world. As such, we view California as one of the most natural and attractive markets for our products, but it is also very stringent in its regulations, generally requiring more time and effort, and lacking legally mandated deadlines for its reviews of reduced-risk biopesticides. Therefore, gaining concurrent approvals with the EPA, other states other countries may not always be achievable. Even if we obtain all necessary regulatory approvals to market and sell our products, they will be subject to continuing review and extensive regulatory requirements, including periodic re-registrations. The EPA, as well as state and foreign regulatory authorities, could withdraw a previously approved product from the market upon receipt of newly discovered information, including an inability to comply with their regulatory requirements or the occurrence of unanticipated problems with our products, or for other reasons.

Adverse weather conditions, climate change and other natural conditions can reduce acreage planted or incidence of crop disease or pest infestations, which can adversely affect our results of operations.

Production of the crops on which our products are typically applied is vulnerable to extreme weather conditions such as heavy rains, hurricanes, hail, tornadoes, freezing conditions, drought, fires and floods. Weather conditions can be impacted by climate change resulting from global warming, including changes in precipitation patterns and the increased frequency of extreme weather events, or other factors. Unfavorable weather conditions can reduce both acreages planted and incidence (or timing) of certain crop diseases or pest infestations, each of which may reduce demand for our products. For example, since 2012, global warming has led all or parts of the United States to experience abnormally low rainfall or drought relative to historical periods, reducing the incidence of fungal diseases such as mildews and the demand for fungicides such as Regalia. These conditions have persisted or worsened particularly in California and the Pacific Northwest, resulting in continued reductions in acreage planted throughout those regions. Shortened bloom cycles relating to changes in weather patterns also could reduce the amount of pesticides and plant health products used during a growing season. For example, in 2014, the Florida citrus market experienced a shortened bloom cycle as a result of changes in weather patterns, which negatively affected our sales of Grandevo in the Florida market. Climate change has also led to increasingly powerful hurricanes, which disrupt agriculture and significantly affected sales of crop protection products to Florida and Puerto Rico in the third and fourth quarters of 2017.

In addition, ideal weather conditions can reduce the incidence of diseases and pest infestations and increase yields without the use of additional pesticide and plant health applications. Increased yields can also reduce commodity prices causing growers to make a decision not to increase costs by reducing the amount of pesticides and plant health products used during a growing season. Since all of our products have different margins, changes in product mix as a result of these conditions could affect our overall margins.

Our product sales are subject to weather conditions and other factors beyond our control, which may cause our operating results to fluctuate significantly quarterly and annually.

In recent years, we have increasingly had higher sales during the first half of the year than the second half, and expect this trend to continue. However, the level of seasonality in our business may change due to a number of factors, including our expansion into new geographical territories, the introduction of new products, the timing of introductions of new formulations and products, the addition or changes to distributors or distributor programs and the impact of weather and climate change. It is possible that our business may become more seasonal, or experience seasonality in different periods.

Notwithstanding any such seasonality, we expect substantial fluctuation in sales year over year and quarter over quarter as a result of a number of variables on which sales of our products are dependent. Weather conditions, natural disasters and other factors affect planting and growing seasons and incidence of pests and plant disease, and accordingly affect decisions by our distributors, direct customers and end users about the types and amounts of pest management and plant health products to purchase and the timing of use of such products. In addition, disruptions that cause delays by growers in harvesting or planting can result in the movement of orders to a future quarter, which would negatively affect the quarter and cause fluctuations in our operating results. Customers also may purchase large quantities of our products in a particular quarter to store and use over long periods of time or time their purchases to manage their inventories, which may cause significant fluctuations in our operating results for a particular quarter or year, and low commodity prices may discourage growers from purchasing our products in an effort to reduce their costs and increase their margins for a growing season.

Our expense levels are based in part on our expectations regarding future sales. As a result, any shortfall in sales relative to our expectations could cause significant fluctuations in our operating results from quarter to quarter, which could result in uncertainty surrounding our level of earnings and possibly a decrease in our stock price.

Bio-based pest management and plant health products are not well understood, which necessitates investment in customer education and makes effectively marketing and selling our products difficult.

The market for bio-based pest management and plant health products is underdeveloped when compared to conventional pesticides. Customers in the crop production sector and the water treatment sector are generally cautious in their adoption of new products and technologies. Growers often require on-farm demonstrations of a given pest management or plant health product. Initial purchases of the product tend to be conservative, with the grower testing on a small portion of their overall crop. As the product is proven, growers incorporate the product into their rotational programs and deploy it on a greater percentage of their operations. As a result, large scale adoption generally takes several growing seasons. Water treatment products must also pass efficacy and ecological toxicity tests. In addition, given the relative novelty of our water treatment products, consumers of those products will continue to require education on their use, which may delay their adoption.

In addition, customers have historically perceived bio-based pest management products as more expensive and less effective than conventional chemical pesticides. To succeed, we will need to continue to change that perception. To the extent that the market for bio-based pest management products does not further develop or customers elect to continue to purchase and rely on conventional chemical pesticides, our market opportunity will be limited.

The high level of competition in the market for pest management and plant health products may result in pricing pressure, reduced margins or the inability of our products to achieve market acceptance.

The markets for pest management and plant health products are intensely competitive, rapidly changing and undergoing consolidation. We may be unable to compete successfully against our current and future competitors, which may result in price reductions, reduced margins and the inability to achieve market acceptance for our products.

Many entities are engaged in developing pest management and plant health products. Our competitors include major multinational agrichemical companies such as UPL/Arysta, BASF, Bayer, Corteva Agriscience (owned by DowDuPont), FMC, Monsanto, Sumitomo Chemical and Syngenta, some of which have developed bio-based products for our target markets, as well as specialized bio-based pesticide and plant health businesses such as AgraQuest (now a part of Bayer), Certis USA (now a part of Mitsui), Novozymes (in a joint venture with Monsanto) and Valent Biosciences (now a part of Sumitomo). Many of these organizations have longer operating histories, significantly greater resources, greater brand recognition and a larger base of customers than we do. As a result, they

may be able to devote greater resources to the manufacture, promotion or sale of their products, receive greater resources and support from independent distributors, initiate or withstand substantial price competition or more readily take advantage of acquisition or other opportunities. Further, many of the large agrichemical companies have a more diversified product offering than we do, which may give these companies an advantage in meeting customers' needs by enabling them to offer a broader range of pest management and plant health solutions. In addition, we could face competition in the future from new, well-financed start-up companies such as AgBiome and Indigo.

We rely on the experience and expertise of our senior management team and other key personnel, and if we are unable to recruit or retain qualified personnel, our development and commercialization efforts may be significantly delayed.

We depend heavily on the principal members of our management, particularly Pamela G. Marrone, Ph.D., our founder and Chief Executive Officer, the loss of whose services might significantly delay or prevent the achievement of our scientific or business objectives. Although we maintain and are the beneficiary of $10.0 million in key person life insurance policies for the life of Dr. Marrone, we do not believe the proceeds would be adequate to compensate us for her loss.

We have a lean level staffing, and rely on qualified sales and marketing, research and development and management personnel to succeed. For example, the departures of our former chief operating officer and significant members of our sales staff in the third quarter of 2014 and subsequent turnover in our sales and marketing department adversely impacted our business by disrupting the 2014 launch of Venerate as well as the growth in sales of our other commercialized products, including Regalia and Grandevo. In addition, we had significant turnover in our sales and marketing department during the fourth quarter of 2017, which we believe impacted our sales during that quarter and could impact our sales in the near-term. The process of hiring, training and successfully integrating qualified personnel into our operation is lengthy and expensive. The market for qualified personnel, such as experienced fermentation engineers and formulation chemists, is very competitive because of the limited number of people available with the necessary technical skills and understanding of our technology and anticipated products, and few sales and marketing personnel have prior experience with bio-based products. Perceived instability and risk in our business has made it difficult to retain qualified personnel and could impair our ability to meet our business objectives and adversely affect our results of operations and financial condition.

If we or our third-party manufacturers are unable to produce our products at a satisfactory quality, in a timely manner, in sufficient quantities or at an acceptable cost, our business could be negatively impacted.

We have transitioned the majority of our manufacturing processes in-house to our facility in Bangor, Michigan. If severe weather, a fire or natural disaster occurs, a contaminant grows in our fermentations, or a mechanical or labor problem leads to a reduced capacity or shutdown of our fermenters or other equipment, we may not be successful in producing the amount and quality of product we anticipate in the facility and our results of operations may suffer as a result.

We also continue to rely on third parties to formulate Grandevo and Zequanox into spray-dried powders, for all of our production of Venerate, Majestene/Zelto, Stargus/Amplitude and Haven, and from time to time, we expect to use third-party manufacturers for supplemental production capacity to meet excess seasonal demand and for packaging. Our reliance on third parties to manufacture our products presents significant risks to us, including the following:

- reduced control over delivery schedules, yields and product reliability;
- price increases;
- manufacturing deviations from internal and regulatory specifications, including contaminations;
- the failure of a key manufacturer to perform its obligations to us for technical, market or other reasons;
- challenges presented by introducing our fermentation processes to new manufacturers or deploying them in new facilities, including contaminations;
- difficulties in establishing additional manufacturers if we are presented with the need to transfer our manufacturing process technologies to them;
- misappropriation of our intellectual property; and
- other risks in potentially meeting our product commercialization schedule or satisfying the requirements of our distributors, direct customers and end users.

We have not entered into any long-term manufacturing or supply agreements for any of our products, and we may need to enter into additional agreements for the commercial development, manufacturing and sale of our products. There can be no assurance that we can do so on favorable terms, if at all.

Our products have been produced in quantities, and on timelines, sufficient to meet commercial demand and for us to satisfy our delivery schedules. However, our dependence upon others for the production of a portion of our products, or for a portion of the manufacturing process, particularly for drying and for all our production of Venerate, may adversely affect our ability to satisfy demand and meet delivery obligations, as well as to develop and commercialize new products, on a timely and competitive basis. If manufacturing capacity is reduced or eliminated at one or more of our third-party manufacturers' facilities, we could have difficulties fulfilling our customer orders, which could adversely affect customer relationships, and our net revenues and results of operations could decline.

We must accurately forecast demand for our products to obtain adequate and cost-effective capacity from our third-party manufacturers and to purchase certain of the raw materials used in our products at cost-effective rates. Our third-party manufacturers are not required to supply us products until we place, and they accept, our purchase orders, which generally occurs approximately three months prior to the anticipated product delivery dated to customers based on our own rolling forecasts. Our purchase orders may not be accepted and our third-party manufacturers may not be willing to provide us with additional products on a timely basis if they prioritize orders placed by other companies, many of whom are more established than us and order larger volumes of products. In addition, while raw material orders are generally placed one month in advance of suppliers orders, because certain of the raw materials used in our products are in short supply or are subject to capacity demands, we place some raw material orders approximately six months in advance to avoid paying higher prices. Accordingly, if we inaccurately forecast demand for our products, we may be unable to meet our customers' delivery requirements, or we may accumulate excess inventories of products and raw materials.

Failure to achieve expected manufacturing yields and pesticidal activity or contamination of our production runs could negatively impact our operating results.

We do not know whether a yield problem exists until our products are manufactured. When a yield issue is identified, the product is analyzed and tested to determine the cause. As a result, yield deficiencies may not be identified until well into the production process. We may experience inability to ramp up yields in our own manufacturing facility or third-party manufacturers. In the event that we continue to rely on third-party manufacturers, resolution of yield problems requires cooperation among, and communication between, us and our manufacturers. Third-party manufacturers as well as our own plant in Michigan may contaminate the runs of our products while in process, causing a run failure and causing us to miss sales opportunities or a season. We will not succeed if we cannot maintain or decrease our production costs and effectively scale our technology and manufacturing processes with the desired yields and pesticidal activity and without contaminations.

We rely on a single supplier based in China for a key ingredient of Regalia.

The active ingredient in our Regalia product line is derived from the giant knotweed plant, which we obtain from China. Our single supplier acquires raw knotweed from numerous regional sources and performs an extraction process on this plant, following our specifications, thus creating a dried extract that is shipped to our manufacturing facility in Bangor, Michigan. Although we have identified additional sources of knotweed at competitive prices that appear to be reliable and of appropriate quality, there can be no assurance that we will continue to be able to obtain dried extract from China at a competitive price point, including due to impact of any deterioration in the trade relationship between the United States and China such as tariffs placed on Chinese goods exported to the United States, changes in the exchange rate between the U.S. Dollar and the Renminbi and potential actions taken by regulators in China. We endeavor to keep 6 months of knotweed extract on hand at any given time and have identified and qualified other knotweed suppliers.

Other ingredients used in the manufacturing of our products are also sourced from a limited number of suppliers. There can be no assurance that we will continue to be able to obtain such ingredients reliably and of appropriate quality at a competitive price point.

Our efforts on Zequanox may not result in increased sales.

Our Zequanox product line is principally designed to control invasive mussels that restrict critical water flow in industrial and power facilities and impinge on access to recreational waters. Due to our prioritization plan, we have not committed sufficient resources to this product in order to market it full-scale. Our collective ability to generate significant revenues from Zequanox has been dependent on persuading customers to evaluate the costs of our

Zequanox products compared to the overall cost of the chlorine treatment process, the primary current alternative to using Zequanox, rather than the cost of purchasing chemicals alone. Sales of Zequanox could remain lower than our other products due to the length of the treatment cycle, the longer sales cycle (the bidding process with utility companies and government agencies occurs on a yearly or multi-year basis) and the unique nature of the treatment approach for each customer based on the extent of the infestation and the design of the facility.

Any decline in U.S. agricultural production could have a material adverse effect on the market for pesticides and on our results of operations and financial position.

Conditions in the U.S. agricultural industry significantly impact our operating results. The U.S. agricultural industry has contracted in recent periods, and can be affected by a number of factors, including weather patterns and field conditions, current and projected grain inventories and prices, domestic and international demand for U.S. agricultural products and U.S. and foreign policies regarding trade in agricultural products. State and federal governmental policies, including farm subsidies and commodity support programs, as well as the prices of fertilizer products and the prices at which produce may be sold, may also directly or indirectly influence the number of acres planted, the mix of crops planted and the use of pesticides for particular agricultural applications.

Our intellectual property is integral to our business. If we are unable to protect our patents and proprietary rights in the United States and foreign countries, our business could be adversely affected.

Our success depends in part on our ability to obtain and maintain patent and other proprietary rights protection for our technologies and products in the United States and other countries. If we are unable to obtain or maintain these protections, we may not be able to prevent third parties from using our proprietary rights. It is also possible that we will fail to identify patentable aspects of our research and development output before it is too late to obtain patent protection. As of December 31, 2018, we had 42 issued U.S. patents and 294 issued foreign patents (of which 3 U.S. patents and 45 foreign patents were in-licensed), 19 pending provisional and non-provisional U.S. patent applications (of which 1 was in-licensed) and 93 pending foreign patent applications (of which 5 were in-licensed).

The patent position of biotechnology and biochemical companies generally is highly uncertain, involves complex legal and factual questions and has in recent years been the subject of much litigation. As a result, the issuance, scope, validity, enforceability and commercial value of our patent rights are highly uncertain. Our pending and future patent applications may not result in patents being issued which protect our technology or products, in whole or in part, or which effectively prevent others from commercializing competitive technologies and products. Changes in either the patent laws or interpretation of the patent laws in the United States and other countries may diminish the value of our patents or narrow the scope of our patent protection. For example, the U.S. Supreme Court has ruled on several patent cases in recent years, either narrowing the scope of patent protection available in certain circumstances or weakening the rights of patent owners in certain situations. In addition, recent changes to the patent laws of the United States provide additional procedures for third parties to challenge the validity of issued patents, some of which allow a lower evidentiary standard to hold a patent claim invalid. The laws of some foreign countries do not protect proprietary rights to the same extent as the laws of the United States, and we may encounter significant problems and costs in protecting our proprietary rights in these foreign countries.

Our patents, and those patents for which we have license rights, may be challenged, narrowed, invalidated or circumvented. In addition, our issued patents may not contain claims sufficiently broad to protect us against third parties with similar technologies or products or provide us with any competitive advantage. We are not certain that our pending patent applications will be issued. Moreover, our competitors could challenge or circumvent our patents or pending patent applications. It is also not possible to patent and protect all knowledge and know-how associated with our products, so there may be areas that are not protected such as certain formulations and manufacturing processes. Costly and time-consuming litigation could be necessary to enforce and determine the scope of our proprietary rights, and failure to obtain or maintain trade secret protection could adversely affect our competitive business position.

For certain of our products, we hold co-exclusive licenses to certain of the intellectual property related to these products. Although our products that are derived from intellectual property licensed to us on a co-exclusive basis also include our own proprietary technology, the third parties with whom we share co-exclusive rights may develop products based on the same underlying intellectual property. This could adversely affect the sale of our products.

Intellectual property litigation could cause us to spend substantial resources and could distract our personnel from their normal responsibilities.

Even if resolved in our favor, litigation or other legal proceedings relating to intellectual property claims may cause us to incur significant expenses and could distract our technical and management personnel from their normal responsibilities. In addition, there could be public announcements of the results of hearings, motions or other interim proceedings or developments. If securities analysts or investors perceive these results to be negative, it could have a substantial adverse effect on the price of our common stock. Such litigation or proceedings could substantially increase our operating losses and reduce the resources available for development, sales, marketing or distribution activities. We may not have sufficient financial or other resources to adequately conduct such litigation or proceedings. Some of our competitors may be able to sustain the costs of such litigation or proceedings more effectively than we can because of their greater financial resources. Uncertainties resulting from the initiation and continuation of patent litigation or other proceedings could have a material adverse effect on our ability to compete in the marketplace.

If we are unable to protect the confidentiality of our trade secrets, our business and competitive position could be harmed.

We have taken measures to protect our trade secrets and know-how, including the use of confidentiality agreements with our employees, consultants, advisors and third-party manufacturers. It is possible that these agreements may be breached and that any remedies for a breach will not make us whole. In addition, some courts inside and outside of the United States are less willing or unwilling to protect trade secrets. We generally control and limit access to, and the distribution of, our product documentation and other proprietary information. Despite our efforts to protect these proprietary rights, our trade secret-protected know-how could fall into the public domain, and unauthorized parties may copy aspects of our products and obtain and use information that we regard as proprietary. We also cannot guarantee that other parties will not independently develop our knowhow or otherwise obtain access to our technologies.

Third parties may misappropriate our microbial strains.

Third parties, including contract manufacturers, often have custody or control of our microbial strains. If our microbial strains were stolen, misappropriated or reverse engineered, they could be used by other parties who may be able to reproduce the microbial strains for their own commercial gain. If this were to occur, it would be difficult for us to challenge and prevent this type of use, especially in countries with limited intellectual property protection.

Other companies may claim that we infringe their intellectual property or proprietary rights, which could cause us to incur significant expenses or prevent us from selling our products.

Our success depends in part on our ability to operate without infringing the patents and proprietary rights of third parties. Product development is inherently uncertain in a rapidly evolving technological environment such as ours in which there may be numerous patent applications pending, many of which are confidential when filed, with regard to similar technologies. Patents issued to third parties may contain claims that conflict with our patents and that may place restrictions on the commercial viability of our products and technologies. Third parties could assert infringement claims against us in the future. We may become party to, or threatened with, future adversarial proceedings or litigation regarding intellectual property rights with respect to our products, product candidates and technology. We may not be aware of all such third-party intellectual property rights potentially relevant to our products and product candidates.

Any litigation, adversarial proceeding or proceeding before governmental authorities regarding intellectual property rights, regardless of its outcome, would probably be costly and require significant time and attention of our key management and technical personnel. Litigation, adversarial proceedings or proceedings before governmental

authorities could also force us to:

- stop or delay selling, manufacturing or using products that incorporate the challenged intellectual property;
- pay damages; and/or
- enter into licensing or royalty agreements which, if available at all, may only be available on unfavorable terms.

Claims that we have misappropriated the confidential information or trade secrets of third parties could have a similar negative impact on our business.

We use hazardous materials in our business and are subject to potential liability under environmental laws. Any claims relating to improper handling, storage or disposal of hazardous materials could be time consuming and costly to resolve.

We are subject to federal, state and local laws and regulations governing the use, manufacture, storage, handling, disposal and release of hazardous materials and certain waste products. Our research and development and manufacturing activities involve the controlled use of hazardous materials and/or biological waste. Some of these materials may be novel, including bacteria with novel properties and bacteria that produce biologically active compounds. We cannot eliminate the risk of accidental contamination or discharge and any injury resulting from these materials. In addition, although we have not currently identified any environmental liabilities, the manufacturing facility we purchased in July 2012 may have existing environmental liabilities associated with it that may also result in successor liabilities for us, and we will be subject to increased exposure to potential environmental liabilities as we manufacture our products on a larger scale. We may also be held liable for hazardous materials brought onto the premises of our manufacturing facility before we acquired title, without regard for fault for, or knowledge of, the presence of such substances, as well as for hazardous materials that may be discovered after we no longer own the property if we sell it in the future. In the event of an accident, or if any hazardous materials are found within our operations or on the premises of our manufacturing facility in violation of the law at any time, we may be liable for all cleanup costs, fines, penalties and other costs. This liability could exceed our resources, and, if significant losses arise from hazardous substance contamination, our financial viability may be substantially and adversely affected.

In addition, we may have to incur significant costs to comply with future environmental laws and regulations. We cannot predict the impact of new governmental regulations that might have an adverse effect on the research, development, production and marketing of our products. We may be required to incur significant costs to comply with current or future laws or regulations. Our business may be harmed by the cost of compliance.

Our collaborators may use hazardous materials in connection with our collaborative efforts. To our knowledge, their work is performed in accordance with applicable biosafety regulations. In the event of a lawsuit or investigation, however, we could be held responsible for any injury caused to persons or property by exposure to, or release of, hazardous materials used by these parties. Further, we may be required to indemnify our collaborators against all damages and other liabilities arising out of our development activities or products produced in connection with these collaborations.

Our headquarters and other facilities and certain manufacturers and suppliers are located in regions that are subject to natural disasters, as well as in some cases geopolitical risks and social upheaval.

The impact of a major earthquake, fire or other natural disaster, including floods, on our Davis facilities, Bangor, Michigan manufacturing plant, infrastructure and overall operations is difficult to predict, and any natural disaster could seriously disrupt our entire business process. In addition, Haven is produced by a third-party manufacturer in

Florida in a location that could be impacted by hurricane activity, and certain of our raw materials are sourced in China, which is subject to risks associated with uncertain political, economic and other conditions such as the outbreak of contagious diseases, such as avian flu, swine flu and SARS, and natural disasters. The insurance we maintain may not be adequate to cover our losses resulting from natural disasters or other business interruptions. Although these risks have not materially adversely affected our business, financial condition or results of operations to date, there can be no assurance that such risks will not do so in the future.

Inability to comply with regulations applicable to our facilities and procedures could delay, limit or prevent our research and development or manufacturing activities.

Our research and development and manufacturing facilities and procedures are subject to continual review and periodic inspection. We must spend funds, time and effort in the areas of production, safety and quality control and assurance to ensure full technical compliance with the regulations applicable to these facilities and procedures. If the EPA or another regulatory body determines that we are not in compliance with these regulations, regulatory approval of our products could be delayed, or we may be required to limit or cease our research and development or manufacturing activities or pay a monetary fine. If we are required to limit or cease our research and development activities, our ability to develop new products would be impaired. In addition, if we are required to limit or cease our manufacturing activities, our ability to produce our products in commercial quantities would be impaired or prohibited, which would harm our business.

We may be exposed to product liability and remediation claims, which could harm our business.

The use of certain bio-based pest management and plant health products is regulated by various local, state, federal and foreign environmental and public health agencies. These regulations may include requirements that only certified or professional users apply the product or that certain products be used only on certain types of locations, may require users to post notices on properties to which products have been or will be applied, may require notification to individuals in the vicinity that products will be applied in the future or may ban the use of certain ingredients. Even if we are able to comply with all such regulations and obtain all necessary registrations, we cannot provide assurance that our products will not cause injury to crops, the environment or people under all circumstances. For example, our products may be improperly combined with other pesticides or, even when properly combined, our products may be blamed for damage caused by these other pesticides. The costs of remediation or products liability could materially adversely affect our future quarterly or annual operating results.

We may be held liable for, or incur costs to settle, liability and remediation claims if any products we develop, or any products that use or incorporate any of our technologies, cause injury or are found unsuitable during product testing, manufacturing, marketing, sale or use. These risks exist even with respect to products that have received, or may in the future receive, regulatory approval, registration or clearance for commercial use. We cannot guarantee that we will be able to avoid product liability exposure.

We currently maintain product liability insurance at levels we believe are sufficient and consistent with industry standards for companies at our stage of development. We cannot guarantee that our product liability insurance is adequate, and at any time, it is possible that this insurance coverage may not be available on commercially reasonable terms or at all. A product liability claim could result in liability to us greater than our assets or insurance coverage. Moreover, even if we have adequate insurance coverage, product liability claims, or recalls could result in negative publicity or force us to devote significant time and attention to those matters, which could harm our business.

Our ability to use our net operating loss carryforwards to offset future taxable income may be subject to certain limitations.

As of December 31, 2018, we had approximately $216.0 million of federal operating loss carryforwards available to offset future taxable income, which expire in varying amounts beginning in 2026 if unused. As of December 31, 2018, we had approximately $150.4 million of state operating loss carryforwards available to offset future taxable income, which began expiring in 2016. It is possible that we will not generate taxable income in time to use these loss carryforwards before their expiration.

Section 382 of the Internal Revenue Code imposes restrictions on the use of a corporation’s net operating losses, as well as certain recognized built-in losses and other carryforwards, after an “ownership change” occurs. A Section 382 “ownership change” occurs if one or more stockholders or groups of stockholders who own at least 5% of our stock increase their ownership by more than 50 percentage points over their lowest ownership percentage within a rolling three-year period. Future issuances or sales of our stock (including certain transactions involving our stock that are outside of our control) could also result in an ownership change under Section 382. If an “ownership change” occurs, Section 382 would impose an annual limit on the amount of pre-change net operating losses and other losses we can use to reduce our taxable income generally equal to the product of the total value of our outstanding equity immediately prior to the “ownership change” (subject to certain adjustments) and the long-term tax-exempt interest rate for the month of the “ownership change.” The applicable rate for ownership changes occurring in the month of December 2018 was 2.51%.

Because U.S. federal net operating losses generally may be carried forward for up to 20 years, the annual limitation may effectively provide a cap on the cumulative amount of pre-ownership change losses, including certain recognized built-in losses that may be utilized. Such pre-ownership change losses in excess of the cap may be lost. In addition, if an ownership change were to occur, it is possible that the limitations imposed on our ability to use pre-ownership

change losses and certain recognized built-in losses could cause a net increase in our U.S. federal income tax liability and U.S. federal income taxes to be paid earlier than otherwise would be paid if such limitations were not in effect. Further, if the amount or value of these deferred tax assets is reduced, such reduction would have a negative impact on the book value of our common stock.

We completed a Section 382 analysis as of December 31, 2013 and concluded that approximately $0.5 million in federal net operating losses and approximately $0.2 million in federal research and development credits are expected to expire prior to utilization as a result of our previous ownership changes and corresponding annual limitations. We have not conducted an analysis to determine the amount of state net operating losses that are also expected to expire prior to utilization. Our existing net operating loss carryforwards or credits may be subject to significant limitations due to events occurring since December 31, 2013, and we have not updated our Section 382 analysis to consider events since December 31, 2013, including the effect of the financing transactions we completed in February 2018 and our April 2018 equity offering. Our inability to use these net operating loss carryforwards as a result of the Section 382 limitations could harm our financial condition.

Our business is subject to various governmental regulations, and compliance with these regulations may cause us to incur significant expenses. If we fail to maintain compliance with applicable regulations, we may be forced to recall products and cease their manufacture and distribution, which could subject us to civil or criminal penalties.

The complex legal and regulatory environment exposes us to compliance and litigation costs and risks that could materially affect our operations and financial results. These laws and regulations may change, sometimes significantly, as a result of political or economic events. They include environmental laws and regulations, tax laws and regulations, import and export laws and regulations, government contracting laws and regulations, labor and employment laws and regulations, securities and exchange laws and regulations, and other laws such as the Foreign Corrupt Practices Act. In addition, proposed laws and regulations in these and other areas could affect the cost of our business operations. We face the risk of changes in both domestic and foreign laws regarding trade, potential loss of proprietary information due to piracy, misappropriation or foreign laws that may be less protective of our intellectual property rights. Violations of any of these laws and regulations could subject us to criminal or civil enforcement actions, any of which could have a material adverse effect on our business, financial condition or results of operations.

Significant disruptions of information technology systems or breaches of data security could adversely affect our business.

We are increasingly dependent on information technology systems and infrastructure to operate our business. Potential vulnerabilities can be exploited from inadvertent or intentional actions of our employees, third-party vendors, business partners, or by malicious third parties. Attacks of this nature are increasing in their frequency, levels of persistence, sophistication and intensity, and are being conducted by sophisticated and organized groups and individuals with a wide range of motives (including, but not limited to, industrial espionage) and expertise, including organized criminal groups, “hacktivists,” nation states and others. In addition to the extraction of sensitive information, such attacks could include the deployment of harmful malware, ransomware, denial-of-service attacks, phishing attacks social engineering and other means to affect service reliability.

Risks Related to Ownership of our Common Stock

Our stock price has in the past and may in the future fail to meet minimum requirements for continued listing on The Nasdaq Capital Market. Our ability to publicly or privately sell equity securities and the liquidity of our common stock could be adversely affected if we are delisted from The Nasdaq Capital Market or if we are unable to transfer our listing to another stock market.

In the past we have received written notifications from Nasdaq informing us that we were not in compliance with certain continued listing requirements of The Nasdaq Stock Market LLC (“Nasdaq”). As previously disclosed, on

January 2, 2018, we received written notice from the Listing Qualifications Department of Nasdaq indicating that we were not in compliance with the rules for continued listing because we had not yet held an annual meeting of stockholders within twelve months of the end of our 2016 fiscal year end. As a result of our holding the 2017 Annual Meeting on January 31, 2018, we regained compliance with the applicable rule. There can be no assurance that we will continue to maintain compliance with the requirements for listing our common stock on Nasdaq. Delisting from Nasdaq could adversely affect our ability to raise additional financing through the public or private sale of equity securities, would significantly affect the ability of investors to trade our securities and would negatively affect the value and liquidity of our common stock. Delisting could also have other negative results, including the potential loss of confidence by employees, the loss of institutional investor interest and fewer business development opportunities.

Our principal stockholders have significant voting power and may take actions that may not be in the best interest of other stockholders.

As of March 18, 2019, our executive officers and directors and their affiliates, including Ospraie Ag Science LLC (“Ospraie”), beneficially owned or controlled (i.e., directly or indirectly and including exercisable warrants), an aggregate of approximately 61.3 million shares, or 43.4% of our common stock, including 27.7% of our currently outstanding shares. In addition, affiliates of Waddell & Reed Financial, Inc. (“Waddell”), beneficially own 25.0% of our common stock and 22.3% of our currently outstanding shares, Ardsley Advisory Partners (“Ardsley”) beneficially owns 14.0% of our common stock and 9.9% of our currently outstanding shares, and Van Herk Investments B.V. owns 10.7% of our common stock and 6.4% of our currently outstanding share. These principal stockholders collectively beneficially owned or controlled, directly or indirectly an aggregate of 73.5 million shares or 66.4% of our total common stock outstanding and if all of these security holders act together, or exercise their warrants, they will be able to exert significant control over our management and affairs, which could result in some corporate actions that our other stockholders do not view as beneficial such as failure to approve change of control transactions that could offer holders of our common stock a premium over the market value of our company. As a result, the market price of our common stock could be adversely affected.

Our common stock may experience extreme price and volume fluctuations, and you may not be able to resell shares of our common stock at or above the price you paid.

We have had a history of losses, and our business, financial results and stock price have been adversely affected by concerns regarding our ability to continue operations. Since shares of our common stock were sold in our initial public offering in August 2013 at a price of $12.00 per share, our stock price has ranged between $0.60 and $20.00 through December 31, 2018. The trading price of our common stock will likely continue to be highly volatile and could be subject to wide fluctuations in price in response to various factors, some of which are beyond our control. These factors include

- our public float relative to the total number of shares of common stock that are issued and outstanding;
- quarterly variations in our results of operations, those of our competitors or those of our customers;
- announcements of technological innovations, new products or services or new commercial relationships by us or our competitors;
- our ability to develop and market new products on a timely basis;
- disruption to our operations;
- media reports and publications about our financials or about pest management products;
- announcements concerning our competitors or the pest management industry in general;
- our entry into, modification of or termination of key license, research and development or collaborative agreements;
- new regulatory pronouncements and changes in regulatory guidelines or the status of our regulatory approvals;
- general and industry-specific economic conditions;
- any major change in our board of directors or management;
- the commencement of, or our involvement in, litigation;
- changes in financial estimates, including our ability to meet our future net revenues and operating profit or loss projections; and
- changes in earnings estimates or recommendations by securities analysts.

Substantial future sales of our common stock, or the perception in the public markets that these sales may occur, may depress our stock price.

Sales of substantial amounts of our common stock in the public market, or the perception that such sales could occur, could adversely affect the market price of our common stock. As of March 18, 2019, we had approximately 110.7 million shares of common stock outstanding, 31.5 million which were held by our directors and officers and their affiliates and an additional 35.7 million shares which were held by other beneficial holders of 5% or more of our common stock. Although these shares are subject in some cases to volume and manner of sale restrictions of Rule 144 of the Securities Act, any determination by holders of a substantial number of such shares to sell our stock, or the perception that such sales may occur, could cause our stock price to decline.

In addition, as of March 18, 2019, we had 6.2 million shares of our common stock available to be awarded under our equity incentive plans, 1.1 million shares of our common stock issuable upon the settlement outstanding restricted stock units, 7.1 million shares of our common stock issuable upon the exercise of outstanding options with a weighted average exercise price of $3.31 per share and 52.7 million shares of our common stock issuable upon the exercise of outstanding warrants with a weighted average exercise price of $1.10 per share. These shares may be sold in the public market upon issuance.

Because we have no plans to pay dividends on our common stock, investors must look solely to stock appreciation for a return on their investment in us.

We have never declared or paid any cash dividends on our common stock, and we do not anticipate paying any cash dividends on our common stock in the foreseeable future. We currently intend to retain all future earnings to fund the development and growth of our business. Any payment of future dividends will be at the discretion of our board of directors and will depend on, among other things, our earnings, financial condition, capital requirements, level of indebtedness, statutory and contractual restrictions applying to the payment of dividends and other considerations that the board of directors deems relevant. Investors must rely on sales of their common stock after price appreciation, which may never occur, as the only way to realize a return on their investment. Investors seeking cash dividends should not purchase our common stock.

We are a "smaller reporting company" and we cannot be certain if the reduced disclosure requirements applicable to smaller reporting companies will make our common stock less attractive to investors.

We are a "smaller reporting company" as defined by the Securities and Exchange Commission. For as long as we continue to be a smaller reporting company, we may choose to take advantage of certain scaled disclosures from various reporting requirements applicable to other public companies but not to smaller reporting companies, which include, among other things:

- reduced disclosure obligations related to Management's Discussion and Analysis of Financial Conditions and Results of Operations;
- reduced disclosure obligations regarding executive compensation in our periodic reports and proxy statements;
- exemption from the requirements of selected financial data and supplementary financial information; and
- reduced income statement, cash flow, and changes in stockholders' equity statements from three years to two years.

We cannot predict if investors will find our common stock less attractive if we rely on these exemptions. If some investors find our common stock less attractive as a result, there may be a less active trading market for our common stock and our stock price may be more volatile.

We incur significant costs as a result of operating as a public company, and our management is required to devote substantial time to comply with the laws and regulations affecting public companies.

As a public company, we incur significant legal, accounting and other expenses, including costs associated with public company reporting and corporate governance requirements, in order to comply with the rules and regulations imposed

by the Sarbanes-Oxley Act, as well as rules implemented by the SEC and Nasdaq. Our management and other personnel also have devoted a substantial amount of time to ensure compliance with these initiatives, and our legal and accounting compliance costs have increased and are expected to increase in connection with the additional compliance measures. We may also need to hire additional staff or consultants in the areas of investor relations, legal and accounting, to continue to operate as a public company and greater expenditures may be necessary in the future with the advent of new laws and regulations pertaining to public companies. We also expect that, it will continue to be expensive for us to obtain directors' and officers' liability insurance.

The Sarbanes-Oxley Act requires, among other things, that we maintain effective internal control over financial reporting and disclosure controls and procedures. In particular, as a public company, we are required to perform system and process evaluations and testing of our internal control over financial reporting to allow management to report on the effectiveness of our internal control over financial reporting, as required by Section 404 of the Sarbanes-Oxley Act. During 2018, we were required to comply with the auditor attestation provisions of Section 404, our testing, or the subsequent testing by our independent registered public accounting firm, may reveal deficiencies in our internal control over financial reporting that are deemed to be material weaknesses. We expect to incur substantial accounting expense and management time on compliance-related issues with respect to Section 404. Moreover, if we are not able to comply with the requirements of Section 404 in a timely manner, or if we or our independent registered public accounting firm identify deficiencies in our internal control over financial reporting that are deemed to be material weaknesses, we could lose investor confidence in the accuracy and completeness of our financial reports, which could cause our stock price to decline.

We have in the past identified material weaknesses, and if we fail to establish and maintain proper and effective internal controls, our ability to produce accurate financial statements on a timely basis could be impaired, which could adversely affect our consolidated operating results, our ability to operate our business, our stock price and investors' views of us.

Our management is responsible for establishing and maintaining adequate internal control over financial reporting to ensure that information regarding the reliability of our financial reporting and the preparation of financial statements for external purposes in accordance with GAAP, but in the past, we have identified material weaknesses in these controls. For example, in connection with management's assessment of our internal control over financial reporting, management identified an additional deficiency that constituted a material weakness in our internal control over financial reporting as of December 31, 2017 related to the accounting for embedded derivative instruments that were a part of certain loan instruments that we entered into during the year ended December 31, 2017. We developed and implemented new internal controls during 2018 and remediated this material weakness as of December 31, 2018. While we believe we have appropriately remediated the previously disclosed material weakness in our internal control over financial reporting related to the accounting for embedded derivative instruments, we can provide no assurances that other material weaknesses in our internal control over financial reporting, will not be identified in the future.

Remediating our material weaknesses has required substantial management time and attention, and ensuring that we have adequate internal control over financial reporting and procedures in place to produce accurate financial statements on a timely basis will continue to be a costly and time-consuming effort. Any failure to implement effective internal control over financial reporting or to complete and maintain the remediation of our identified control deficiencies may result in additional errors, material misstatements or delays in our financial reporting, failure to meet our financial reporting obligations or failure to avoid or detect fraud in our financial reporting. This in turn would have a material adverse effect on our business and results of operations and could have a substantial adverse impact on the trading price of our common stock and our relationships with customers and suppliers.

Our management does not expect that our internal control over financial reporting will prevent or detect all errors and all fraud. A control system, no matter how well designed and operated, can provide only reasonable, not absolute, assurance that the control system's objectives will be met. Because of the inherent limitations in all control systems, no evaluation of controls can provide absolute assurance that misstatements due to error or fraud will not occur or that all control issues and instances of fraud, if any, within the Company will have been detected. As discussed in this Annual Report on Form 10-K, our Audit Committee and management have identified control deficiencies in the past and may identify additional deficiencies in the future.

Unforeseen problems with the implementation and maintenance of our information systems, or failure to design and operate effective internal controls over information systems, could have an adverse effect on our operations and could result in ineffective internal control over our financial reporting.

In fourth quarter of 2016, we began the process of implementing a cloud-based enterprise resource planning ("ERP") system. During the second quarter of fiscal 2017, we transitioned to our ERP system for manufacturing operations for material requirements planning, general ledger, procurement, payment, billings and cash receipts functions. This transition, including our engagement of third-party experts to help in the design, training and implementation of the new ERP system, has accounted for increases in sales, general and administrative costs, relative to prior periods. As we add functionality and increase the use of the ERP system, we will incur additional costs and problems could arise that we have not foreseen, including interruptions in service, loss of data, or reduced functionality. Such problems could adversely impact our ability to provide quotes, take customer orders, and otherwise run our business in a timely manner. In addition, if our new systems fail to provide accurate and increased visibility into pricing and cost structures, it may be difficult to improve or maximize our profit margins. As such, our results of operations and cash flows could be adversely affected.

In addition, we do not have experience with implementing and maintaining controls over this ERP system. While we believe we have designed the appropriate controls around this ERP system, if we have not designed controls within or around these systems that are effective at preventing and detecting unreliable data, or if we are unable to design or operate controls within or around these systems to provide effective control around program changes and access to the systems, we may be at risk for future material weaknesses. The existence of a material weakness could result in errors in our financial statements that could result in a restatement of financial statements, which could cause us to fail to meet our reporting obligations, to be in breach of agreements with our lenders and equity inventor, lead to a loss of investor confidence and have a negative impact on the trading price of our common stock.

Provisions in our charter documents and under Delaware law could discourage a takeover that stockholders may consider favorable.

Provisions in our amended and restated certificate of incorporation and bylaws may have the effect of delaying or preventing a change of control or changes in our management. These provisions include the following:

- the right of our board of directors to elect directors to fill a vacancy created by the expansion of our board of directors or the resignation, death or removal of a director, which prevents stockholders from being able to fill vacancies on our board of directors;
- the establishment of a classified board of directors requiring that only a subset of the members of our board of directors be elected at each annual meeting of stockholders;
- the prohibition of cumulative voting in our election of directors, which would otherwise allow less than a majority of stockholders to elect director candidates;
- the requirement that stockholders provide advance notice to nominate individuals for election to our board of directors or to propose matters that can be acted upon at a stockholders' meeting. These provisions may discourage or deter a potential acquirer from conducting a solicitation of proxies to elect the acquirer's own slate of directors or otherwise attempting to obtain control of our company;
- the ability of our board of directors to issue, without stockholder approval, shares of undesignated preferred stock with terms set by the board of directors, which rights could be senior to those of our common stock. The ability to authorize undesignated preferred stock makes it possible for our board of directors to issue preferred stock with voting or other rights or preferences that could impede the success of any attempt to acquire us;
- the ability of our board of directors to alter our bylaws without obtaining stockholder approval;
- the inability of our stockholders to call a special meeting of stockholders and to take action by written consent in lieu of a meeting;
- the required approval of the holders of at least two-thirds of the shares entitled to vote at an election of directors to adopt, amend or repeal our bylaws;
- the required approval of the holders of at least two-thirds of the shares entitled to vote at an election of directors to repeal or adopt any provision of our certificate of incorporation regarding the election of directors;
- the required approval of the holders of at least 80% of such shares to amend or repeal the provisions of our bylaws regarding the election and classification of directors; and
- the required approval of the holders of at least two-thirds of the shares entitled to vote at an election of directors to remove directors without cause.

As a Delaware corporation, we are also subject to certain Delaware anti-takeover provisions. Under Delaware law, a corporation may not engage in a business combination with any holder of 15% or more of its common stock unless the holder has held the stock for three years or, among other things, the board of directors has approved the transaction. Our board of directors could rely on Delaware law to prevent or delay an acquisition of us.

ITEM 1B. UNRESOLVED STAFF COMMENTS

None.

ITEM 2. PROPERTIES

Our headquarters are located at 1540 Drew Avenue in Davis, California, in a facility consisting of approximately 27,300 square feet of office, laboratory and greenhouse space under a lease entered into in September 2013. This facility accommodates our research, development, sales, marketing, operations, finance and administrative activities. The facility includes a new, state-of-the-art fermentation lab and pilot plant, an expanded formulation lab and pilot with spray drying and granulation capabilities, an insectary, a plant pathology and nematology lab and a plant and weed sciences lab, among others. The initial term of the lease is for a period of 60 months and commenced in August 2014. In November 2018, we provided irrevocable notice to the landlord to exercise the first lease extension option, extending the lease term for an additional 60 months, as discussed in Footnote 10 and 17. In January 2016, the Company entered into an agreement with a sublessee to sublease approximately 3,800 square feet of vacant office space located in this facility pursuant to the terms of our lease agreement. The initial term of the sublease is for a period of approximately 43 months and commenced in February 2016.

We also purchased an 11,400 square-foot manufacturing facility in Bangor, Michigan, in July 2012, which we have repurposed to accommodate large-scale manufacturing of our products. We believe that our leased facilities and our manufacturing facility are adequate to meet our needs.

ITEM 3. LEGAL PROCEEDINGS

On April 3, 2018, the Company was named as a defendant in a complaint filed by Piper Jaffray, Inc. (“Piper”) with the Superior Court of the State of Delaware. The Company was informed of and received Piper’s complaint and related documents on April 5, 2018, following the filing of the Company’s Annual Report on Form 10-K for the year ended December 31, 2017. Piper’s complaint alleges one breach of contract claim, specifically, that the Company breached an engagement letter with Piper by failure to pay a $2,000,000 transaction fee, which Piper alleges is due under the engagement letter as a result of the Company’s consummation of its private placement and debt refinancing transactions in February 2018. Piper’s complaint includes a demand for payment the foregoing transaction fee, in addition to interest and costs and expenses incurred in pursuing the action, including reasonable attorneys’ fees. While the Company believes Piper’s complaint is without merit, this matter is at an early stage, and the outcome of this matter is not presently determinable. As of December 31, 2018, a trial date for the matter has been scheduled for July of 2020.

From time to time we may also be involved in litigation that we believe is of the type common to companies engaged in our line of business, including intellectual property and employment issues. While the outcome of these other claims cannot be predicted with certainty, we do not believe that the outcome of any of these other legal matters will have a material adverse effect on our results of operations, financial condition or cash flows.

ITEM 4. MINE SAFETY DISCLOSURES

Not applicable.

PART II

ITEM 5. MARKET FOR REGISTRANT'S COMMON EQUITY, RELATED STOCKHOLDER MATTERS AND ISSUER PURCHASES OF EQUITY SECURITIES

Market Information for Common Stock

Our common stock was been listed on the NASDAQ Global Market under the symbol "MBII" from August 2, 2013 through September 5, 2016. Since September 6, 2016, our common stock has been listed on the Nasdaq Capital Market. Prior to that time, there was no public market for our stock.

Holders of Record

As of December 31, 2018, there were 64 stockholders of record of our common stock, and the closing price of our common stock was $1.47 per share as reported on the Nasdaq Capital Market. Because some of our shares of common stock are held by brokers and other institutions on behalf of stockholders, we are unable to estimate the total number of stockholders represented by these record holders.

Dividend Policy

We have never declared or paid any cash dividend on our common stock. We intend to retain any future earnings and do not expect to pay dividends in the foreseeable future.

Equity Compensation Plan Information

Information regarding equity compensation plans approved and not approved by stockholders is summarized in the following table as of December 31, 2018:

PLAN CATEGORY	NUMBER OF SECURITIES TO BE ISSUED UPON CONVERSION OF RESTRICTED STOCK UNITS AND EXERCISE OF OUTSTANDING OPTIONS, WARRANTS AND RIGHTS	WEIGHTED-AVERAGE EXERCISE PRICE OF OUTSTANDING OPTIONS, WARRANTS AND RIGHTS	**NUMBER OF SECURITIES REMAINING AVAILABLE FOR FUTURE ISSUANCE UNDER EQUITY COMPENSATION PLANS (EXCLUDING SECURITIES REFLECTED IN COLUMN (a)[(1)]**
	(a)	(b)	
Equity compensation plans approved by stockholders	8,282,242	$ 3.04	6,174,668
	—	—	—

Equity compensation plans not approved by stockholders				
Total	8,282,242	$	3.04	6,174,668

(1) Consists of shares available for issuance under our 2013 Stock Incentive Plan.

ITEM 6. SELECTED FINANCIAL DATA

Not applicable – this item is not required for smaller reporting companies.

ITEM 7. MANAGEMENT'S DISCUSSION AND ANALYSIS OF FINANCIAL CONDITION AND RESULTS OF OPERATIONS

You should read the following discussion of our financial condition and results of operations in connection with our consolidated financial statements and the related notes included in Part II-Item 8-"Financial Statements and Supplementary Data" in this Annual Report on Form 10-K. Additional information regarding the Company is also available in our other reports filed with the Securities and Exchange Commission, which are also available on our investor relations website, investors.marronebio.com, which we also use, together with our corporate Twitter account, @Marronebio, as a means of disclosing material non-public information and for complying with our disclosure obligations under Regulation FD. We encourage our investors to monitor and review the information we make public in these locations. The information contained in the foregoing locations are not incorporated by reference into this filing, and the Company's references to website URLs are intended to be inactive textual references only. In addition to our historical consolidated financial information, the following discussion contains forward-looking statements that reflect our plans, estimates and beliefs. Our actual results could differ materially from those discussed in the forward-looking statements. Factors that could cause or contribute to these differences include those discussed below and elsewhere in this Annual Report on Form 10-K, particularly in Part I-Item 1A-"Risk Factors."

Our current products target major markets that use conventional chemical pesticides, including certain agricultural and water markets, where our bio-based products are used as alternatives for, or used in programs with, conventional chemical products. We also target new markets for which (i) there are no available conventional chemical pesticides or (ii) the use of conventional chemical pesticides may not be desirable or permissible either because of health and environmental concerns (including for organically certified crops) or because the development of pest resistance has reduced the efficacy of conventional chemical pesticides. Six of seven of our current products, including our newest biological fungicide, Stargus/Amplitude, are approved by the United States Environmental Protection Agency ("EPA") and registered as "biopesticides." Our first non-EPA product is Haven, a plant health product, is a "biostimulant" which requires state registrations, but does not require EPA registration. We believe our current portfolio of EPA-approved and registered "biopesticide" products and our pipeline address the growing global demand for effective, efficient and environmentally responsible products to control pests, increase crop yields and reduce crop stress.

2018 Highlights

The following are the more significant financial results for the fiscal year ending December 31, 2018:

Revenues grew to $21.2 million in 2018, a 16.8% increase compared with $18.2 million in 2017, as sales of the current portfolio of products expanded both with current customers and across new crops and geographies.
Gross margins expanded to 48.6% in 2018, compared with 42.0% in 2017, reflecting a favorable mix effect from higher sales of the Venerate product family.
Full-year operating expenses were $29.8 million in 2018, compared to $30.6 million in operating expenses in 2017.
Net loss improved by $10.7 million to a loss of $20.2 million, or $(0.20) per share, reflecting revenue growth and higher gross margins. Net income for the fiscal year ending December 31, 2018 included the benefit of lower interest expense, and the one-time non-cash effect of changes in the fair value of financial instruments and the extinguishment of debt

The following are the more significant business results for the fiscal year ending December 31, 2018:

The expansion of our sales and marketing function to serve new US specialty crop regions and increased focus on showing the return on investment of our products to potential customers;
The submission to the EPA of the registration package for our new bioherbicide, MBI-014, a water dispersible microbial herbicide made from a new species of heat-killed bacteria, *Burkholderia rinojensis;*
The launch of TerraConnect™, a new global biological soil-applied and seed-treatment platform, delivering growers high-performance products as well as a broad range of valuable tools to improve and protect crops; and
The expansion of our international distribution network through new agreements with Hop Tri Investment Corporation in Vietnam and Cambodia, with AMC/Agrimatco in Turkey for Grandevo, Majestene and/or Regalia, and with Kyung Nong Corporation in South Korea for Majestene and Venerate.

Business Strategy

The agricultural industry is increasingly dependent on effective and sustainable pest management practices to maximize yields and quality in a world of increased demand for agricultural products, rising consumer awareness of food production processes and finite land and water resources. In addition, our research has shown that the global market for biopesticides is growing substantially faster than the overall market for pesticides. We seek to capitalize on these global trends by providing both conventional and organic growers with solutions to a broad range of pest management needs through strategies such as adding new products to our product portfolio, continuing to broaden the commercial applications of our existing product lines, leveraging growers' positive experiences with existing product lines, educating growers with on-farm product demonstrations and controlled product launches with key target customers and other early adopters. In May 2017, we entered into an agreement with Jet Harvest Solutions to sell their contact biofungicide, Jet-Ag, in most regions of the United States, and we continue to launch new product lines, with first sales of Haven and Stargus/Amplitude in 2017. We believe this approach enables us to stay ahead of our competition in providing innovative pest management solutions, enhances our sales process at the distributor level and helps us to capture additional value from our products.

We enhance our products, refine our recommendations for their use in optimal IPM programs, expand our commercial labels and submit new product formulations to the EPA and other regulatory agencies. For example, we began sales of Regalia SC, an earlier formulation of Regalia, in the Florida fresh tomatoes market in 2008, while a more effective formulation of Regalia with an expanded master label, including listing for use in organic farming, was under review by the EPA. In 2011, we received EPA approval of a further expanded Regalia master label covering hundreds of crops and various new uses for applications to soil and through irrigation systems, and we recently expanded sales of Regalia in large-acre row crops as a plant health product, in addition to its beneficial uses as a fungicide. In January 2016, we launched a new formulation of Regalia that no longer contains a solvent that is difficult to source and may experience future regulatory restrictions. This new formulation of Regalia disperses better in water and is easier to mix and rinse from containers and spray equipment. In addition, in June 2016, we launched a new formulation of Grandevo, Grandevo WDG, which offers improved handling and better, more convenient packaging. The water dispersible granule mixes easily in spray tanks with no dust or foam, which saves valuable time in the preparation and application processes. Similarly, ongoing field development research on the microbe used in Venerate, one of our insecticide products, led to our October 2015 registration of Majestene as a nematicide. We believe we have opportunities to broaden the commercial applications and expand the use of our existing products lines to help drive significant growth for our company. For example, in 2018, we launched the CG (Cultivated Garden) line for Regalia, Grandevo and Venerate, which is targeted for cannabis growers, greenhouse flower and vegetable growers, gardeners and small farmers.

Financial Overview

Our total revenues were $21.2 million and $18.2 million for the years ended December 31, 2018 and 2017, respectively, and have risen as growers have adopted our products and have used our products on an expanded number of crops. We generate our revenues primarily from product sales, which are principally attributable to sales of our Regalia, Grandevo and Venerate product lines, but which also included sales of Majestene, Zequanox, Bio-Tam 2.0, Haven, Stargus, Amplitude and Jet-Ag, as well as Bio-Tam 2.0, a third party biofungicide that compliments Regalia, which we distributed from 2016 to 2018, but whose distribution we did not renew given the launch of our Stargus product. Going forward, we believe our revenues will largely be impacted by weather, trade tariffs, natural disasters and other factors affecting planting and growing seasons and incidence of pests and plant disease, and, accordingly, the decisions by our distributors, direct customers and end users about the types and amounts of pest management and plant health products to purchase and the timing of use of such products.

We currently rely, and expect to continue to rely, on a limited number of distributors for a significant portion of our revenues since we sell through highly concentrated, traditional distribution channels. Distributors to which 10% or more of our total revenues are attributable for any one of the periods presented consist of the following:

	CUSTOMER A		CUSTOMER B		CUSTOMER C	
Year ended December 31, 2018	17	%	1	%	35	%

2017	24	%	2	%	-

While we expect product sales to a limited number of distributors to continue to be our primary source of revenues, as we continue to develop our pipeline and introduce new products to the marketplace, we anticipate that our revenue stream will be diversified over a broader product portfolio and customer base.

Since 2011, we have also recognized revenues from our strategic collaboration and distribution agreements, which amounted to $0.4 million and $0.2 million for the years ended December 31, 2018 and 2017, respectively.

Our cost of product revenues was $10.9 million and $10.5 million for the years ended December 31, 2018 and 2017, respectively. Cost of product revenues consists principally of the cost of inventory, which includes the cost of raw materials, and third-party services and allocation of operating expenses of our manufacturing plant related to procuring, processing, formulating, packaging and shipping our products. Cost of product revenues also include charges recorded for write-downs of inventory and idle capacity at our manufacturing plant. We expect our cost of product revenues related to the cost of inventory to increase and cost of product revenues relating to write-downs of inventory and idle capacity of our manufacturing plant to decrease as we expand sales and increase production of our existing commercial products Regalia, Grandevo, Venerate, Majestene, Zequanox, Haven, Stargus and Amplitude. We expect to see a gradual increase in gross margin over the life cycle of each of our products as we improve production processes, gain efficiencies and increase product yields. These increases may be offset by additional charges for inventory write-downs and idle capacity at our manufacturing plant until overall volume in the plant increases significantly, however we are expecting these charges to decrease over time.

Our research, development and patent expenses have historically comprised a significant portion of our operating expenses, amounting to $10.7 million and $10.8 million for the years ended December 31, 2018 and 2017, respectively. We are seeking collaborations with third parties to develop and commercialize more early stage candidates, on which we have elected not to expend significant resources given our efforts on cost containment.

Selling, general and administrative expenses incurred to establish and build our market presence and business infrastructure have generally comprised the remainder of our operating expenses, amounting to $19.2 million and $19.8 million for the years ended December 31, 2018 and 2017, respectively. We have been building a sales and marketing organization that provides for increased training and a better ability to educate and support customers and for our product development staff to undertake responsibility for technical sales support, field trials and demonstrations to promote sales growth. We expect that our selling, general and administrative expenses to remain approximately flat in all departments with the exception of sales and marketing. In 2018, we increased our marketing communications campaigns and put more “boots on the ground”, which should increase grower demand, or pull-through, and develop new customers, as well as expand business with existing customers.

Historically, we have funded our operations from the issuance of shares of common stock, preferred stock, warrants and convertible notes, the issuance of debt and entry into financing arrangements, product sales, payments under strategic collaboration and distribution agreements and government grants, but we have experienced significant losses as we invested heavily in research and development. We expect to incur additional losses related to our investment in the continued development, expansion and marketing of our product portfolio.

In February 2018, we completed private placement and debt refinancing transactions, which we refer to as the February 2018 Financing Transactions. Upon the completion of those transactions, the aggregate principal amounts outstanding under our debt agreements was reduced to approximately $10.7 million. As of December 31, 2018, the aggregate amount of principal and capitalized interest under our debt agreements is approximately $21.4 million, with approximately $8.6 million of such principal accruing interest at a variable rate of 7.25% and which is repayable in monthly payments through June 2036, an aggregate of approximately $7.5 million of such principal accruing interest at 8% per annum, and which both the principal and accrued interest payable are repayable upon maturity in December 2022, and under a LOC facility an aggregate of $2.1 million of such principal amount accruing interest at 12.8% per annum and which was payable in January 2019.

Key Components of Our Results of Operations

Product Revenues

Product revenues consist of revenues generated primarily from sales to distributors, net of rebates and cash discounts. Product revenues constituted 98% and 99% of our total revenues for the years ended December 31, 2018 and 2017, respectively. Product revenues in the United States constituted 91% and 92% of our total revenues for the years ended December 31, 2018 and 2017, respectively.

For the period prior to the adoption of Accounting Standards Codification ("ASC") 606, *Revenue from contracts with Customers*, in some cases, we recognize distributor revenue as title and risk of loss passes, provided all other revenue recognition criteria have been satisfied either on a "sell-in" or "sell-through" method. Additionally, for periods prior to the adoption of ASC 606, for certain sales to certain distributors, the revenue recognition criteria for distributor sales are not satisfied at the time title and risk of loss passes to the distributor; specifically, in instances where "inventory protection" arrangements were offered in the past to distributors that permitted these distributors to return to the Company certain unsold products, we consider the arrangement not to be fixed or determinable, and accordingly, revenue is deferred until products are resold to customers of the distributor (the "sell-through" method). For the year ended December 31, 2017, 40% of product revenues were recognized on a sell-through basis. On January 1, 2018, we adopted Accounting Standards Codification ("ASC") 606, *Revenue from contracts with Customers*. During fiscal year 2018, we recognized distributor revenue provided all revenue recognition criteria were satisfied, consistent with the "sell-in" method used for revenue recognition during prior periods. The cost of goods sold associated with such deferral are also deferred and classified as deferred cost of product revenues in the consolidated balance sheets. Upon the adoption of ASC 606, the majority of the deferred revenues and associated deferred cost of product revenues, on the consolidated balance sheet as of December 31, 2017, was deemed to have satisfied all revenue recognition criteria under ASC 606 and approximately $5.9 million and $3.1 million, respectively, was reclassified into retained earnings. See Note 2 of our accompanying Notes to Consolidated Financial Statements included in Part II-Item 8-"Financial Statements and Supplementary Data" in this Annual Report on Form 10-K for further discussion.

License Revenues

License revenues generally consist of revenues recognized under our strategic collaboration and distribution agreements for exclusive distribution rights, either for Regalia, for other commercial products, or for our broader pipeline of products, for certain geographic markets or for market segments that we are not addressing directly through our internal sales force. Our strategic collaboration and distribution agreements generally outline overall business plans and include payments we receive at signing and for the achievement of certain testing validation, regulatory progress and commercialization events. As these activities and payments are associated with exclusive rights that we provide over the term of the strategic collaboration and distribution agreements, revenues related to the payments received are deferred and recognized as revenues over the term of the exclusive period of the respective agreements, which we estimate to be between 5 and 17 years based on the terms of the contract and the covered products and regions. For the years ended December 31, 2018 and 2017, license revenues constituted 2% and 1% of total revenues, respectively. As of December 31, 2018 and 2017, we have received an aggregate of $4.1 million and $3.9 million in payments under our strategic collaboration and distribution agreements. In addition, $0.8 million in payments under these agreements that we could potentially receive if certain testing validation, regulatory progress and commercialization events occur.

Cost of Product Revenues and Gross Profit

Cost of product revenues consists principally of the cost of raw materials, including inventory costs and third-party services related to procuring, processing, formulating, packaging and shipping our products. As we have used our

Bangor, Michigan manufacturing plant to produce certain of our products, cost of product revenues includes an allocation of operating costs including direct and indirect labor, production supplies, repairs and maintenance, depreciation, utilities and property taxes. The amount of indirect labor and overhead allocated to finished goods is determined on a basis presuming normal capacity utilization. Operating costs incurred in excess of production allocations, considered idle capacity, are expensed to cost of product revenues in the period incurred rather than added to the cost of the finished goods produced. Cost of product revenues may also include charges due to inventory adjustments and reserves. In addition, costs associated with license revenues have been included in cost of product revenues as they have not been significant. Gross profit is the difference between total revenues and cost of product revenues. Gross margin is gross profit expressed as a percentage of total revenues.

We have entered into in-license technology agreements with respect to the use and commercialization of four of our commercially available product lines, Regalia, Grandevo, Zequanox, Haven and certain products under development. Under these licensing arrangements, we typically make royalty payments based on net product revenues, with royalty rates varying by product and ranging between 2% and 5% of net sales, subject in certain cases to aggregate dollar caps. These royalty payments are included in cost of product revenues, but they have historically not been significant. The exclusivity and royalty provisions of these agreements are generally tied to the expiration of underlying patents. The patents for Regalia and Zequanox expired in 2017 and the in-licensed U.S. patent for Grandevo is expected to expire in 2024. We have filed separate patent applications with respect to the Regalia and Zequanox product lines and have been issued four U.S. patents with respect to Regalia and five with respect to Zequanox. There are pending in-licensed patent application relating to Grandevo, which could expire later than 2024 if issued. The licensed patents for Haven begin to expire in 2019. After the termination of these provisions, we may continue to produce and sell these products. While third parties thereafter may develop products using the technology under expired patents, we do not believe that they can produce competitive products without infringing other aspects of our proprietary technology, including pending patent applications related to Regalia, Grandevo, Zequanox, and Haven and we therefore do not expect the expiration of the patents or the related exclusivity obligations to have a significant adverse financial or operational impact on our business.

We expect to see increases in gross profit over the life cycle of each of our products as gross margins are expected to increase over time as production processes improve and as we gain efficiencies and increase product yields. While we expect margins to improve on a product-by-product basis, our overall gross margins may vary as we introduce new products, or as we experience changes in the sales mix of these products. In particular, we may experience downward pressure on overall gross margins as we rollout Haven, Stargus and Amplitude and expand sales of Grandevo and Zequanox. Gross margin has been and will continue to be affected by a variety of factors, including plant utilization, product manufacturing yields, changes in production processes, new product introductions, product sales mix and average selling prices.

In July 2012, we acquired a manufacturing facility, which we repurposed for manufacturing operations. We began full-scale manufacturing using this facility in 2014. We continue to use third party manufacturers for Venerate, Majestene, Haven, Stargus and Amplitude, and for spray-dried powder formulations of Grandevo and Zequanox. We expect gross margins to improve using this facility when sales volumes recover enough to reduce overhead and idle capacity charges from our facility.

Research, Development and Patent Expenses

Research, development and patent expenses include personnel costs, including salaries, wages, benefits and share-based compensation, related to our research, development and patent staff in support of product discovery and development activities. Research, development and patent expenses also include costs incurred for laboratory supplies, field trials and toxicology tests, quality control assessment, consultants and facility and related overhead costs.

Selling, General and Administrative Expenses

Selling, general and administrative expenses consist primarily of personnel costs, including salaries, wages, benefits and share-based compensation, related to our executive, sales, marketing, finance and human resources personnel, as well as professional fees, including legal and accounting fees, public company expenses and other selling costs incurred related to business development and to building product and brand awareness. We create brand awareness through programs such as speaking at industry events, trade show displays and hosting local-level grower and distributor meetings. In addition, we dedicate significant resources to technical marketing literature, targeted advertising in print and online media, webinars and radio advertising. Costs related to these activities, including travel, are included in selling expenses.

We expect selling, general, and administrative expenses to remain approximately flat in all departments with the exception of sales and marketing. In 2018, we increased our marketing communications campaigns and put more

“boots on the ground”, which should increase grower demand, or pull-through, and develop new customers, as well as expand business with existing customers.

Interest Expense

We recognize interest expense on notes payable and other debt obligations. In June 2014, we entered into a $10.0 million promissory note with a variable interest rate that varies with the prime rate. In August 2015, we issued and sold to affiliates of Waddell & Reed Financial, Inc. senior secured promissory notes in the aggregate principal amount of $40.0 million with a fixed interest rate of 8%, with respect to which $35.0 million of principal converted to equity in connection with the February 2018 Financing Transactions, leaving $5.0 million of principal outstanding. Further due to the manner in which we accounted for the transaction, the total amount of future interest was included in the principal balance, both due on the maturity date of the note, resulting in no further interest expense under this note. In October 2012 and April 2013, we entered into a series of promissory notes totaling $12.5 million with an initial interest rate of 18% and reduced to 14% by subsequent amendments in November 2016. In connection with the February 2018 Financing Transactions, $10 million of principal under the October 2012 and April 2013 note was converted to equity, leaving $2.5 million of principal outstanding, and the interest rate on the notes was further reduced to 8%. Further due to the manner in which we accounted for the transaction, the total amount of future interest was included in the principal balance, both due on the maturity date of the note, resulting in no further interest expense under this note. In March 2017, we entered into an invoice purchase agreement with LSQ Funding Group, L.C. (“LSQ”), which was subsequently amended in June 2018, that allowed us to receive advances of up to $7.0 million against receivables sold to LSQ. As of December 31, 2018, we had an outstanding balance of $2.1 million in secured borrowings. In October 2017, we began to borrow funds pursuant to a convertible promissory note which provided for borrowings up to $6 million at the lender’s sole discretion. As of December 31, 2017, the outstanding balance of this convertible note was $3.6 million, net of a $400,000 discount, and bore interest at a rate of 1%. All of the principal under this outstanding note converted to equity in connection with the February 2018 Financing Transactions.

As of December 31, 2018, our expenses decreased significantly based on the February 2018 Financing Transactions, including the recognition of one-time gain on extinguishment of debt of $9.2 million which was offset by a change in fair value of derivative liability of $5.2 million and loss on extinguishment of debt of $2.2 million. See Notes 6 and 17 to our accompanying Notes to Consolidated Financial Statements included in Part II-Item 8-”Financial Statements and Supplementary Data” in this Annual Report on Form 10-K.

Interest Income

Interest income consists primarily of interest earned on cash balances. Our interest income will vary each reporting period depending on our average cash balances during the period and market interest rates.

Income Tax Provision

Since our inception, we have been subject to income taxes principally in the United States. We anticipate that as we further expand our sales into foreign countries, we will become subject to taxation based on the foreign statutory rates and our effective tax rate could fluctuate accordingly.

Income taxes are computed using the asset and liability method, under which deferred tax assets and liabilities are determined based on the difference between the consolidated financial statement and tax bases of assets and liabilities using enacted tax rates in effect during the year in which the differences are expected to affect taxable income. Valuation allowances are established when necessary to reduce deferred tax assets to the amount expected to be realized. As of December 31, 2018, based on the available information, it is more likely than not that our deferred tax assets will not be realized, and accordingly we have taken a full valuation allowance against all of our U.S. deferred tax assets.

As of December 31, 2018, we had net operating loss carryforwards for federal income tax reporting purposes of $216.0 million, which begin to expire in 2026, and California and other state net operating loss carryforwards of $150.4 million and $49.2 million, respectively, which will expire from 2028 through 2037. The federal net operating loss generated in 2018 in the amount of $28.8 million will never expire. Additionally, as of December 31, 2018, we had federal research and development tax credit carryforwards of $2.6 million, which begin to expire in 2026, and state research and development tax credit carryforwards of $2.8 million, which have no expiration date.

Our ability to use our federal and state net operating loss carryforwards and federal and state tax credit carryforwards to reduce future taxable income and future taxes, respectively, may be subject to restrictions attributable to equity transactions that may have resulted in a change of ownership as defined by Internal Revenue Code Section 382. In the event we have had such a change in ownership, utilization of these carryforwards could be severely restricted and could result in significant amounts of these carryforwards expiring prior to benefitting us.

The Tax Cuts and Jobs Act (the “TCJA”) was enacted on December 22, 2017. The Act reduces the US federal corporate tax rate from 35% to 21%. As of December 31, 2018, we completed the accounting for the tax effects of enactment of the TCJA. The most significant impact of the legislation for us was a reduction of approximately $28 million in the value of our net deferred tax assets (which represent future tax benefits) as a result of lowering the U.S. corporate income tax rate from 35% to 21%. As we have taken a full valuation allowance against all of our U.S. deferred tax assets, the TCJA reduced our valuation allowance by $28 million.

Results of Operations

The following table sets forth certain statements of operations data as a percentage of total revenues:

	YEAR ENDED DECEMBER 31,	
	2018	2017
Revenues:		
Product	98 %	99 %
License	2	1
Total revenues	100	100
Cost of product revenues	51	58
Gross profit	49	42
Operating Expenses:		
Research, development and patent	50	60
Selling, general and administrative	90	109
Total operating expenses	140	169
Loss from operations	(91)	(127)
Other income (expense):		
Interest expense	(10)	(19)
Interest expense to related parties	(2)	(24)
Change in estimated fair value of financial instruments	(24)	(1)
Gain on extinguishment of debt, net	(10)	—
Gain on extinguishment of debt, related party	43	—
Other income (expense), net	—	(1)
Total other expense, net	(3)	(45)
Loss before income taxes	(94)	(172)
Net loss	(94)%	(172)%

Comparison of the Years Ended December 31, 2018 and 2017

Product Revenues

	YEAR ENDED DECEMBER 31,	
	2018	2017

	(Dollars in thousands)	
Product revenues	$20,775	$17,935
% of total revenues	98	99

Product revenues increased by $2.8 million, or 16%, in 2018 compared to 2017 due to an increase in sales across certain product offerings, as well as favorable product mix of higher priced product offerings, in each case driven most significantly by increased sales of the Venerate product family, offset by decreases in sales of Regalia.

License Revenues

	YEAR ENDED DECEMBER 31,	
	2018	2017
	(Dollars in thousands)	
License revenues	$445	$232
% of total revenues	2 %	1 %

License revenues related to certain strategic collaboration and distribution agreements increased $0.2 million or 92% in 2018 compared to 2017. The increase in 2018 was primarily due to contractual terms dependent on reaching the anniversary of our license registration. License revenues do not comprise a significant portion of our total revenues.

Cost of Product Revenues and Gross Profit

	YEAR ENDED DECEMBER 31,	
	2018	2017
	(Dollars in thousands)	
Cost of product revenues	$10,907	$10,528
% of total revenues	51 %	58 %
Gross profit	10,313	7,639
% of total revenues	49 %	42 %

Cost of product revenues increased by $.4 million, or 4%, in 2018 compared to 2017. Our gross margins increased to 49% in 2018 from 42% in 2017. Cost of products decreased as a percentage of revenues, and gross margins increased in 2018 compared to 2017, primarily due to a favorable mix of higher margin product offerings and continued improved manufacturing and third-party manufacturing efficiencies.

Research, Development and Patent Expenses

	YEAR ENDED DECEMBER 31,			
	2018		2017	
	(Dollars in thousands)			
Research, development and patent	$10,662		$10,820	
% of total revenues	50	%	60	%

Research, development and patent expenses decreased by $0.2 million, or 1%, in 2018 compared to 2017 as the Company continued to focus on increased field trial activities for existing products on a wider range of prospective crops.

Selling, General and Administrative Expenses

	YEAR ENDED DECEMBER 31,			
	2018		2017	
	(Dollars in thousands)			
Selling, general administrative expenses	$19,155		$19,814	
% of total revenues	90	%	109	%

Selling, general, and administrative expenses decreased $0.7 million, or 3%, in 2018 compared to 2017. The decrease primarily related to a decrease in legal costs, associated with corporate transaction activities, reduced audit and consulting fees and a 2018 non-reoccurring item of a $0.4 million credit realized as a result of insurance recoveries related to the Company’s restatement of our consolidated financial statements and litigation from 2016. In addition, the Company incurred a non-cash write down on sale of approximately $0.4 million related to manufacturing assets in 2017.

Other Income (Expense), Net

	YEAR ENDED DECEMBER 31,	
	2018	2017
	(Dollars in thousands)	
Interest expense	$(2,057)	(3,374)
Interest expense to related parties	(451)	(4,355)
Change in estimated fair value of derivative liability	(5,177)	(96)
Loss on extinguishment of debt, net	(2,196)	-
Gain on extinguishment of debt, related party	9,183	-
Other (expense) income, net	(11)	(105)
	$(709)	$(7,930)

Interest income and expense decreased significantly in 2018 compared to 2017. Interest expense decreased by $1.3 million, interest expense due to related party decreased by $3.9 million and the Company recognized a gain on extinguishment of debt of $9.2 million which was offset by a change in fair value of derivative liability of $5.2 million and loss of extinguishment of debt of $2.2 million in connection with the February 2018 Financing Transaction. An expense of $0.1 million was recognized related to the change in the underlying fair value of this feature as of December 31, 2017. See Note 16 to our accompanying Notes to Consolidated Financial Statements included in Part II-Item 8-”Financial Statements and Supplementary Data” in this Annual Report on Form 10-K.

Seasonality and Quarterly Results

In recent years, we have increasingly had higher sales during the first half of the year than the second half, and expect this trend to continue. However, the level of seasonality in our business may change due to a number of factors, our expansion into new geographical territories, the introduction of new products, the timing of introductions of new products, and the impact of weather and climate change. It is possible that our business may become more seasonal, or experience seasonality in different periods, than anticipated, particularly if we expand into new geographical territories, add or change distributors or distributor programs or introduce new products with different applicable growing seasons, or if a more significant component of our revenue becomes comprised of sales of Zequanox, which has a separate seasonal sales cycle compared to our crop protection products. Notwithstanding any such seasonality, we expect substantial fluctuation in sales year over year and quarter over quarter as a result of the number of variables on which sales of our products are dependent. Weather conditions, new trade tariffs, natural disasters and other factors affect planting and growing seasons and incidence of pests and plant disease, may, accordingly affect decisions by our distributors, direct customers and end users about the types and amounts of pest management and plant health products to purchase and the timing of use of such products. In addition, disruptions that cause delays by growers in harvesting or planting can result in the movement of orders to a future quarter, which would negatively affect the quarter and cause fluctuations in our operating results. For example, late snows and cold temperatures in the

Midwestern and Eastern United States in the first and second quarters of 2014 delayed planting and pesticide and plant health applications, and the California drought in 2015 and the Northeast U.S. drought in 2016 affected fungicide sales and Hurricanes Irma and Maria affected Florida and Puerto Rico crops in the third quarter of 2017. Customers also may purchase large quantities of our products in a particular quarter to store and use over long periods of time or time their purchases to manage their inventories, which may cause significant fluctuations in our operating results for a particular quarter or year, and low commodity prices may discourage growers from purchasing our products in an effort to reduce their costs and increase their margins for a growing season.

Liquidity and Capital Resources

Since our inception, our operations have been financed primarily by net proceeds from public offerings of common stock and private placements of convertible preferred stock, convertible notes and promissory notes, and term loans, as well as proceeds from the sale of our products and payments under strategic collaboration and distribution agreements and government grants.

In December 2016, we filed a shelf registration statement on Form S-3 with the SEC that provides for the sale and issuance of up to $50.0 million of our common stock, preferred stock, debt securities, warrants, rights and/or units, including the ability to sell up to $15.0 million of our common stock through an at-the-market program in accordance with an offering agreement we entered into with H.C. Wainwright. The Company began selling common shares under this registration statement in January 2017. As of December 31, 2017, the Company had sold 104,000 shares of common stock under at-the-market program at a weighted average exercise price of $2.22 per share for proceeds (net of commission) of $0.2 million, and $14.8 million remained available for sale under the agreement with H.C. Wainwright. In April 2017, the Company completed a public offering of 6,571,000 registered shares of its common stock (inclusive of 857,000 shares of its common stock to cover over-allotments). The public offering price of the shares sold in the offering was $1.40 per share. The total gross proceeds to the Company from the offerings were $9,200,000. Additionally, in April 2018, we completed an underwritten public offering of 8,366,250 registered shares of our common stock. The public offering price of the shares sold in the offering was $1.65 per share, and after deducting underwriting discounts and commissions and other offering expenses payable by us, the aggregate net proceeds to us from the offering totaled approximately $12.7 million. Following these and other prior transactions, as of December 31, 2018, a total of $12.0 million remained available for sale under the shelf registration statement

In March 2017, we entered into an invoice purchase agreement with LSQ, pursuant to which LSQ may elect to purchase up to $7,000,000 of eligible customer invoices from us. Our obligations under the LSQ financing are secured by a lien on substantially all of the Company's personal property; such lien is first priority with respect to the Company's accounts receivable, inventory, and related property. In April 2017, we began to draw down the LSQ financing. The agreement was amended in June 2018 to extend the expiration date of the agreement from March 2017 to June 2019, include international invoices, and reduce certain fees. As of December 31, 2018, we had an outstanding balance of $2.1 million in secured borrowings.

In October 2017, the Company and Dwight W. Anderson (the "Anderson") entered into an unsecured convertible promissory note (the "October 2017 Convertible Note") in which the Company could borrow an aggregate amount of up to $6,000,000, at Anderson's sole discretion, due on October 23, 2020 (the "Maturity Date"). This note would bear interest at 1% through December 31, 2017 and 10% thereafter. Through December 22, 2017, this Note was convertible into shares of the Company's common stock at a rate of one share of common stock per $1.00 of converting principal or interest, rounded down to the nearest share with any fractional amounts cancelled, at the election of Anderson by delivery of written notice to the Company. In December 2017, the October 2017 Convertible Note was amended and restated. As part of this amendment, this note became secured debt. Until January 31, 2018, conversion of all or part of this note was subject to certain limitations that were removed when the stockholders of the Company voted on that date to approve a related equity financing.

In December 2017, we entered into a securities purchase agreement (the "Purchase Agreement") with certain accredited investors named therein including Ospraie and Ardsley, pursuant to which the investors thereunder agreed, subject to the satisfaction of certain closing conditions, to purchase units consisting of shares of our common stock and warrants to purchase a share of our common stock. Concurrently with the entry into the Purchase Agreement, the Company entered into amendments to the senior promissory notes issued to affiliates of Waddell & Reed Financial, Inc. ("Waddell") and our secured promissory notes issued in October 2012 and April 2013 (the "October 2012 and April 2013 Promissory Notes"). In February 2018, we completed the transactions contemplated in the Purchase Agreement, the

note amendments and certain related agreements, which resulted in:

the issuance of an aggregate of 40,000,001 shares of our common stock and warrants to purchase an aggregate of 41,333,333 shares of our common stock to purchasers under the Purchase Agreement for an aggregate purchase price of $30.0 million, which includes conversion of all outstanding principal under the October 2017 Convertible Note;
the conversion of $35.0 million aggregate principal amount of the Waddell notes into an aggregate of 20,000,000 shares of our common stock and warrants to purchase 4,000,000 shares of our common stock, such that $5.0 million of principal under such notes remained outstanding, in connection with which the maturity of such notes was extended to December 31, 2022, all interest payments under such notes was deferred to maturity on December 31, 2022, and Ospraie was granted a right of first refusal to acquire such notes;

the conversion of $10.0 million aggregate principal amount of indebtedness outstanding under the October 2012 and April 2013 Promissory Notes to an aggregate of 5,714,285 shares of our common stock and warrants to purchase 1,142,856 shares of our common stock such that $2.45 million of principal under such notes remained outstanding, and in connection with which the maturity of such notes was extended to December 31, 2022, the interest was reduced from 14% to 8% and all interest payments under such notes were deferred to the maturity on December 31, 2022; and

the issuance of 800,000 shares of common stock and warrants to purchase 2,017,143 shares of common stock to the placement agent that facilitated the foregoing transactions.

In sum, the completion of the February 2018 Financing Transactions resulted in the issuance of an aggregate of 70.5 million shares of common stock and warrants to purchase an aggregate of 48.9 million shares of common stock, the deleveraging of our balance sheet by reducing principal payments that were outstanding as of December 31, 2017 by $49 million, and the deferral of payment on $7.5 million of remaining outstanding debt until December 31, 2022. The gross proceeds to the Company from the offering were approximately $24.0 million, which excludes the $6.0 million in debt converted under the Secured December 2017 Convertible Note. After deducting underwriting discounts and commissions and estimated offering expenses payable by the Company, the aggregate net proceeds to the Company totaled $21.8 million.

As of December 31, 2018, our cash and cash equivalents totaled $18.2 million, and we had an additional $1.6 million of restricted cash that we are contractually obligated to maintain in accordance with a debt agreement with Five Star Bank. While we were out of compliance with certain covenant requirements associated with that agreement. Five Star Bank waived their right to deem recurring losses, liquidity, going concern, and financial condition as material adverse changes through November 15, 2020. Unless Five Star Bank extends its waiver of the applicable covenants, or we enter into strategic agreements that include significant cash payments upfront, significantly increase revenues from sales or raise additional capital through the issuance of equity, we will exceed the maximum debt-to-worth requirement under our promissory note with Five Star Bank at the expiration of the waiver on November 15, 2020. As of December 31, 2018, we had an accumulated deficit of $283.5 million, and we estimate that we will continue to incur losses, which will further increase our accumulated deficit.

Our historical operating results as of December 31, 2018 indicate substantial doubt exists related to our ability to continue as a going concern for the next 12 months from the date of the issuance of the accompanying financial statements. However, we believe that our existing cash and cash equivalents and restricted cash of $19.8 million at December 31, 2018, expected revenues, the net proceeds from expected future debt or equity financings, and cost management as well as cost reductions will be sufficient to fund operations as currently planned through one year from the date of the issuance of these consolidated financial statements. We also anticipate securing additional sources through equity and/or debt financings, collaborative or other funding arrangements with partners, or through other sources of financing, consistent with historic results. However, we cannot predict, with certainty, the outcome of our actions to grow revenues, to manage or reduce costs or to secure additional financing from outside sources on terms acceptable to us or at all. Further, we may continue to require additional sources of cash for general corporate purposes, which may include operating expenses, working capital to improve and promote our commercially available products, advance product candidates, expand international presence and commercialization, general capital expenditures and satisfaction of debt obligations. We have based our beliefs on assumptions and estimates that may prove to be wrong, and we could spend our available financial resources less or more rapidly than currently expected.

The actions discussed above cannot be considered probable of occurring and mitigating the substantial doubt raised by our historical operating results and satisfying our estimated liquidity needs for 12 months from the issuance of these consolidated financial statements. If we become unable to continue as a going concern, we may have to liquidate our assets, and stockholders may lose all or part of their investment in our common stock.

Since our inception, we have incurred significant net losses, and we expect to incur additional losses related to the continued development and expansion of our business. Our liquidity may be negatively impacted as a result of slower than expected adoption of our products. We have certain strategic collaboration and distribution agreements under which we receive payments for the achievement of certain testing validation, regulatory progress and commercialization events.

Additional information regarding risks related to our capital and liquidity is described in this Annual Report filed on Form 10-K in Part I— Item 1A— "Risk Factors", which should be read in connection with this disclosure.

We had the following debt arrangements in place as of December 31, 2018, in each case as discussed below (dollars in thousands):

DESCRIPTION	STATED ANNUAL INTEREST RATE	PRINCIPAL BALANCE (INCLUDING ACCRUED INTEREST)	PAYMENT/MATURITY
Promissory Notes [1]	8.00 %	$ 2,640	Due December 31, 2022 [5]
Promissory Note [2]	7.25 %	8,875	Monthly/ Due June 2036
Promissory Notes [3]	8.00 %	5,699	Due December 31, 2022[5]
Secured Borrowing [4]	12.78 %	2,084	Varies[6]/ Due June 2019

(1) See "—October 2012 and April 2013 Secured Promissory Notes."
(2) See "—June 2014 Secured Promissory Note."
(3) See "—August 2015 Senior Secured Promissory Notes."
(4) See "—LSQ Financing."
(5) In February 2018, the maturity date and all interest payments were extended to December 2022
(6) Payable through the lender's direct collection of certain accounts receivable through June 2019.

October 2012 and April 2013 Secured Promissory Notes

In connection with a series of transactions in October 2012 and April 2013, we borrowed from a group of lenders an aggregate of $12.5 million in original principal pursuant to senior notes, collateralized by substantially all of the Company's assets (collectively, "October 2012 and April 2013 Secured Promissory Notes"). Pursuant to an amendment entered into in December 2017, in connection with the February 2018 Financing Transactions, $10.0 million aggregate principal amount of indebtedness outstanding under the October 2012 and April 2013 Promissory Notes converted to an aggregate of 5,714,285 shares of our common stock and warrants to purchase 1,142,856 shares of our common stock, such that $2.5 million of principal under such notes remained outstanding, the maturity of the such notes was extended to December 31, 2022, the interest was reduced from 14% to 8% and all interest payments under such notes were deferred to the maturity on December 31, 2022.

June 2014 Secured Promissory Note

In June 2014, we borrowed $10.0 million pursuant to a business loan agreement and promissory note (“June 2014 Secured Promissory Note”) with Five Star Bank (“Five Star Bank”) which bears interest at 6.25% as of September 30, 2017. The interest rate is subject to change and is based on the prime rate plus 2.00% per annum. The June 2014 Secured Promissory Note is repayable in monthly payments of $73,695 and adjusted from time-to-time as the interest rate changes, with the final payment due in September 2036. Certain of our deposit accounts and MMM LLC’s inventories, chattel paper, accounts, equipment and general intangibles have been pledged as collateral for the promissory note. We are required to maintain a deposit balance with Five Star Bank of $1.6 million, which is recorded as restricted cash included in non-current assets.

August 2015 Senior Secured Promissory Notes

On August 20, 2015, we entered into a purchase agreement with Ivy Science & Technology Fund, Waddell & Reed Advisors Science & Technology Fund and Ivy Funds VIP Science and Technology, each an affiliate of Waddell, which is a beneficial owner of more than 5% of our common stock. Pursuant to such purchase agreement, we sold to such affiliates senior secured promissory notes ("August 2015 Senior Secured Promissory Notes") in the aggregate principal amount of $40.0 million. The August 2015 Senior Secured Promissory Notes bear interest at a rate of 8% per annum payable semi-annually on June 30 or December 31 of each year, commencing on December 31, 2015, with $10.0 million payable three years from the closing, $10.0 million payable four years from the closing and $20.0 million payable five years from the closing. In connection with the February 2018 Financing Transactions, $35.0 million aggregate principal amount of the August 2015 Senior Secured Promissory Notes was converted into an aggregate of 20,000,000 shares of our common stock and warrants to purchase 4,000,000 shares of our common stock, such that $5.0 million of principal under the such notes remained outstanding, the maturity of such notes was extended to December 31, 2022, all interest payments under the such notes was deferred to maturity on December 31, 2022 and Ospraie was granted a right of first refusal to acquire such notes.

The August 2015 Senior Secured Promissory Notes are secured by substantially all of our personal property assets. The agent, acting on behalf of the lenders, shall be entitled to have a first priority lien on our intellectual property assets, pursuant to intercreditor arrangements with certain of our existing lenders.

LSQ Financing

On March 24, 2017, we entered into an Invoice Purchase Agreement (the "LSQ Financing") with LSQ, which may elect to purchase up to $7.0 million of eligible customer invoices from the Company.

In June 2018, we amended the LSQ Financing arrangement which effectively decreased (i) invoice purchase fee from 1.00% to a range of 0.40% to 1.00%, (ii) the funds usage fee from 0.035% to a range of 0.020% to 0.035%, and (iii) extended the term of the agreement to June 30, 2019. As of December 31, 2018, the outstanding balance under the LSQ Financing totaled $2.1 million. Our obligations under the LSQ Financing are secured by a lien on substantially all of our personal property. LSQ may terminate this agreement with 30 days written notice, at which time the LSQ Financing will be terminated at the earlier of the 30-day period, the end of the current term, or the end of the then renewal term. The events of default under the LSQ Financing include failure to pay amounts due, failure to turn over amounts due to LSQ within a cure period, breach of covenants, falsity of representations, and certain insolvency events.

Upon sale of the receivable, we may elect to set up a reserve where upon the cash for the sale remains with the third-party and the Company can draw on the available amount on the reserve account at any time. Since April 2017, there were times when we elected to utilize the reserve account, and we had no excess funds available on the reserve account outstanding as of December 31, 2018. As of December 31, 2018, we had $2.7 million included in accounts receivable that were transferred under this arrangement.

Our debt arrangements contain certain representations and warranties by and between us and each of the debtors, certain indemnification provisions in favor of the lenders and customary restrictive covenants (including limitations on other debt, liens, acquisitions, investments and dividends), and events of default (including payment defaults, breaches of covenants, a material impairment in the lender's security interest or in the collateral, and events relating to bankruptcy or insolvency). See Note 6, to our accompanying Notes to Consolidated Financial Statements included in Part II-Item 8-"Financial Statements and Supplementary Data" in this Annual Report on Form 10-K. As of December 31, 2018, we were in compliance with these covenants or have obtained the appropriate waivers for non-compliance with such covenants.

The following table sets forth a summary of our cash flows for the periods indicated:

	YEAR ENDED DECEMBER 31,	
	2018	2017
	(Audited)	
Net cash used in operating activities	$(19,626)	$(21,056)
Net cash used in investing activities	(579)	(814)
Net cash provided in financing activities	37,153	12,090
Net increase (decrease) in cash, cash equivalents, and restricted cash	16,948	(9,780)

Cash Flows from Operating Activities

Net cash used in operating activities of $19.6 million during the twelve months ended December 31, 2018 primarily resulted from our net loss of $20.2 million, which included $1.9 million of depreciation and amortization expense, $1.9 million of share-based compensation expense, $0.9 million of non-cash interest expense, $5.2 million of change in the fair value of financial instruments, and $2.2 million on loss on extinguishment of debt offset by a gain of $9.2 million gain on extinguishment of debt with related parties. In addition, net cash used in operating activities resulted from a decrease in accounts receivable of $1.1 million and inventories of $1.6 million offset by a $2.0 million decrease in accounts payable, a $1.2 million decrease in accrued and other liabilities, and decrease of $1.6 million related to accrued interest due to related parties. The includes any impact from errors discussed in Note 16 to our accompanying Notes to Consolidated Financial Statements included in Part II-Item 8-"Financial Statements and Supplementary Data" in this Annual Report on Form 10-K.

Net cash used in operating activities of $21.1 million during the twelve months ended December 31, 2017 primarily resulted from our net loss of $30.9 million, which included $2.0 million of depreciation and amortization expense, $2.1 million of share-based compensation expense, $1.6 million of non-cash interest expense, and $0.4 million of loss on sale of equipment. In addition, net cash used in operating activities resulted from an increase in inventories of $1.3 million, increases in prepaid expenses and deferred product revenues of $0.5 million, all of which was offset by a $2.3 million increase in accounts payable, a $2.6 million increase in accrued and other liabilities, and a $0.8 million increase in deferred revenues.

Cash Flows from Investing Activities

Net cash used in investing activities of $0.6 million during the twelve months ended December 31, 2018 resulted from the purchase of property, plant and equipment to support growth of our operations.

Net cash used in investing activities of $0.8 million during the twelve months ended December 31, 2017 resulted from the purchase of property, plant and equipment to support growth of our operations.

Cash Flows from Financing Activities

Net cash provided in financing activities of $37.2 million during the twelve months ended December 31, 2018 consisted primarily of $34.5 million in net proceeds from the issuance of common stock and $23.8 million in proceeds from the issuance of debt, offset by reductions and repayment of debt of $21.3 million.

Net cash provided by financing activities of $12.1 million during the twelve months ended December 31, 2017 consisted primarily of $8.2 million in proceeds from the issuance of common stock net of offering costs, proceeds from debt, net of repayments and financing costs of $4.3 million. This was partially offset by $0.4 million in payments on our capital lease obligations.

Contractual Obligations

The following is a summary of our contractual obligations as of December 31, 2018:

	TOTAL	2019	2020 - 2021	2022-2023	2024 AND BEYOND
	(In thousands)				
Operating lease obligations	$615	$615	$-	$ -	$ -
Debt	18,367	2,338	588	8,130	7,311
Interest payments	9,900	619	1,180	4,364	3,737
Total	$28,882	$3,572	$1,768	$ 12,494	$ 11,048

Operating leases consist of contractual obligations from agreements for non-cancelable office space and leases used to finance the acquisition of equipment. Debt and capital equipment lease payments and the interest payments relating thereto include promissory notes and capital lease obligations in accordance with the payment terms under the agreements.

In September 2013 and then amended in April 2014, we entered into a lease agreement for approximately 27,300 square feet of office and laboratory space located in Davis, California. The initial term of the lease is for a period of 60 months and commenced in August 2014. The monthly base rent is $44,000 for the first 12 months with a 3% increase each year thereafter. Concurrent with this amendment, in April 2014, we entered into a lease agreement with an affiliate of the landlord to lease approximately 17,400 square feet of office and laboratory space in the same building complex in Davis, California. The initial term of the lease is for a period of 60 months and commenced in August 2014. The monthly base rent is $28,000 with a 3% increase each year thereafter. In November 2018, we provided

irrevocable notice to the landlord exercising the first lease extension option under the initial lease agreement, extending the lease term of the lease for an additional 60 months through 2024.

In January 2016, we entered into an agreement with a sublessee to sublease approximately 3,800 square feet of vacant office space in the aforementioned building complex pursuant to the terms of our lease agreement. The initial term of the sublease is for a period of approximately 43 months and commenced on February 1, 2016. The monthly base rent is approximately $5,000 per month for the first 12 months with a 5% increase each year thereafter.

Since December 31, 2018, we have not added any additional leases that would qualify as operating leases.

Inflation

We believe that inflation has not had a material impact on our results of operations during the years ended December 31, 2018 and 2017.

Off-Balance Sheet Arrangements

We have not been involved in any material off-balance sheet arrangements.

Recently Issued Accounting Pronouncements

See Note 2 to the Consolidated Financial Statements included in this Annual Report on Form 10-K in Part II-Item 8-”Financial Statements and Supplementary Data”.

Critical Accounting Policies and Estimates

Our consolidated financial statements and the related notes included elsewhere in this Annual Report on Form 10-K are prepared in accordance with GAAP. The preparation of these consolidated financial statements requires us to make estimates and assumptions that affect the reported amounts of assets, liabilities, net revenue, costs and expenses, and any related disclosures. We base our estimates on historical experience and on various other assumptions that we believe to be reasonable under the circumstances. Changes in accounting estimates are reasonably likely to occur from period to period. Accordingly, actual results could differ significantly from the estimates made by our management. We evaluate our estimates and assumptions on an ongoing basis. To the extent that there are material differences between these estimates and our actual results, our future financial statement presentation, financial condition, results of operations and cash flows will be affected. See Note 2 to our accompanying Notes to Consolidated Financial Statements included in Part II-Item 8-”Financial Statements and Supplementary Data” in this Annual Report on Form 10-K for additional information regarding our significant accounting policies.

Inventories

Inventories are stated at the lower of cost or market value (net realizable value or replacement cost) and include the cost of material and external and internal labor and manufacturing costs. Cost is determined on the first-in, first-out basis. We provide for inventory reserves when conditions indicate that the selling price may be less than cost due to physical deterioration, obsolescence, changes in price levels or other factors. Additionally, we provide reserves for excess and slow-moving inventory on hand that is not expected to be sold to reduce the carrying amount of excess and slow-moving inventory to its estimated net realizable value. The reserves are based upon estimates about future demand from our customers and distributors and market conditions.

Fair Value of Financial Instruments

Fair value is defined as an exit price that would be received from the sale of an asset or paid to transfer a liability in an orderly transaction between market participants on the measurement date. A three tier fair value hierarchy has been established, which prioritizes the inputs used in measuring fair value as follows: Level 1, observable inputs such as

quoted prices in active markets; Level 2, inputs other than the quoted prices in active markets that are observable either directly or indirectly; and Level 3, unobservable inputs in which there is little or no market data, which requires that we develop our own assumptions. This hierarchy requires the use of observable data, when available, and minimizes the use of unobservable inputs when determining fair value.

Revenue Recognition

On January 1, 2018, we adopted the Accounting Standards Codification ("ASC") 606, Revenue from Contracts with Customers and all the related amendments ("the new revenue standard") and applied it to all contracts using the modified retrospective method. We recognized the cumulative effect of initially applying the new revenue standard as an adjustment to the opening balance of accumulated deficit. The comparative information has not been restated and continues to be reported under the accounting standards in effect for those periods.

Under ASC 606, we recognize revenue for product sales at a point in time following the transfer of control of such products to the customers, which typically occurs upon shipment or delivery depending on the terms of the underlying contracts. We may enter into contracts in which the standalone selling prices ("SSP") is different from the amount we are entitled to bill the customer. As of December 31, 2018, we had deferred product revenue in the amount of $0.5 million associated primarily with billings in excess of SSP. Product revenues consist of revenues generated from sales of our products to distributors and direct customers, net of rebates and cash discounts.

Historically, prior to the adoption of ASC 606, for sales of products made to distributors, we recognized revenue either on a sell-in or sell-through basis depending on the specific facts and circumstances of the transaction(s) with the distributor. Factors considered include, but are not limited to, whether the payment terms offered to the distributor are structured to correspond to when product is resold, the distributor history of adhering to the terms of its contractual arrangements with us, whether we had a pattern of granting concessions for the benefit of the distributor and whether there were other conditions that may indicate that the sale to the distributor was not substantive. In some cases, we recognized distributor revenue as title and risk of loss passed, provided all other revenue recognition criteria were satisfied (the "sell-in" method). For certain sales to certain distributors, the revenue recognition criteria for distributor sales were not satisfied at the time the title and risk of loss passed to the distributor; specifically, in instances where "inventory protection" arrangements were offered to distributors that permitted these distributors to return to us certain unsold products, we considered the arrangement not to be fixed or determinable, and accordingly, revenue was deferred until such products were resold to the end customers of the distributor (the "sell-through" method). During the years ended December 31, 2017, 39% of total revenues were recognized on a sell-through basis. We offer certain product rebates to our distributors and growers, which are estimated and recorded as reductions to product revenues, and an accrued liability is recorded at the later of when the revenues are recorded, or the rebate is being offered.

As of December 31, 2017, we recorded deferred product revenues of $6.5 million net of estimated customer incentives and rebates. The cost of product revenues associated with such deferral are also deferred and classified as deferred cost of product revenues in the consolidated balance sheets. Cash received from customers related to delivered product that may not represent a true sale is classified as customer refund liabilities in the consolidated balance sheets and the related cost of inventory remains in inventory in the consolidated balance sheets until the product is returned or is resold to customers of the distributor and revenue is recognized. Upon the adoption of ASC 606, we made an adjustment to the opening balance of accumulated deficit of $2.3 million which reduced the recorded deferred product revenues and deferred cost of product revenues by approximately $5.4 million and $3.1 million, respectively, in the consolidated balance sheet.

We recognize license revenues pursuant to strategic collaboration and distribution agreements under which we receive payments for the achievement of certain testing validation, regulatory progress and commercialization events. As these activities and payments are associated with exclusive rights that we provide in connection with strategic collaboration and distribution agreements over the term of the agreements, revenues related to the payments received are deferred and recognized over the term of the exclusive distribution period of the respective agreement. We received $0.3 million in payments under these agreements for the year ended December 31, 2018 and there were no amounts included in accounts receivable under these agreements as of December 31, 2018. During the year ended December 31, 2017, we received no payments under these agreements and there were no amounts included in accounts receivable under these agreements.

As of December 31, 2018, we recorded current and non-current deferred revenues of $0.3 million and $1.5 million, respectively, related to payments received under these agreements. As of December 31, 2017, we recorded current and non-current deferred revenues of $0.2 million and $1.6 million, respectively, related to payments received under these agreements.

Share-Based Compensation

We recognize share-based compensation expense for all stock options and restricted stock units granted to employees and directors based on estimated fair values.

We estimate the fair value of restricted stock units based on the closing bid price of our common stock on the date of grant. During the year ended December 31, 2018 and 2017, we recognized $0.8 million and $0.1 million of share-based compensation expense on restricted stock units.

We estimate the fair value of stock options on the date of grant using an option-pricing model. The value of the portion of the stock options that is ultimately expected to vest is recognized as expense on a straight-line basis over the requisite service period. Forfeitures are estimated on the date of grant and revised, if necessary, in subsequent periods if actual forfeitures differ from those estimates.

During the years ended December 31, 2018 and 2017, we recorded share-based compensation expense related to stock options of $1.0 million and $1.9 million, respectively.

We use the Black-Scholes-Merton ("BSM") option-pricing model to calculate the estimated fair value of stock options on the measurement date (generally, the date of grant). The required inputs in the option-pricing model include the expected life of the stock options, estimated volatility factor, risk-free interest rate and expected dividend yield. These inputs are subjective and generally require significant judgment.

If, in the future, we determine that other methods for calculating these assumptions are more reasonable, or if other methods are prescribed by authoritative guidance, the fair value calculated for our stock options could change significantly. Higher volatility factors and longer expected lives result in an increase to the share-based compensation expense determined at the date of grant. Share-based compensation expense is recorded in research, development and patent expense and selling, general and administrative expense.

The BSM option-pricing model was developed for use in estimating the fair value of traded options that have no vesting restrictions and are fully transferable, characteristics not present in our stock options. Existing valuation models, including the BSM option-pricing model, may not provide reliable measures of the fair values of our stock options. Consequently, there is a risk that our estimates of the fair values of the stock options on the grant dates may bear little resemblance to the actual values realized upon exercise. Stock options may expire or otherwise result in zero intrinsic value as compared to the fair values originally estimated on the grant date and reported in the consolidated financial statements. Alternatively, value may be realized from these instruments that is significantly higher than the fair values originally estimated on the grant date and reported in the consolidated financial statements.

Warrants

The warrants granted in connection with the February 2018 Financing Transactions was accounted for in equity. In connection with the February 2018 Financing Transactions, the Company estimated the fair value of the warrants issued using an Option Pricing Model.

Income Taxes

We use the asset and liability method of accounting for income taxes. Deferred tax assets and liabilities are recognized for the estimated future tax consequences attributable to the differences between the consolidated financial statement carrying amounts of existing assets and liabilities and their respective tax bases. Deferred tax assets and liabilities are

measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. To the extent that deferred tax assets cannot be recognized under the preceding criteria, we establish valuation allowances, as necessary, to reduce deferred tax assets to the amounts expected to be realized.

ITEM 8. FINANCIAL STATEMENTS AND SUPPLEMENTARY DATA

REPORTS OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

To the Stockholders and Board of Directors of

Marrone Bio Innovations, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheet of Marrone Bio Innovations, Inc. (the "Company") as of December 31, 2018, the related consolidated statements of operations, stockholders' equity and cash flows for the year ended December 31, 2018, and the related notes (collectively referred to as the "financial statements"). In our opinion, the financial statements present fairly, in all material respects, the financial position of the Company as of December 31, 2018, and the results of its operations and its cash flows for the year ended December 31, 2018, in conformity with accounting principles generally accepted in the United States of America.

We also have audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) ("PCAOB"), the Company's internal control over financial reporting as of December 31, 2018, based on the criteria established in Internal Control - Integrated Framework issued by the Committee of Sponsoring Organizations of the Treadway Commission (COSO) in 2013 and our report dated March 28, 2019, expressed an unqualified opinion on the effectiveness of the Company's internal control over financial reporting.

Explanatory Paragraph – Going Concern

The accompanying financial statements have been prepared assuming that the Company will continue as a going concern. As more fully described in Note 1, the Company has incurred significant losses and needs to raise additional funds to meet its obligations and sustain its operations. These conditions raise substantial doubt about the Company's ability to continue as a going concern. Management's plans in regard to these matters are also described in Note 1. The financial statements do not include any adjustments that might result from the outcome of this uncertainty.

Explanatory Paragraph – Change in Accounting Principles

As discussed in Note 2 to the financial statements, the Company changed its method of accounting for revenues in 2018 due to the adoption of Accounting Standard Codification 606, Revenue from Contracts with Customers.

Basis for Opinion

These financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company's financial statements based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audit included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audit also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audit provides a reasonable basis for our opinion.

/s/ Marcum LLP
Marcum LLP

We have served as the Company's auditor since 2018.

San Francisco, CA

March 28, 2019

REPORT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM ON INTERNAL CONTROL OVER FINANCIAL REPORTING

To the Stockholders and Board of Directors of

Marrone Bio Innovations, Inc.

Opinion on Internal Control over Financial Reporting

We have audited Marrone Bio Innovations, Inc.'s (the "Company") internal control over financial reporting as of December 31, 2018, based on criteria established in *Internal Control-Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission. In our opinion, the Company maintained, in all material respects, effective internal control over financial reporting as of December 31, 2018, based on criteria established in *Internal Control – Integrated Framework (2013)* issued by the Committee of Sponsoring Organizations of the Treadway Commission.

We have also audited, in accordance with the standards of the Public Company Accounting Oversight Board (United States) ("PCAOB"), the consolidated balance sheet as of December 31, 2018 and the related consolidated statements of operations, stockholders' equity, and cash flows for the year then ended of the Company and our report dated March 28, 2019 expressed an unqualified opinion, which included explanatory paragraphs for going concern and change in accounting principles, on those financial statements.

Basis for Opinion

The Company's management is responsible for maintaining effective internal control over financial reporting, and for its assessment of the effectiveness of internal control over financial reporting, included in the accompanying "Management Annual Report on Internal Control over Financial Reporting". Our responsibility is to express an opinion on the Company's internal control over financial reporting based on our audit. We are a public accounting firm registered with the PCAOB and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether effective internal control over financial reporting was

maintained in all material respects. Our audit of internal control over financial reporting included obtaining an understanding of internal control over financial reporting, assessing the risk that a material weakness exists, and testing and evaluating the design and operating effectiveness of internal control based on the assessed risk. Our audit also included performing such other procedures as we considered necessary in the circumstances. We believe that our audit provides a reasonable basis for our opinion.

Definition and Limitations of Internal Control over Financial Reporting

A company's internal control over financial reporting is a process designed to provide reasonable assurance regarding the reliability of financial reporting and the preparation of financial statements for external purposes in accordance with generally accepted accounting principles. A company's internal control over financial reporting includes those policies and procedures that (1) pertain to the maintenance of records that, in reasonable detail, accurately and fairly reflect the transactions and dispositions of the assets of the company; (2) provide reasonable assurance that transactions are recorded as necessary to permit preparation of financial statements in accordance with generally accepted accounting principles, and that receipts and expenditures of the company are being made only in accordance with authorizations of management and directors of the company; and (3) provide reasonable assurance regarding prevention or timely detection of unauthorized acquisition, use, or disposition of the company's assets that could have a material effect on the financial statements.

Because of the inherent limitations, internal control over financial reporting may not prevent or detect misstatements. Also, projections of any evaluation of effectiveness to future periods are subject to the risk that controls may become inadequate because of changes in conditions, or that degree of compliance with the policies or procedures may deteriorate.

/s/ Marcum llp

Marcum llp

San Francisco, CA

March 28, 2019

Report of Independent Registered Public Accounting Firm

To the Shareholders and the Board of Directors of

Marrone Bio Innovations, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheet of Marrone Bio Innovations, Inc. (the Company) as of December 31, 2017, the related consolidated statements of operations, stockholders' equity (deficit) and cash flows for the year then ended, and the related notes (collectively referred to as the “consolidated financial statements”). In our opinion, the consolidated financial statements present fairly, in all material respects, the financial position of the Company at December 31, 2017, and the results of its operations and its cash flows for the year then ended, in conformity with U.S. generally accepted accounting principles.

The Company's Ability to Continue as a Going Concern

The accompanying consolidated financial statements have been prepared assuming that the Company will continue as a going concern. As discussed in Note 1 to the consolidated financial statements, the Company’s historical operating results and negative working capital indicate substantial doubt exists about the Company’s ability to continue as a going concern. Management’s evaluation of the events and conditions and management’s plans regarding these matters also are described in Note 1. The consolidated financial statements do not include any adjustments to reflect the possible future effects on the recoverability and classification of assets or the amounts and classification of liabilities that may result from the outcome of this uncertainty.

Basis for Opinion

These consolidated financial statements are the responsibility of the Company's management. Our responsibility is to express an opinion on the Company’s consolidated financial statements based on our audits. We are a public accounting firm registered with the Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

We conducted our audit in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audit to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. The Company is not required to have, nor were we engaged to perform, an audit of its internal control over financial reporting. As part of our audit we are required to obtain an understanding of internal control over financial reporting but not for the purpose of expressing an opinion on the effectiveness of the Company's internal control over financial reporting. Accordingly, we express no such opinion.

Our audit included performing procedures to assess the risks of material misstatement of the financial statements, whether due to error or fraud, and performing procedures that respond to those risks. Such procedures included examining, on a test basis, evidence regarding the amounts and disclosures in the financial statements. Our audit also included evaluating the accounting principles used and significant estimates made by management, as well as evaluating the overall presentation of the financial statements. We believe that our audit provides a reasonable basis for our opinion.

/s/ Ernst & Young LLP

We served as the Company’s auditor from 2008 to 2018.

Roseville, California

April 4, 2018

MARRONE BIO INNOVATIONS, INC.

Consolidated Balance Sheets

(In Thousands, Except Par Value)

	DECEMBER 31,	
	2018	2017
Assets		
Current assets:		
Cash and cash equivalents	$18,221	$786
Restricted cash, current portion	—	487
Accounts receivable	2,720	3,785
Inventories, net	8,224	9,827
Deferred cost of product revenues	4	3,063
Prepaid expenses and other current assets	967	1,170
Total current assets	30,136	19,118
Property, plant and equipment, net	14,512	16,016
Restricted cash, less current portion	1,560	1,560
Other assets	359	219
Total assets	$46,567	$36,913
Liabilities and stockholders' equity (deficit)		
Current liabilities:		
Accounts payable	$1,692	$3,800
Accrued liabilities	6,871	8,189
Accrued interest due to related parties	—	1,622
Deferred revenue, current portion	438	6,193
Derivative liability	—	674
Debt, current portion, net	2,318	1,524
Total current liabilities	11,319	22,002
Deferred revenue, less current portion	2,399	2,046
Debt, less current portion, net	11,819	24,407
Debt due to related parties	7,300	37,822
Other liabilities	794	1,287
Total liabilities	33,631	87,564
Commitments and contingencies *(Note 10)*		
Stockholders' equity (deficit):		
Preferred stock: $0.00001 par value; 20,000 shares authorized and no shares issued or outstanding at December 31, 2018 and December 31, 2017	—	—
Common stock: $0.00001 par value; 250,000 shares authorized, 110,691 and 31,351 shares issued and outstanding as of December 31, 2018 and December 31, 2017, respectively	1	—
Additional paid in capital	296,409	214,921
Accumulated deficit	(283,474)	(265,572)
Total stockholders' equity (deficit)	12,936	(50,651)
Total liabilities and stockholders' equity (deficit)	$46,567	$36,913

See accompanying notes.

MARRONE BIO INNOVATIONS, INC.

Consolidated Statements of Operations

(In Thousands, Except Per Share Data)

	YEAR ENDED DECEMBER 31,	
	2018	2017
Revenues:		
Product	$20,775	$17,935
License	445	232
Total revenues	21,220	18,167
Cost of product revenues	10,907	10,528
Gross profit	10,313	7,639
Operating Expenses:		
Research, development and patent	10,662	10,820
Selling, general and administrative	19,155	19,814
Total operating expenses	29,817	30,634
Loss from operations	(19,504)	(22,995)
Other income (expense):		
Interest expense	(2,057)	(3,374)
Interest expense, related parties	(451)	(4,355)
Change in fair value of financial instruments	(5,177)	(96)
Loss on extinguishment of debt, net	(2,196)	—
Gain on extinguishment of debt, related party	9,183	—
Other expense, net	(11)	(105)
Total other expense, net	(709)	(7,930)
Net loss	$(20,213)	$(30,925)
Basic and diluted net loss per common share:	$(0.20)	$(1.06)
Weighted-average shares outstanding used in computing basic and diluted net loss per common share:	101,248	29,235

See accompanying notes.

MARRONE BIO INNOVATIONS, INC.

Consolidated Statements Stockholders' Equity (Deficit)

(In Thousands)

	COMMON STOCK SHARES	AMOUNT	ADDITIONAL PAID IN CAPITAL	ACCUMULATED DEFICIT	TOTAL STOCKHOLDERS' EQUITY (DEFICIT)
Balance at January 1, 2017	24,661	$ —	$ 204,463	$ (234,647)	$ (30,184)
Net loss	—	—	—	(30,925)	(30,925)
Exercise of stock options	14	—	17	—	17
Share-based compensation	—	—	2,060	—	2,060
Issuance of common stock warrants for services	—	—	54	—	54
Issuance of restricted stock units	—	—	139	—	139
Issuance of common stock in follow-on offering, net of offering costs and underwriter commissions	6,676	—	8,188	—	8,188
Balance at December 31, 2017	31,351	—	214,921	(265,572)	(50,651)
New revenue standard adoption impact	—	—	—	2,311	2,311
Net loss	—	—	—	(20,213)	(20,213)
Net settlement of options	44	—	26	—	26
Exercise of warrants	78	—	98	—	98
Share-based compensation	—	—	1,850	—	1,850
Issuance of restricted stock units in lieu satisfaction of bonus payment	—	—	205	—	205
Settlement of restricted stock units	338	—	—	—	—
Conversion of related party notes for common stock and warrants	20,000	—	21,685	—	21,685
Conversion of secured promissory notes for common stock and warrants	5,714	—	6,196	—	6,196
Conversion of convertible notes for common stock and warrants	12,000	—	16,843	—	16,843
Fair value of common stock and warrants issued to placement agent in connection with private placement and note conversion [(1)]	800	—	1,610	—	1,610
Issuance of common stock and warrants in private placement, net of offering costs and underwriter commissions	32,000	1	20,310	—	20,311
Issuance of common stock in follow-on offering, net of offering costs and underwriter commissions	8,366	—	12,665	—	12,665
Balance at December 31, 2018	110,691	$ 1	$ 296,409	$ (283,474)	$ 12,936

See accompanying notes.

MARRONE BIO INNOVATIONS, INC.

Consolidated Statements of Cash Flows

(In Thousands)

	YEAR ENDED DECEMBER 31,	
	2018	2017
Cash flows from operating activities		
Net loss	$(20,213)	$(30,925)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	1,890	2,044
Gain on disposal of equipment	-	363
Share-based compensation	1,850	2,114
Non-cash interest expense	994	1,596
Change in fair value of financial instruments	5,177	96
Loss on extinguishment of debt, net	2,196	—
Gain on extinguishment of debt, related party, net	(9,183)	—
Net changes in operating assets and liabilities:		
Accounts receivable	1,065	(193)
Inventories	1,603	(1,345)
Prepaid Expenses and other assets	33	(144)
Deferred cost of product revenues	1	(375)
Accounts payable	(2,028)	2,305
Accrued and other liabilities	(857)	2,599
Accrued interest due to related parties	(1,614)	4
Deferred revenue	(339)	805
Net cash used in operating activities	(19,425)	(21,056)
Cash flows from investing activities		
Purchases of property, plant and equipment	(580)	(849)
Proceeds from the sale of equipment	-	35
Net cash used in investing activities	(580)	(814)
Cash flows from financing activities		
Proceeds from issuance of common stock, net of offering costs	34,486	8,188
Proceeds from issuance of debt	2,000	4,000
Proceeds from secured borrowings	21,844	16,228
Reductions in secured borrowings	(21,046)	(14,952)
Repayment of debt	(254)	(756)
Financing costs	(201)	(215)
Repayment of capital leases	-	(420)
Exercise of stock options	40	17
Net settlement of options	(14)	—
Exercise of warrants	98	—
Net cash provided by financing activities	36,953	12,090
Net increase in cash and cash equivalents and restricted cash	16,948	(9,780)

Cash and cash equivalents and restricted cash, beginning of period	2,833	12,613
Cash and cash equivalents and restricted cash, end of period	$19,781	$2,833
Supplemental disclosure of cash flow information		
Cash paid for interest	$2,772	$5,993
Supplemental disclosure of non-cash investing and financing activities		
Property, plant and equipment included in accounts payable and accrued liabilities	$51	$245
Conversion of debt to equity	$10,000	$—
Conversion of bridge loan (convertible note) to equity	$6,000	$—
Conversion of debt, related party to equity	$35,000	$—
Conversion of accrued liabilities into equity associated with the granting of restricted stock units	$205	$—
Increase in debt discount associated with change in fair value of derivative liability	$573	-
Conversion of accrued interest, related party, into debt, related party	$324	-

See accompanying notes.

MARRONE BIO INNOVATIONS, INC.

Notes to Consolidated Financial Statements

December 31, 2018

1. Summary of Business, Basis of Presentation

Marrone Bio Innovations, Inc. (“Company”), formerly Marrone Organic Innovations, Inc., was incorporated under the laws of the State of Delaware on June 15, 2006, and is located in Davis, California. In July 2012, the Company formed a wholly-owned subsidiary, Marrone Michigan Manufacturing LLC (“MMM LLC”), which holds the assets of a manufacturing plant the Company purchased in July 2012. The consolidated financial statements include the accounts of the Company and its wholly-owned subsidiary. All significant intercompany balances and transactions have been eliminated in consolidation. The Company makes bio-based pest management and plant health products. The Company targets the major markets that use conventional chemical pesticides, including certain agricultural and water markets where its bio-based products are used as alternatives for, or mixed with, conventional chemical pesticides. The Company also targets new markets for which (i) there are no available conventional chemical pesticides or (ii) the use of conventional chemical pesticides may not be desirable or permissible either because of health and environmental concerns (including for organically certified crops) or because the development of pest resistance has reduced the efficacy of conventional chemical pesticides. The Company delivers EPA-approved and registered biopesticide products and other bio-based products that address the global demand for effective, safe and environmentally responsible products.

Going Concern, Liquidity, and Management Plans

The accompanying consolidated financial statements have been prepared under the assumption that the Company will continue to operate as a going concern for the 12 months upon the issuance of these consolidated financial statements, which contemplates the realization of assets and the settlement of liabilities in the normal course of business. The consolidated financial statements do not include any adjustments to reflect the possible future effects on the recoverability and classification of assets or the amounts of liabilities that may result from the Company’s ability to continue as a going concern.

The Company is an early stage company and has a limited number of commercialized products. As of December 31, 2018, the Company had an accumulated deficit of $283,474,000, has incurred significant losses since inception, and expects to continue to incur losses for the foreseeable future. Until the completion of the IPO in August 2013, the Company had funded operations primarily with net proceeds from the private placements of convertible preferred stock, convertible notes, promissory notes and term loans, as well as with the proceeds from the sale of its products and payments under strategic collaboration and distribution agreements and government grants. The Company will

need to generate significant revenue growth to achieve and maintain profitability. As of December 31, 2018, the Company had a working capital surplus of $18,817,000, including cash and cash equivalents of $18,221,000. In addition, as of December 31, 2018, the Company had debt and debt due to related parties of $14,137,000 and $7,300,000, respectively, for which the underlying debt agreements contain various financial and non-financial covenants, as well as certain material adverse change clauses. As of December 31, 2018, the Company had a total of $1,560,000 of restricted cash relating to these debt agreements (See Notes 6 and 13 for further discussion).

The Company participates in a heavily regulated and highly competitive crop protection industry and believes that adverse changes in any of the following areas could have a material effect on the Company’s future financial position, results of operations or cash flows: inability to obtain regulatory approvals, increased competition in the pesticide market, market acceptance of the Company’s products, weather and other seasonal factors beyond the Company’s control, litigation or claims against the Company related to intellectual property, patents, products or governmental regulation, and the Company’s ability to support increased growth.

The Company's historical operating results, including prior periods of negative working capital, indicate substantial doubt exists related to the Company's ability to continue as a going concern for the next 12 months from the date of issuance of these consolidated financial statements. However, the Company believes that its existing cash and cash equivalents and restricted cash of $19,781,000 at December 31, 2018, together with expected revenues, expected future debt or equity financings and cost management as well as cost reductions will be sufficient to fund operations as currently planned through one year from the date of the issuance of these consolidated financial statements. The Company anticipates securing additional sources of through equity and/or debt financings, collaborative or other funding arrangements with partners, or through other sources of financing, consistent with historic results. However, the Company cannot predict, with certainty, the outcome of its actions to grow revenues, to manage or reduce costs or to secure additional financing from outside sources on terms acceptable to the Company or at all. Further, the Company may continue to require additional sources of cash for general corporate purposes, which may include operating expenses, working capital to improve and promote its commercially available products, advance product candidates, expand international presence and commercialization, general capital expenditures and satisfaction of debt obligations.

If the Company further breaches any of the covenants contained within the debt agreements or if the material adverse change clauses are triggered, the entire unpaid principal and interest balances would be due and payable upon demand. Without entering into a continuation of its current waiver, which expires November 15, 2020, entering into strategic agreements that include significant cash payments upfront, significantly increasing revenues from sales or raising additional capital through the issuance of equity, the Company expects it will exceed its maximum debt-to-worth requirement under the June 2014 Secured Promissory Note with Five Star Bank. Further, a violation of a covenant in one debt agreement will cause the Company to be in violation of certain covenants under each of its other debt agreements. Breach of covenants included in the Company's debt agreements, which could result in the lenders demanding payment of the unpaid principal and interest balances, will have a material adverse effect upon the Company and would likely require the Company to seek to renegotiate these debt arrangements with the lenders. If such negotiations are unsuccessful, the Company may be required to seek protection from creditors through bankruptcy proceedings. The Company's inability to maintain compliance with its debt covenants could have a negative impact on the Company's financial condition and ability to continue as a going concern.

Although the Company recognizes that it will likely need to raise additional funds in the future, there can be no assurance that such efforts will be successful or that, in the event that they are successful, the terms and conditions of such financing will not be unfavorable. Any future equity financing may result in dilution to existing stockholders and any debt financing may include additional restrictive covenants. Any failure to obtain additional financing or to achieve the revenue growth necessary to fund the Company with cash flows from operations will have a material adverse effect upon the Company and will likely result in a substantial reduction in the scope of the Company's operations and impact the Company's ability to achieve its planned business objectives.

The June 2014 Secured Promissory Note contains a material adverse change clause that could be invoked by the lender as a result of the uncertainty related to the Company's ability to continue as a going concern. If the lender were to declare an event of default, the entire amount of borrowings related to all debt agreements at that time would have to be reclassified as current in the consolidated financial statements. The lender has waived its right to deem recurring losses, liquidity, going concern, and financial condition a material adverse change through November 15, 2020. As a

result, none of the long-term portion of the Company's outstanding debt has been reclassified to current in these consolidated financial statements as of December 31, 2018.

In December 2017, the Company entered into a securities purchase agreement (the "Purchase Agreement") with certain accredited investors named therein including Ospraie and Ardsley, pursuant to which the investors thereunder agreed, subject to the satisfaction of certain closing conditions, to purchase units consisting of shares of the Company's common stock and warrants to purchase a share of the Company's common stock. Concurrently with the entry into the Purchase Agreement, the Company entered into amendments to the senior promissory notes issued to affiliates of Waddell & Reed Financial, Inc. ("Waddell") and the secured promissory notes issued in October 2012 and April 2013 (the "October 2012 and April 2013 Promissory Notes"). In February 2018, the Company completed the transactions contemplated in the Purchase Agreement, the note amendments and certain related agreements, which resulted in:

- the issuance of an aggregate of 40,000,001 shares of the Company's common stock and warrants to purchase an aggregate of 41,333,333 shares of the Company's common stock to purchasers under the Purchase Agreement for an aggregate purchase price of $30.0 million, which includes conversion of all outstanding principal under the October 2017 Convertible Note;
- the conversion of $35.0 million aggregate principal amount of the Waddell notes into an aggregate of 20,000,000 shares of the Company's common stock and warrants to purchase 4,000,000 shares of the Company's common stock, such that $5.0 million of principal under such notes remained outstanding, in connection with which the maturity of such notes was extended to December 31, 2022, all interest payments under such notes were deferred to maturity on December 31, 2022;

the conversion of $10.0 million aggregate principal amount of indebtedness outstanding under the October 2012 and April 2013 Promissory Notes to an aggregate of 5,714,285 shares of the Company's common stock and warrants to purchase 1,142,856 shares of the Company's common stock such that $2.45 million of principal under such notes remained outstanding, and in connection with which the maturity of such notes was extended to December 31, 2022, the interest was reduced from 14% to 8% and all interest payments under such notes were deferred to the maturity on December 31, 2022; and

the issuance of 800,000 shares of common stock and warrants to purchase 2,017,143 shares of common stock to the placement agent that facilitated the foregoing transactions.

As a result of the completion of the February 2018 Financing Transactions, the Company issued an aggregate of 70.5 million shares of common stock and warrants to purchase an aggregate of 48.9 million shares of common stock, the deleveraging of the Company's balance sheet by reducing principal payments that were outstanding as of December 31, 2017 by $49.0 million, and the deferral of payment on $7.5 million of remaining outstanding debt until December 31, 2022.

In December 2016, the Company filed a shelf registration statement on Form S-3 with the SEC that provides for the sale and issuance of up to $50,000,000 million of the Company's common stock, preferred stock, debt securities, warrants, rights and/or units, including the ability to sell up to $15,000,000 million of the Company's common stock through an at-the-market program in accordance with an offering agreement the Company entered into with H.C. Wainwright. As of December 31, 2017, the Company had sold 104,000 shares of common stock under at-the-market program at a weighted average exercise price of $2.22 per share for proceeds (net of commission) of $0.2 million, and $14.8 million remained available for sale under the agreement with H.C. Wainwright. In April 2017, using the shelf registration statement, the Company completed an underwritten public offering of 6,571,000 registered shares of common stock (inclusive of 857,000 shares of its common stock to cover over-allotments). The public offering price of the shares sold in the offering was $1.40 per share, and after deducting underwriting discounts and commissions and other offering expenses payable by the Company, the aggregate net proceeds to the Company from the offering totaled approximately $8,188,000. In April 2018, also under the December 2016 shelf registration statement, the Company completed a public offering of 8,366,250 registered shares of its common stock. The public offering price of the shares sold in the offering was $1.65 per share, and after deducting the underwriting discounts and commissions and other offering expenses payable by the Company, the aggregate net proceeds to the Company from the offering totaled $12,665,000 million. See Note 14 for further discussion.

The Company has based its beliefs on assumptions and estimates that may prove to be wrong, and the Company could spend its available financial resources less or more rapidly than currently expected. The actions discussed above cannot be considered probable of occurring and mitigating the substantial doubt raised by its historical operating results and satisfying its estimated liquidity needs for 12 months from the issuance of these consolidated financial statements. If the Company becomes unable to continue as a going concern, it may have to liquidate its assets, and stockholders may lose all or part of their investment in the Company's common stock.

2. Significant Accounting Policies

Use of Estimates

The preparation of these consolidated financial statements in conformity with accounting principles generally accepted in the United States ("GAAP") requires management to make estimates and assumptions that affect the reported amounts of assets and liabilities and the disclosure of contingent assets and liabilities as of the date of the consolidated financial statements and the reported amounts of revenues and expenses during the reporting period. Actual results could differ from those estimates.

The Company believes that the assumptions and estimates associated with revenue recognition, including assumptions and estimates used in determining the timing and amount of revenue to recognize for those transactions with variable considerations, fair value of financial instruments, inventory valuation, warrants and share-based compensation have the greatest potential impact on the consolidated financial statements. Therefore, the Company considers these estimates to be its significant estimates.

Cash and Cash Equivalents

The Company considers all highly liquid financial instruments purchased with a maturity of three months or less to be cash equivalents. Cash and cash equivalents consist of cash on deposit, money market funds and certificates of deposit accounts with U.S. financial institutions. The Company is exposed to credit risk in the event of default by financial institutions to the extent that cash and cash equivalents balances with financial institutions are in excess of amounts that are insured by the Federal Deposit Insurance Corporation. The Company has not experienced any losses on these deposits. The following table provides a reconciliation of cash, cash equivalents and restricted cash to amounts shown in the statement of cash flows in thousands as a result of the adoption of Accounting Standards Update No. 2016-18, Statement of Cash Flows (Topic 230): Restricted Cash ("ASU 2016-18"):

	DECEMBER 31,	
	2018	2017
Cash and cash equivalents	$18,221	$786
Restricted cash, current portion	0	487
Restricted cash, less current portion	1,560	1,560
Total cash, cash equivalents and restricted cash	$19,781	$2,833

Restricted Cash

The Company's restricted cash consists of cash that the Company is contractually obligated to maintain in accordance with the terms of its June 2014 Secured Promissory Note. See Note 6 for further discussion.

Derivative Liability

From time-to-time, the Company may issue convertible notes that contain embedded features that required derivative accounting including the determination of the fair value of the financial instruments at the execution of the contract and the change in such fair values through each reporting period until such time the liability is extinguished. The Company's convertible debt as further discussed in Note 6, has an embedded derivative that required bifurcation from the host instrument. The October 2017 Convertible Note was extinguished as part of the February 2018 Financing Transaction (See Notes 6 and 13 for further discussion).

Fair Value of Financial Instruments

Accounting Standards Codification (“ASC”) 820, *Fair Value Measurements* (“ASC 820”), clarifies that fair value is an exit price, representing the amount that would be received to sell an asset or paid to transfer a liability in an orderly transaction between market participants. As such, fair value is a market-based measurement that should be determined based on assumptions that market participants would use in pricing an asset or liability.

ASC 820 requires that the valuation techniques used to measure fair value must maximize the use of observable inputs and minimize the use of unobservable inputs. ASC 820 establishes a three-tier value hierarchy, which prioritizes inputs that may be used to measure fair value as follows:

Level 1—Quoted prices in active markets for identical assets or liabilities.

Level 2—Observable inputs other than quoted prices in active markets for identical assets and liabilities, quoted prices for identical or similar assets or liabilities in inactive markets or other inputs that are observable or can be corroborated by observable market data for substantially the full term of the assets or liabilities.

Level 3—Inputs that are generally unobservable and typically reflect management’s estimate of assumptions that market participants would use in pricing the asset or liability.

The following table presents the Company's financial liabilities measured at fair value on a recurring basis as of December 31, 2018 and 2017 (in thousands):

	DECEMBER 31, 2018			
	TOTAL	LEVEL 1	LEVEL 2	LEVEL 3
Derivative liability	$—	$—	$—	$—

	DECEMBER 31, 2017			
	TOTAL	LEVEL 1	LEVEL 2	LEVEL 3
Derivative liability	$674	$ —	$ —	$ 674

The Company estimated the fair value of the derivative liability using an Option Pricing Model as of December 31, 2017, for the period January 11-17, 2018 on issuance of additional derivative liability commensurate with the receipt of additional principle under the convertible note, and upon extinguishment of the convertible note on February 5, 2018 (See Note 6). The fair value is subjective and is affected by certain significant inputs to the valuation model, which are disclosed in the table below. The fair value of the derivative liability is based upon the outputs of the Option Pricing Model probability-weighted to reflect three different conversion option exercise dates. As the Option Pricing Model estimates the fair value of derivative liability using unobservable inputs, it is considered to be a Level 3 fair value measurement.

The periodic changes in the estimated fair value between the collective issuance dates, at each reporting period, and on the extinguishment of the convertible note, resulted in the Company recognizing a net loss from the total change in estimated fair market value of the derivative liabilities as of December 31, 2018, as shown in the tables below. This loss is included in the change in estimated fair value of derivative liability in the Company's consolidated statement of operations.

The following table provides a reconciliation of the activity for the derivative liability measured between the most recent reporting period and as of the balance sheet date based on the fair value using significant inputs including the unobservable inputs (Level 3) (in thousands):

	DERIVATIVE LIABILITY
Fair value at December 31, 2017	$ 674
Derivative liability issued	573
Change in estimated fair value recorded of financial instruments	5,177

Derivative liability extinguished	(6,424)
Fair value at December 31, 2018	$ —

The following table represents the significant inputs used in determining the fair value of the derivative liability:

	FEBRUARY 5, 2018	JANUARY 11-17 2018	DECEMBER 31, 2017
Price	$ 0.50	$1.00	$ 1.00
Stock Price volatility	60 %	60 %	60 %
Risk-free rate	1.46 %	1.43 %	1.28 %
Probability weighted term in years	0.18	0.23 – 0.25	0.42

Expected Life. Expected life represents the period that management estimates the conversion option is expected to be outstanding, or the estimated period until the holder exercises the conversion option, not to exceed the contractual term of the note.

Estimated Volatility Factor. The Company's volatility assumption is based on the volatility of the Company's common stock adjusted for credit spread and recovery factors, also giving consideration for convertible bond implied volatilities for similarly traded instruments.

Interest Rate. The Company's interest rate is based on interest rates of comparable distressed credits, also giving consideration to historical average recovery for subordinate debt for the equivalent remaining term as the expected life of the convertible note.

Expected Dividend Yield. The Company has not declared dividends, nor does it expect to in the foreseeable future. Therefore, a zero value was assumed for the expected dividend yield.

Concentrations of Credit Risk

Financial instruments that potentially subject the Company to concentrations of credit risk consist principally of cash, cash equivalents, accounts receivable and debt. The Company deposits its cash and cash equivalents with high credit quality domestic financial institutions with locations in the U.S. Such deposits may exceed federal deposit insurance limits. The Company believes the financial risks associated with these financial instruments are minimal.

The Company's customer base is dispersed across many different geographic areas, and currently most customers are pest management distributors in the U.S. Generally, receivables are due up to 120 days from the invoice date and are considered past due after this date, although the Company may offer extended terms from time to time.

During the years ended December 31, 2018 and 2017, 11% and 9%, respectively, of the Company's revenues were generated from international customers.

The Company's principal sources of revenues were its Regalia, Grandevo, and Venerate product lines for the years ended December 31, 2018 and 2017, accounting for 90% and 87%, respectively, of the Company's total revenues.

Customers to which 10% or more of the Company's total revenues are attributable for any one of the periods presented consist of the following:

	CUSTOMER A		CUSTOMER B		CUSTOMER C	
Year ended December 31,						
2018	17	%	1	%	35	%
2017	24	%	2	%	-	

Customers to which 10% or more of the Company's outstanding accounts receivable are attributable as of either December 31, 2018 or 2017 consist of the following:

	CUSTOMER						
DECEMBER 31,	A	B	C	D	E	F	G
2018	8%	24%	-	-	-	-	52%
2017	22%	3%	-	16%	11%	11%	-

Concentrations of Supplier Dependence

The active ingredient in the Company's Regalia product line is derived from the giant knotweed plant, which the Company obtains from China. The Company currently relies on one supplier for this plant. Such single supplier acquires raw knotweed from numerous regional sources and performs an extraction process on this plant, creating a dried extract that is shipped to the Company's manufacturing plant. While the Company does not have a long-term supply contract with this supplier, the Company does have a long-term business relationship with this supplier. The Company endeavors to keep 6 months of knotweed extract on hand at any given time, but an unexpected disruption in supply could have an effect on Regalia supply and revenues. Although the Company has identified additional sources of raw knotweed, there can be no assurance that the Company will continue to be able to obtain dried extract from China at a competitive price.

Accounts Receivable

The carrying value of the Company's receivables represents their estimated net realizable values. The Company generally does not require collateral and estimates any required allowance for doubtful accounts based on historical collection trends, the age of outstanding receivables and existing economic conditions. If events or changes in circumstances indicate that specific receivable balances may be impaired, further consideration is given to the collectability of those balances and the allowance is recorded accordingly. Past-due receivable balances are written-off when the Company's internal collection efforts have been unsuccessful in collecting the amount due. During the years ended December 31, 2018 and 2017, no receivables balances were written off. As of December 31, 2018 and 2017, the Company had no allowance for doubtful accounts.

Inventories

Inventories are stated at the lower of cost or market value (net realizable value or replacement cost) and include the cost of material and external and internal labor and manufacturing costs. Cost is determined on the first-in, first-out basis. The Company provides for inventory reserves when conditions indicate that the selling price may be less than cost due to physical deterioration, obsolescence, changes in price levels or other factors. Additionally, the Company provides reserves for excess and slow-moving inventory on hand that is not expected to be sold to reduce the carrying amount of excess and slow-moving inventory to its estimated net realizable value. The reserves are based upon estimates about future demand from the Company's customers and distributors and market conditions.

During the year ended December 31, 2018, the Company recorded, as a component of cost of product revenues, adjustments to inventory reserves of $327,000 due to quantities on hand that may not be used or sold prior to expiration, and an adjustment of $1,078,000 as a result of actual utilization of the Company's manufacturing plant being less than what is considered normal capacity.

During the year ended December 31, 2017, the Company recorded, as a component of cost of product revenues, adjustments to inventory reserves of $125,000 due to quantities on hand that may not be used or sold prior to expiration, and an adjustment of $224,000 as a result of actual utilization of the Company's manufacturing plant being less than what is considered normal capacity.

Inventories, net consist of the following (in thousands):

	DECEMBER 31, 2018	DECEMBER 31, 2017
Raw materials	$ 1,844	$ 2,310
Work in progress	1,580	2,441
Finished goods	4,800	5,076
	$ 8,224	$ 9,827

As of December 31, 2018 and 2017, the Company had $579,000 and $252,000, respectively, in reserves against its inventories.

Deferred Cost of Product Revenues

Deferred cost of product revenue is stated at the lower of cost or net realizable value and include product sold where title has transferred but the criteria for revenue recognition have not been met. As of December 31, 2018 and 2017, the Company recorded deferred cost of product revenues of $4,000 and $3,063,000, respectively. A portion of the amounts deferred as of December 31, 2017 was recognized in connection with the Company's adoption of Accounting Standards Codification ("ASC") 606, *Revenue from Contracts with Customers,* refer to Deferred Revenue and Revenue Recognition policies within this note.

Property, Plant and Equipment

Property, plant and equipment are recorded at cost and are depreciated using the straight-line method over their estimated useful lives. The Company generally uses the following estimated useful lives for each asset category:

ASSET CATEGORY	ESTIMATED USEFUL LIFE
Building	30 years
Computer equipment	2-3 years
Machinery and equipment	3-20 years
Office equipment	3-5 years
Furniture	3-5 years
Leasehold improvements	Shorter of lease term or useful life
Software	3 years

Amortization of assets under capital leases is included in depreciation expense. Maintenance, repairs and minor renewals are expensed as incurred. Expenditures that substantially increase an asset's useful life are capitalized.

The Company recognized a combined loss on disposals or impairment charge totaling $369,000 for the year ended December 31, 2017 on these disposed or held for sale assets. The Company included the loss on disposal or impairment charge in selling, general and administrative expenses. The Company did not recognize any amounts related to disposals or impairment for the year ended December 31, 2018.

Impairment of Long-Lived Assets

Impairment losses related to long-lived assets are recognized in the event the net carrying value of such assets is not recoverable and exceeds fair value. The Company evaluates the recoverability of its long-lived assets whenever events or changes in circumstances indicate that the carrying value of an asset may not be recoverable. The carrying amount of a long-lived asset (asset group) is not recoverable if it exceeds the sum of the undiscounted cash flows expected to result from the use and eventual disposition of the asset (asset group). If the carrying amount of a long-lived asset (asset group) is considered is not recoverable, the impairment loss is measured as the amount by which the carrying value of the asset group exceeds its estimated fair value.

Deferred Revenue

Historically, prior to the adoption of Accounting Standards Codification ("ASC") 606, *Revenue from Contracts with Customers*, ("ASC 606'), for sales of products made to distributors, the Company recognized revenue either on a sell-in or sell-through basis depending on the specific facts and circumstances of the transaction(s) with the distributor. Factors considered include, but were not limited to, whether the payment terms offered to the distributor were structured to correspond to when product was resold, the distributor's history of adhering to the terms of its contractual arrangements, whether the Company had a pattern of granting concessions for the benefit of the distributor and whether there are other conditions that may indicate that the sale to the distributor is not substantive. In some cases, the Company recognized distributor revenue as title and risk of loss passed, provided all other revenue recognition criteria were satisfied (the "sell-in" method). For certain sales to certain distributors, the revenue recognition criteria were not satisfied at the time title and risk of loss passes to the distributor; specifically, in instances where "inventory protection" arrangements were offered to distributors that permitted these distributors to return certain unsold products to the Company, and therefore considered the arrangement not to be fixed or determinable, and accordingly, revenue was deferred until the products were resold to end customers by the distributor (the "sell-through" method).

On January 1, 2018, in connection with the Company's adoption of ASC 606, the Company reassessed the contracts giving rise to the deferred revenues at December 31, 2017. Under ASC 606, management also considered its historical experience under these contractual arrangements and the Company's overall estimates for returns, along with those factors initially considered in the deferral of such revenues. Under ASC 606, when the Company receives consideration, or such consideration is unconditionally due, from a customer prior to transferring control of goods or services to the customer under the terms of a sales contract, the Company records deferred revenue, which represents a contract liability. The Company recognizes deferred revenue as net sales after the Company has transferred control of the goods or services to the customer and all revenue recognition criteria are met. The Company's deferred revenue is broken out as follows:

	DECEMBER 31, 2018	DECEMBER 31, 2017
Product revenues	$ 457	$ 6,449
Financing costs[1]	604	-
License revenues	1,776	1,790
	2,837	8,239
Less current portion	(438)	(6,193)
	$ 2,399	$ 2,046

(1) Financing costs relate to the implementation of ASC 606. Refer to the Company's revenue recognition policy in this note.

Revenue Recognition

On January 1, 2018, the Company adopted ASC 606 and all the related amendments ("the new revenue standard") and applied it to all contracts using the modified retrospective method. The cumulative effect of initially applying the new revenue standard was an adjustment to the opening balance of accumulated deficit. The comparative information has not been restated and continues to be reported under the accounting standards in effect for those periods.

Under ASC 606, the Company recognizes revenue for product sales at a point in time following the transfer of control of such products to the customers, which typically occurs upon shipment or delivery depending on the terms of the underlying contracts. The Company may enter into contracts in which the standalone selling prices ("SSP") is different from the amount the Company is entitled to bill the customer. As of December 31, 2018, deferred product revenue in the amount of $0.5 million associated primarily with billings in excess of SSP. Product revenues consist of revenues generated from sales of the Company's products to distributors and direct customers, net of rebates and cash discounts.

For the year ended December 31, 2018, the adoption of this standard had a material impact on the Company's consolidated financial statements, and it is expected to have a material impact on future periods, because the Company

will no longer recognize revenue on a sell-through basis. The adoption also resulted in a change in accounting method for income tax purposes, the impact of which was not material to the Company's overall income taxes. See Note 11.

The cumulative effect of the changes made to the Company's consolidated balance sheet on January 1, 2018 for the adoption of the new revenue standard was as follows (in thousands):

BALANCE SHEET	As Reported December 31, 2017	Adjustments Due to ASC 606	**Balance at January 1, 2018**
ASSETS			
Deferred cost of product revenues	$3,063	$ (3,058)	$5
LIABILITIES AND STOCKHOLDERS' EQUITY			
Deferred revenue, current portion	6,193	(5,893)	300
Deferred revenue, less current portion	2,046	524	2,570
Accumulated deficit	$(265,572)	$ 2,311	$(263,261)

85

In accordance with the new revenue standard requirements, the disclosure of the impact of adoption on the Company's Consolidated Balance Sheet and Consolidated Statement of Operations was as follows (in thousands):

	DECEMBER 31, 2018		
BALANCE SHEET	As Reported	Impacts Due to ASC 606	Results without Impact of ASC 606
ASSETS			
Deferred cost of product revenues	$4	$2,285	$2,289
LIABILITIES AND STOCKHOLDERS' EQUITY			
Deferred revenue, current portion	438	4,518	4,956
Deferred revenue, less current portion	2,399	(604)	1,795
Accumulated deficit	$(283,474)	$(1,629)	$(285,103)

	For the YEAR ENDED DECEMBER 31, 2018		
STATEMENT OF OPERATIONS	As Reported	Impacts Due to ASC 606	Results without Impact of ASC 606
Revenues			
Product	$20,775	$1,327	$22,102
License	445	(182)	263
Cost of product revenues	10,907	773	11,680
Interest expense	(2,057)	310	(1,747)
Net loss	$(20,213)	$682	$(19,531)
Basic and Diluted net loss per common share:	$(0.20)	$0.01	$(0.19)

Product Sales. The Company recognizes revenue for product sales at a point in time following the transfer of control of such products to the customers, which typically occurs upon shipment or delivery depending on the terms of the underlying contracts. The Company may enter into contracts in which the standalone selling prices ("SSP") is different from the amount the Company is entitled to bill the customer. As of December 31, 2018, the Company had deferred product revenue in the amount of $457,000 associated primarily with billings in excess of SSP.

Licenses Revenues. The Company recognizes license revenues pursuant to strategic collaboration and distribution agreements under which the Company receives payments for the achievement of certain testing validation, regulatory progress and commercialization events. As these activities and payments are associated with exclusive rights that the Company provides in connection with strategic collaboration and distribution agreements over the term of the agreements, revenues related to the payments received are deferred and recognized over the term of the exclusive distribution period of the respective agreement. As of December 31, 2018 and 2017, the Company has received an

aggregate of $4.1 million and $3.9 million in payments under these strategic collaboration and distribution agreements of which $0.4 million and $0.2 million, respectively was recognized as of December 31, 2018 and 2017. In addition to the amounts already received, an additional $0.8 million in payments under these agreements could potentially receive if certain testing validation, regulatory progress and commercialization events occur.

Financing Component Revenues. The Company recognizes a financing component, if material, when the Company receives consideration from the customer, and when the Company expects control of the product or service to be transferred to the customer in a period of greater than one year from the date of receipt of the consideration. As such, the financing component is determined to be long-term and therefore recorded in the consolidated balance sheet as part of deferred revenues. As of December 31, 2018 the Company recognized $0.2 million of financing revenues.

Revenue recognition requires the Company to make a number of estimates that include variable consideration. For example, customers may receive sales or volume-based pricing incentives or receive incentives for providing the Company with marketing-related information. The Company makes estimates surrounding variable consideration and the net impact to revenues. In making such estimates, significant judgment is required to evaluate assumptions related to the amount of net contract revenues, including the impact of any performance incentives and the likelihood that customers will achieve them. In the event estimates related to variable consideration change, the cumulative effect of these changes is recognized as if the revised estimates had been used since revenue was initially recognized under the contract. Such revisions could occur in any reporting period, and the effects may be material.

From time to time, the Company offers certain product rebates to its distributors and growers, which are estimated and recorded as reductions to product revenues, and an accrued liability is recorded at the later of when the revenues are recorded, or the rebate is being offered.

Contract Assets. The Company does not have contract assets since revenue is recognized as control of goods are transferred or as services are performed or such contract assets are incurred or expensed within one year of the recognition of the revenue.

Contract Liabilities. The contract liabilities consist of deferred revenue. The Company classifies deferred revenue as current or noncurrent based on the timing of when the Company expects to recognize revenue. Generally, all contract liabilities, excluding deferred revenue, are expected to be recognized within one year and are included in accounts payable in the Company's consolidated balance sheet.

Research, Development and Patent Expenses

Research and development expenses include payroll-related expenses, field trial costs, toxicology costs, regulatory costs, consulting costs and lab costs. Patent expenses include legal costs relating to the patents and patent filing costs. These costs are expensed to operations as incurred. During the years ended December 31, 2018 and 2017, research and development expenses totaled $9,681,000 and $9,711,000, respectively, and patent expenses totaled $981,000 and $1,109,000, respectively.

Shipping and Handling Costs

Amounts billed for shipping and handling are included as a component of product revenues. Related costs for shipping and handling have been included as a component of cost of product revenues. Shipping and handling costs for the year ended December 31, 2018 and 2017 were $837,000 and $488,000, respectively.

Advertising

The Company expenses advertising costs as incurred. Advertising costs for the years ended December 31, 2018 and 2017 were $1,022,000 and $386,000, respectively.

Share-Based Compensation

The Company recognizes share-based compensation expense for all stock options and restricted stock units granted to employees and directors based on estimated fair values.

The Company estimates the fair value of restricted stock units based on the closing bid price of the Company's common stock on the date of grant.

The Company estimates the fair value of stock options on the date of grant using an option-pricing model. The value of the portion of the stock options that is ultimately expected to vest is recognized as expense on a straight-line basis over the requisite service period. Forfeitures are estimated on the date of grant and revised, if necessary, in subsequent periods if actual forfeitures differ from those estimates.

The Company uses the Black-Scholes-Merton option-pricing model to calculate the estimated fair value of stock options on the measurement date (generally, the date of grant). The required inputs in the option-pricing model include the expected life of the stock options, estimated volatility factor, risk-free interest rate and expected dividend yield. These inputs are subjective and generally require significant judgment. During the years ended December 31, 2018 and 2017, the Company calculated the fair value of stock options granted based on the following assumptions:

	YEAR ENDED DECEMBER 31,	
	2018	2017
Expected life (years)	2.51-6.08	6.08
Estimated volatility factor	53%-58 %	43%-45 %
Risk-free interest rate	2.42%-2.98%	1.82%-2.30%
Expected dividend yield	—	—

Expected Life. Expected life represents the period that share-based payment awards are expected to be outstanding. The Company uses the "simplified method" in accordance with Staff Accounting Bulletin ("SAB") No. 107, *Share-Based Payment* ("SAB No. 107"), and SAB No. 110, *Simplified Method for Plain Vanilla Share Options* ("SAB No. 110"), to calculate the expected term of stock options determined to be "plain vanilla." Under this approach, the expected term is presumed to be the midpoint between the vesting date and the contractual end of the stock option grant. For stock options granted with an exercise price not equal to the determined fair value, the Company estimates the expected life based on historical data and management's expectations about exercises and post-vesting termination behavior. The Company will use the simplified method until it has sufficient historical data necessary to provide a reasonable estimate of expected life in accordance with SAB No. 107 and SAB No. 110.

Estimated Volatility Factor. From the Company's inception as a public company through December 31, 2017, as the Company's common stock had limited trading history, the Company calculated the estimated volatility factor based on the trading history and calculated volatility of the common stock of comparable agricultural biotechnology companies. Beginning January 1, 2018, the Company began the use of a methodology giving weight to both the volatility of its common stock and the volatility of the common stock of comparable agricultural biotechnology companies.

Risk-Free Interest Rate. The Company calculates the risk-free interest rate based on the implied yield currently available on U.S. Treasury constant-maturity securities with the same or substantially equivalent remaining term as the expected life of the stock options.

Expected Dividend Yield. The Company has not declared dividends, nor does it expect to in the foreseeable future. Therefore, a zero value was assumed for the expected dividend yield.

Estimated Forfeitures. The Company considers voluntary and involuntary termination behavior and actual stock option forfeitures when estimating forfeitures. If, in the future, the Company determines that other methods for calculating these assumptions are more reasonable, or if other methods are prescribed by authoritative guidance, the fair value calculated for the Company's stock options could change significantly. Higher volatility factors and longer expected lives result in an increase to the share-based compensation expense determined at the date of grant. Share-based compensation expense is recorded in the Company's research, development and patent expense and selling, general and administrative expense.

Warrants

The warrants granted in connection with the February 2018 Financing Transactions were accounted for in equity. In connection with the February 2018 Financing Transactions, the Company estimated the fair value of the warrants issued using an Option Pricing Model. The fair value is subjective and is affected by certain significant inputs to the valuation model, which are disclosed in the table below.

	FEBRUARY 5, 2018	
Contractual life (years)	2.9	
Estimated volatility factor	55	%
Risk-free interest rate	2.13	%
Expected dividend yield	—	

Contractual Life. Contractual life represents the period that the warrants are expected to be outstanding and are commensurate with the contractual terms in the agreements.

Estimated Volatility Factor. During the first three, six and nine months of 2018, the Company valued the warrants using estimated volatility factor based on the trading history and calculated volatility of the common stock of comparable agricultural biotechnology companies. It was determined the lack of consideration for the volatility of the Company's common stock and the comparable agricultural biotechnology companies used in reporting for such periods was an error. The inputs in the valuation model above reflect the estimated volatility giving weight to both the volatility of the Company's common stock and the volatility of the common stock of comparable agricultural biotechnology companies. Refer to Footnote 16.

Risk-Free Interest Rate. The Company calculates the risk-free interest rate based on the implied yield currently available on U.S. Treasury constant-maturity securities with the same or substantially equivalent remaining term as the expected life of the stock options.

Expected Dividend Yield. The Company has not declared dividends, nor does it expect to in the foreseeable future. Therefore, a zero value was assumed for the expected dividend yield.

Income Taxes

The Tax Cuts and Jobs Act (the "TCJA") was enacted on December 22, 2017. The Act reduces the US federal corporate tax rate from 35% to 21%. As of December 31, 2018, the Company completed the accounting for the tax effects of the TCJA. The most significant impact of the legislation for the Company was a $27,971,000 reduction of the value of the Company's net deferred tax assets (which represent future tax benefits. As all deferred tax assets were fully offset by a valuation allowance, the impact of the TCJA also reduced the Company's valuation allowance by $27,971,000.

The Company uses the asset and liability method of accounting for income taxes. Deferred tax assets and liabilities are recognized for the estimated future tax consequences attributable to the differences between the consolidated financial statement carrying amounts of existing assets and liabilities and their respective tax bases. Deferred tax assets and liabilities are measured using enacted tax rates expected to apply to taxable income in the years in which those temporary differences are expected to be recovered or settled. To the extent that deferred tax assets cannot be recognized under the preceding criteria, the Company establishes valuation allowances, as necessary, to reduce deferred tax assets to the amounts expected to be realized.

As of December 31, 2018 and 2017, all deferred tax assets were fully offset by a valuation allowance. The realization of deferred tax assets is dependent upon future federal, state and foreign taxable income. The Company's judgments regarding deferred tax assets may change due to future market conditions, as the Company expands into international jurisdictions, due to changes in U.S. or international tax laws and other factors.

These changes, if any, may require material adjustments to the Company's deferred tax assets, resulting in a reduction in net income or an increase in net loss in the period in which such determinations are made. The Company recognizes liabilities for uncertain tax positions based upon a two-step process. To the extent that a tax position does not meet a more-likely-than-not level of certainty, no benefit is recognized in the consolidated financial statements. If a tax position meets the more-likely-than-not level of certainty, it is recognized in the consolidated financial statements at the largest amount that has a greater than 50% likelihood of being realized upon ultimate settlement. The Company's policy is to analyze the Company's tax positions taken with respect to all applicable income tax issues for all open tax years in each respective jurisdiction. As of December 31, 2018 and 2017, the Company concluded that there were no

additional uncertain tax positions were required to be recognized in its consolidated financial statements.

The Company recognizes interest and penalties related to income tax matters in income tax expense. No amounts were recognized for interest and penalties during the years ended December 31, 2018 and 2017.

Comprehensive Loss

Comprehensive loss represents the net loss for the period adjusted for the results of certain changes to stockholders' equity (deficit) that are not reflected in the consolidated statements of operations, if applicable. From time to time the Company is impacted by foreign currency translation in the receipt of payment from customers and payment to vendors. These amounts are not material, and net loss is the only component of the Company's comprehensive loss for the periods presented.

Segment Information

The Company is organized as a single operating segment, whereby its chief operating decision maker assesses the performance of and allocates resources to the business as a whole.

Recently Adopted Accounting Pronouncements

In May 2014, the FASB issued Accounting Standards Update No. 2014-09, *Revenue from Contracts with Customers* (Topic 606) ("ASU 2014-09"). ASU 2014-09 and its related amendments provide new, globally applicable converged guidance concerning recognition and measurement of revenue. The new guidance requires the application of a five-step model to determine the amount and timing of revenue to be recognized. The underlying principle is that revenue is to be recognized for the transfer of goods or services to customers that reflects the amount of consideration that the Company expects to be entitled to in exchange for those goods or services. Additionally, significant additional disclosures are required about the nature, amount, timing and uncertainty of revenue and cash flows arising from contracts with customers. The new guidance is effective for annual and interim periods beginning on or after December 15, 2017. ASU 2014-09 allows for either full retrospective or modified retrospective adoption. The full retrospective method requires ASU 2014-09 be applied to each prior period presented in the year of adoption and the cumulative effect of adoption would be reflected at the beginning of the year of adoption. The modified retrospective method has the cumulative effect of applying ASU 2014-09 at the beginning of the year of adoption.

On January 1, 2018 the Company adopted ASU 2014-09, using the modified-retrospective method. This adoption primarily affected the Company's product revenues accounted for using the sell-through method under ASC 605, Revenue Recognition, and also the accounting for variable consideration in the form of customer incentives. Generally, under the ASU, the Company is required to recognize revenue and profit from its product sales arrangements earlier and in a more linear fashion than historical practice under ASC 605, including the estimation of sell-through revenue and variable consideration that would otherwise have been deferred. Following the adoption of ASU 2014-09, the revenue recognition for the Company's license arrangements remained materially consistent with its historical practice. See "Revenue Recognition" above for further discussion of the effects of the adoption of ASU 2014-09 on the Company's significant accounting policies. The adoption of this standard had a material impact on the Company's consolidated financial statements as disclosed above and is expected, to continue to have a material impact for the foreseeable future.

In August 2016, the FASB issued Accounting Standards Update No. 2016-15, Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments ("ASU 2016-15"). The amendments in this update clarify how certain cash receipts and cash payments are presented and classified in the statement of cash flows. ASU No. 2016-15 will be effective for fiscal years beginning after December 15, 2017, with early adoption permitted. On January 1, 2018 the Company adopted Accounting Standards Update No. 2016-15, Statement of Cash Flows (Topic 230): Classification of Certain Cash Receipts and Cash Payments ("ASU 2016-15"). The adoption of this standard did

not have a material impact on the consolidated financial statements and is not expected to have a material impact on future periods.

In August 2016, the FASB issued Accounting Standards Update No. 2016-18, Statement of Cash Flows (Topic 230): Restricted Cash ("ASU 2016-18"). The amendment requires that the statement of cash flows explain the change during the period in the total cash, cash equivalents, and amounts generally described as restricted cash or restricted cash equivalents. On January 1, 2018, the Company adopted ASU 2016-18. The adoption primarily resulted in the inclusion of the restricted cash balances within the overall cash balances and a reconciliation of cash, cash equivalents and restricted cash reported on the consolidated balance sheet. The adoption of this standard did not have a material impact on the consolidated financial statements and is not expected to have a material impact for the foreseeable future. See "Cash and Cash Equivalents and Restricted Cash" above for further discussion of the effects of the adoption of ASU 2016-18 on the Company's significant accounting policies.

In July 2017, the FASB issued ASU No. 2017-11, "Earnings Per Share (Topic 260); Distinguishing Liabilities from Equity (Topic 480); Derivatives and Hedging (Topic 815), (Part I) Accounting for Certain Financial Instruments with Down Round Features, (Part II) Replacement of the Indefinite Deferral for Mandatorily Redeemable Financial Instruments of Certain Nonpublic Entities and Certain Mandatorily Redeemable Noncontrolling Interests with a Scope Exception," (ASU No. 2017-11) which allows for the exclusion of a down round feature, when evaluating whether or not an instrument or embedded feature requires derivative classification. The Company early adopted this guidance beginning January 1, 2018. The adoption of this standard had a material impact on the Company's consolidated financial statements as the Company was not required to classify the warrants issued in conjunction with the February 5, 2018 Financing Transactions as derivatives.

In March 2018, the FASB issued ASU No. 2018-05, “Income Taxes (Topic 740)—Amendments to SEC Paragraphs Pursuant to SEC Staff Accounting Bulletin No. 118,” (ASU No. 2018-05) which amends certain Securities and Exchange Commission (SEC) material in Topic 740 for the income tax accounting implications of the recently issued Tax Reform. This guidance clarifies the application of Topic 740 in situations where a registrant does not have the necessary information available, prepared, or analyzed in reasonable detail to complete the accounting under Topic 740 for certain income tax effects of Tax Reform for the reporting period in which Tax Reform was enacted. The adoption of this guidance did not have a material impact on the consolidated financial statements of the Company. In March 2018, the Financial Accounting Standards Board (“FASB”) issued guidance pertaining to the accounting of the TCJA, allowing companies a year to finalize and record any provisional or inestimable impacts of the TCJA. This guidance is effective upon issuance. The Company has completed its analysis related to the adoption of this particular guidance, and it did not have a material effect on the Company’s consolidated financial statements.

In June 2018, the FASB issued ASU No. 2018-07, “Compensation – Stock Compensation (Topic 718); Improvements to Nonemployee Share Based Payment Accounting” (ASU No. 2018-07) which aligned certain aspects of share-based payments accounting between employees and nonemployees. Specifically nonemployee share-based payment awards within the scope of Topic 718 are measured at grant-date fair value of the equity instruments that an entity is obligated to issue when the good has been delivered or the service has been rendered and any other conditions necessary to earn the right to benefit from the instruments have been satisfied and an entity considers the probability of satisfying performance conditions when nonemployee share-based payment awards contain such conditions. The Company early adopted this guidance beginning January 1, 2018 using the modified –retrospective method. The adoption of this standard did not have a material impact on the consolidated financial statements.

In June 2018, the SEC adopted the final rule under SEC Release No. 33-10513, “Amendments to Smaller Reporting Company Definition”, amending the thresholds in smaller reporting company (“SRC”) definition, thereby expanding the number of smaller companies eligible to comply with the scaled disclosure requirements in several Regulation S-K and Regulation S-X Items. This final rule is effective on September 10, 2018. The Company has applied the new guidance to its consolidated financial statements for fiscal year ended 2018, and in connection with the application of the final rule has elected to reflect scaled disclosures as part of these consolidated financial statements.

Recently Issued Accounting Pronouncements

In February 2016, the FASB issued Accounting Standards Update No. 2016-02, Leases (Topic 842) Leases: Amendments to the FASB Accounting Standards Codifications (“ASU 2016-02”), to increase transparency and comparability among organizations by recognizing lease assets and lease liabilities on the balance sheet and disclosing key information about leasing arrangements. ASU 2016-02 is effective for public companies for consolidated financial statements issued for fiscal years beginning after December 15, 2018, including interim periods within those fiscal years. Early adoption is permitted. Companies must apply a modified retrospective transition approach for leases existing at, or entered into after, the beginning of the earliest comparative period presented in the consolidated financial statements. The modified retrospective approach would not require any transition accounting for leases that expired before the earliest comparative period presented. Lessees and lessors may not apply a full retrospective

transition approach. The Company is currently evaluating ASU 2016-02, and related ASUs issued after February 2016, including Accounting Standard Update No. 2018-10, Codification Improvements to Topic 842, Leases (“ASU 2018-10”) and Accounting Standard Update No. 2018-11, Leases (Topic 842): Targeted Improvement (“ASU 2018-11”) issued in July 2018 to determine the potential impact to its consolidated financial statements and related disclosures.
ASU 2018-20

The Company will adopt ASU 2016-02 in the first quarter of 2019 under a modified retrospective transition method. The Company has assessed significant impacts of the new guidance on its accounting policies and procedures and has evaluated the new requirements as applied to existing leasing arrangements. The Company believes the most significant impact will relate to the recording of right of use assets and corresponding lease liability identified in connection with the Company’s lease arrangements. As of December 31, 2018, the Company has two building leases classified as operating leases and two subleases in which the Company is the Lessor. When the Company adopts the leasing standard, the Company estimates that the impacts to the consolidated financial statements will be material. In addition, the new guidance is currently expected to result in expanded disclosures related to the terms of the Company’s leasing arrangements beyond those currently made in these consolidated financial statements. The Company is still in the process of estimating the necessary adjustments associated with ASU 2016-02. The Company will likely adopt the practical expedients available under ASU 2016-02 but that determination is not yet finalized. The Company is also in the process of implemented updates to its business processes, systems and controls in connection with the adoption of ASU 2016-02.

In June 2016, the FASB issued Accounting Standards Update No. 2016-13, Financial Instruments—Credit Losses (Topic 326): Measurement of Credit Losses on Financial Instruments ("ASU 2016-13"). ASU 2016-13 introduces a new forward-looking approach, based on expected losses, to estimate credit losses on certain types of financial instruments, including trade receivables. The estimate of expected credit losses will require entities to incorporate considerations of historical information, current information and reasonable and supportable forecasts. ASU 2016-13 also expands the disclosure requirements to enable users of consolidated financial statements to understand the entity's assumptions, models and methods for estimating expected credit losses. For public business entities that meet the definition of a Securities and Exchange Commission filer, ASU 2016-13 is effective for annual and interim reporting periods beginning after December 15, 2019, and the guidance is to be applied using the modified-retrospective approach. Earlier adoption is permitted for annual and interim reporting periods beginning after December 15, 2018. In November 2018, the FASB issued ASU No. 2018-19, "Codification Improvements to Topic 326, Financial Instruments – Credit Losses," (ASU No. 2018-19), which clarifies that operating lease receivables arising from operating leases are not within the scope of Topic 326-20. The provisions of ASU No. 2018-19 are effective consistent with ASU No. 2016-13. The Company is currently evaluating both ASU 2016-13 and ASU 2018-19 to determine the impact to its consolidated financial statements and related disclosures.

In August 2018, the FASB issued ASU No. 2018-13, "Fair Value Measurement (Topic 820)," (ASU No. 2018-13), which modifies the disclosure requirements on fair value measurements in Topic 820, Fair Value Measurement. The provisions of ASU No. 2018-13 are effective for annual reporting periods beginning after December 15, 2019 and interim reporting periods within those annual periods, with early adoption permitted. Amendments on changes in unrealized gains and losses, the range and weighted average of significant unobservable inputs used to develop Level 3 fair value measurements, and the narrative description of measurements uncertainty should be applied prospectively for only the most recent interim or annual periods presented in the initial year of adoption with all other amendments applied retroactively to all periods presented upon their effective date. The Company has not yet determined the impact of implementing this new standard on the consolidated financial statements.

In August 2018, the FASB issued ASU No. 2018-15, "Intangibles – Goodwill and Other-Internal-Use Software (Subtopic 350-40)," (ASU No. 2018-15), which aligns the requirements for capitalizing implementation costs incurred in a hosting arrangement that is a service contract with the requirements for capitalizing implementation costs incurred to develop or obtain internal-use software. The provisions of ASU No. 2018-15 are effective for annual reporting periods beginning after December 15, 2019 and interim reporting periods within those annual periods, with early adoption permitted. This ASU shall be applied either retrospectively or prospectively to all implementation costs incurred after the date of adoption. The Company has not yet determined the impact of implementing this new standard on the consolidated financial statements.

In November 2018, the FASB issued ASU No. 2018-18, "Collaborative Arrangements (Topic 808): Clarifying the Interactions between Topic 808 and Topic 606" (ASU No. 2018-18), which clarifies certain transactions between collaborative arrangement participants should be accounted for as revenue under Topic 606 when the collaborative arrangement participant is a customer in the context of a unit of account including aligning Topic 808 with the guidance in Topic 606. The provisions of ASU No. 2018-18 are effective for annual reporting periods beginning after December 15, 2019 and interim reporting periods within those annual periods, with early adoption permitted, including adoption in any interim period for public business entities for periods for which consolidated financial

statements have not yet be issued. This ASU shall be applied retrospectively to the date of initial application of Topic 606. The Company has not yet determined the impact of implementing this new standard on the consolidated financial statements.

3. Property, Plant and Equipment

Property, plant and equipment consist of the following (in thousands):

	DECEMBER 31,	
	2018	2017
Land	$1	$1
Buildings	6,528	6,528
Computer equipment and software	528	522
Furniture, fixtures and office equipment	347	343
Machinery and equipment	15,701	15,302
Leasehold improvements	2,373	2,373
Construction in progress	95	218
	25,573	25,287
Less accumulated depreciation	(11,061)	(9,271)
	$14,512	$16,016

The Company recognized depreciation and amortization expense during the years ended December 31, 2018 and 2017 of $1,890,000 and $2,044,000, respectively, inclusive of amortization expense related to assets disposed of during the period and related to capital leases (See Note 6). During December 31, 2018 and 2017 the Company disposed of $0.1 and $.5 million in property, plant, and equipment.

4. Net Loss per Share

Basic net loss per share is calculated by dividing the net loss attributable to common stockholders by the weighted average number of common shares outstanding during the period. Diluted net loss per share reflects the potential dilution that could occur if securities or other contracts to issue common stock, such as stock options, restricted stock units, convertible notes, convertible preferred stock and warrants, result in the issuance of common stock which share in the losses of the Company. Certain potential shares of common stock have been excluded from the computation of diluted net loss per share for certain periods as their effect would be anti-dilutive. Such potentially dilutive shares are excluded when the effect would be to reduce the loss per share. The treasury stock method has been applied to determine the dilutive effect of warrants.

The following table sets forth the potential shares of common stock as of the end of each period presented that are not included in the calculation of diluted net loss per share because to do so would be anti-dilutive (in thousands):

	DECEMBER 31,	
	2018	2017
Stock options outstanding	7,136	3,121
Warrants to purchase common stock	52,647	4,232
Restricted stock units outstanding	1,146	822
Convertible notes payable	—	4,005
Common shares to be issued in lieu of agent fees	498	—
	61,427	12,180

93

5. Accrued Liabilities

Accrued liabilities consist of the following (in thousands):

	DECEMBER 31,	
	2018	2017
Accrued compensation	$2,570	$1,825
Accrued warranty costs	320	556
Accrued legal costs	69	1,558
Accrued customer incentives	2,170	1,986
Accrued liabilities, other	1,742	2,264
	$6,871	$8,189

The Company warrants the specifications and/or performance of its products through implied product warranties and has extended product warranties to qualifying customers on a contractual basis. The Company estimates the costs that may be incurred during the warranty period and records a liability in the amount of such costs at the time product is shipped. The Company's estimate is based on historical experience and estimates of future warranty costs as a result of increasing usage of the Company's products. The Company periodically assesses the adequacy of its recorded warranty liability and adjusts the amount as necessary. Changes in the Company's accrued warranty costs during the period are as follows (in thousands):

Balance at December 31, 2017	$556
Warranties issued (released) during the period	(202)
Settlements made during the period	(34)
Balance at December 31, 2018	$320

6. Debt

Debt, including debt due to related parties, consists of the following (in thousands):

	DECEMBER 31,	
	2018	2017
Secured promissory notes ("October 2012 and April 2013 Secured Promissory Notes") bearing interest at 8.00% per annum, interest and principal due at maturity (December 31, 2022), collateralized by substantially all of the Company's assets, net of unamortized debt discount as of	$3,425	$12,347

December 31, 2018 and December 31, 2017 of $0 and $103, respectively		
Secured promissory note (“June 2014 Secured Promissory Note”) bearing interest at prime plus 2% (7.25% as of December 31, 2018) per annum, payable monthly through June 2036, collateralized by certain of the Company’s deposit accounts and MMM LLC’s inventories, chattel paper, accounts, equipment and general intangibles, net of unamortized debt discount as of December 31, 2018 and December 31, 2017 of $205 and $226, respectively, discount is based on effective interest rate of 7.02%	8,639	8,872
Senior secured convertible promissory notes (“Secured December 2017 Convertible Note”) bearing interest at 10% per annum, interest and principal through the conversion date in February 2018, collateralized by substantially all of the Company’s assets, net of unamortized discount as of December 31, 2018 and December 31, 2017 of $0 and $510, respectively	—	3,490
Secured revolving borrowing (“LSQ Financing”) bearing interest at (12.8% annually) payable through the lenders direct collection of certain accounts receivable through June 2019, collateralized by substantially all of the Company’s personal property, net of unamortized debt discount as of December 31, 2018 and December 31, 2017 of $0 and $54, respectively, with an effective interest rate of 18.41%.	2,073	1,222
Senior secured promissory notes due to related parties (“August 2015 Senior Secured Promissory Notes”) bearing interest at 8% per annum, interest and principal payable at maturity (December 31, 2022), collateralized by substantially all of the Company’s assets, net of unamortized discount as of December 31, 2018 and December 31, 2017 of $0 and $2,178, respectively debt discount is based on imputed interest rate of 0% (see Note 13 and 15)	7,300	37,822
Debt, including debt due to related parties	21,437	63,753
Less debt due to related parties, non-current	(7,300)	(37,822)
Less current portion	(2,318)	(1,524)
Debt, non-current	$11,819	$24,407

As of December 31, 2018, aggregate contractual future principal payments on the Company's debt, including debt due to related parties, are due as follows (in thousands):

Period ended December 31, 2018	Debt	Debt to Related Party
2019	$2,338	-
2020	283	-
2021	305	-
2022	2,778	5,000
2023	352	-
Thereafter	7,311	-
Total future principal payments	13,367	5,000
Interest payments included in debt balance [(1)]	976	2,300
	$14,343	7,300

(1) Due to the debt extinguishment requirement, the Company has included both accrued interest and future interest in the debt balance for certain outstanding debt, as further discussed in Notes 13 and 14.

The fair value of the Company's outstanding debt obligations, which excludes debt due to related parties, as of December 31, 2018 and 2017 was $14,137,000 and $21,133,000, respectively. For the October 2012 and April 2013 Secured Promissory Notes, the debt was valued by applying the ratio of the value of common stock the lender agreed to take as consideration in connection with the Securities Purchase Agreement (Note 15) and applying this ratio to the outstanding principal balance. The Company used 7.25%, the current interest rate, to value the variable rate debt. This debt is classified as Level 3 within the fair value hierarchy. The debt entered during 2017 was valued using the outstanding principal balance.

The following is a reconciliation of interest expense for the debt outstanding during the year ended December 31, 2018 and 2017 (in thousands):

	Expense	DECEMBER 31, 2018 Interest Related Party, Net	Non-cash
October 2012 and April 2013 Secured Promissory Notes	$ 213	$ —	$ 13

June 2014 Secured Promissory Note	638	—	21
Secured December 2017 Convertible Note [1]	529	—	480
LSQ Financing	361	—	57
August 2015 Senior Secured Promissory Note	—	451	113
ASC 606 Financing Component[2]	310	—	310
Other	6	—	—
	$ 2,057	$ 451	$ 994

95

	Expense	DECEMBER 31, 2017 Interest Related Party, Net	Non-cash
October 2012 and April 2013 Secured Promissory Notes	$ 1,925	$ —	$ 185
June 2014 Secured Promissory Note	574	—	23
Secured December 2017 Convertible Note [1]	288	—	71
LSQ Financing	438	—	162
August 2015 Senior Secured Promissory Note	—	4,355	1,155
Capital leases and other	149	—	—
	$ 3,374	$ 4,355	$ 1,596

(1) This agreement was terminated in February 2018

(2) The Company adopted ASC 606 on January 1, 2018.

October 2012 and April 2013 Secured Promissory Notes

On October 2, 2012, the Company borrowed $7,500,000 pursuant to senior notes (“October 2012 Secured Promissory Notes”) with a group of lenders. On April 10, 2013 (“Conversion Date”), the Company entered into an amendment to increase, by up to $5,000,000, the amount available under the terms of the loan agreement with respect to the October 2012 Secured Promissory Notes. Under this amendment, an additional $4,950,000 was issued in partial consideration for $3,700,000 in cash received and in partial conversion for the cancellation of a $1,250,000 subordinated convertible note (collectively, “April 2013 Secured Promissory Notes”). The total amount borrowed under the amended loan agreement for the October 2012 Secured Promissory Notes and the April 2013 Secured Promissory Notes increased from $7,500,000 to $12,450,000 as of the Conversion Date. The October 2012 and April 2013 Secured Promissory Notes bore interest at 14% at until February 5, 2018.

On February 5, 2018, the Company converted, pursuant to an amendment, dated December 15, 2017, to the October 2012 and April 2013 Secured Promissory Notes, $10,000,000 aggregate principal amount of indebtedness outstanding under the October 2012 and April 2013 Secured Promissory Notes to an aggregate of 5,714,285 shares of common stock and warrants to purchase 1,142,856 shares of common stock (such conversion, the “Snyder Debt Conversion”), such that $2,450,000 of principal under the October 2012 and April 2013 Secured Promissory Notes is outstanding as of December 31, 2018. Simultaneously with the Snyder Debt Conversion, the maturity of the October 2012 and April 2013 Secured Promissory Notes was extended to December 31, 2022 (“Maturity Date”), the interest was reduced from 14% to 8% and all interest payments under the October 2012 and April 2013 Secured Promissory Notes were deferred to the Maturity Date. This loan is collateralized by substantially all of the Company’s assets. The October 2012 and April 2013 Secured Promissory Notes contain representations and warranties by the Company and the lender, certain indemnification provisions in favor of the lenders and customary covenants (including limitations on other debt, liens,

acquisitions, investments and dividends), and events of default (including payment defaults, breaches of covenants, a material impairment in the lender's security interest or in the collateral, and events relating to bankruptcy or insolvency). The October 2012 and April 2013 Secured Promissory Notes contain several restrictive covenants. The Company is in compliance with all related covenants, or has received an appropriate waiver of these covenants.

In conjunction with the Snyder Debt Conversion, the Company accounted for the partial debt extinguishment under the troubled debt restructuring accounting guidance. The Company recognized a gain of $3,015,000 for the year ended December 31, 2018 on partial extinguishment of the October 2012 and April 2013 Secured Promissory Notes, which included the recognition of the debt discount. Because the Company recognized a gain on the partial extinguishment of debt, the Company was required to include all future interest and additional consideration, which included accrued interest, under the terms of this agreement as a reduction of the gain. As a result, the amount of the debt on the Company's consolidated balance sheet related to the October 2012 and April 2013 Secured Promissory Notes is $3,425,000, as compared to $2,450,000 of contractual principal outstanding thereunder. Going forward, subject to future amendments to debt agreement or costs, the Company will not recognize future interest expense on the October 2012 and April 2013 Secured Promissory Notes.

The accounting for the change due to the Snyder Debt Conversion is as follows (in thousands):

Principal (pre-conversion)	$12,450
Discount (pre-conversion)	(134)
Consideration of common stock and warrants provided at conversion	(6,196)
Gain on extinguishment	(2,695)
Principal and future interest at December 31, 2018	$3,425

Additionally, in conjunction with the terms of the October 2012 Secured Promissory Notes and the April 2013 Secured Promissory Notes, the Company agreed to pay a fee of 7% of the funded principal amount to the agent that facilitated the 2018 February Financing Transactions between the Company and the collective lenders. As part of the Snyder Debt Conversion, the Company renegotiated the Agent Fee, which resulted in 498,000 shares to the Company's common stock in lieu of a cash payment for services. These shares are issuable at the Maturity Date of the note. The Company has included this liability in other non-current liabilities. The change in the value of the agent fee and the fair value of the common stock granted in lieu of cash was also included in the gain on partial extinguishment of debt as follows:

Agent fee, included in other liabilities, long term (pre-conversion)	$827
Gain on extinguishment	(319)
Agent fee payable in common shares	$508

June 2014 Secured Promissory Note

In June 2014, the Company borrowed $10,000,000 pursuant to a business loan agreement and promissory note ("June 2014 Secured Promissory Note") with Five Star Bank ("Lender") which bears interest at 7.25% as of December 31, 2018. The interest rate is subject to change and is based on the prime rate plus 2.00% per annum. The June 2014 Secured Promissory Note is repayable in monthly payments of $73,695 and adjusted from time-to-time as the interest rate changes, with the final payment due in June 2036. Certain of the Company's deposit accounts and MMM LLC's inventories, chattel paper, accounts, equipment and general intangibles have been pledged as collateral for the promissory note. The Company is required to maintain a deposit balance with the Lender of $1,560,000, which is recorded as restricted cash included in non-current assets. In addition, until the Company provides documentation that the proceeds were used for construction of the Company's manufacturing plant, proceeds from the loan will be maintained in a restricted deposit account with the Lender.

The Company may prepay 20% of the outstanding principal loan balance each year without penalty. A prepayment fee of 10% will be charged if prepayments exceed 20% in the first year, and the prepayment fee will decrease by 1% each year for the first ten years of the loan.

Under this note the Company is required to maintain a current ratio of not less than 1.25-to-1.0, a debt-to-worth ratio of no greater than 4.0-to-1.0 and a loan-to-value ratio of no greater than 70% as determined by Five Star Bank. The Company is also required to comply with certain affirmative and negative covenants under the loan agreement discussed above. In the event of default on the debt, Five Star Bank may declare the entire unpaid principal and interest immediately due and payable. As of December 31, 2018, the Company was in compliance with each of these covenants (the current ratio, debt to worth ratio, and a loan-to-value ratio of no greater than 70%), however would not be in compliance with the material adverse situation given the Company's current going concern assessment and compensation limitation increases. As such, the Company has obtained a waiver from the lender for the non-compliance through November 15, 2020.

The following table reflects the activity under this note:

Principal balance, net at December 31, 2017	$8,872
Payments	(868)
Interest	614
Debt discount amortization	21
Principal balance, net at December 31, 2018	8,639

LSQ Financing

On March 24, 2017, the Company entered into an Invoice Purchase Agreement (the "LSQ Financing") with LSQ Funding Group, L.C. ("LSQ"), pursuant to which LSQ may elect to purchase up to $7,000,000 of eligible customer invoices from the Company. The Company's obligations under the LSQ Financing are secured by a lien on substantially all of the Company's personal property; such lien is first priority with respect to the Company's accounts receivable, inventory, and related property, pursuant to an intercreditor agreement, dated March 22, 2017 (the "Three Party Intercreditor Agreement"), with administrative agents for the October 2012 and April 2013 Secured Promissory Notes holders and the August 2015 Senior Secured Promissory Notes holders.

Advances by LSQ may be made at an advance rate of up to 80% of the face value of the receivables being sold. Upon the sale of the receivable, the Company will not maintain servicing. LSQ may require the Company to repurchase accounts receivable if (i) the payment is disputed by the account debtor, with the purchaser being under no obligation to determine the bona fides of such dispute, (ii) the account debtor has become insolvent or (iii) upon the effective date of the termination of the LSQ Financing. LSQ will retain its security interest in any accounts repurchased from the Company.

The Company will also pay to LSQ (i) an invoice purchase fee equal to 1% of the face amount of each purchased invoice, at the time of the purchase, and (ii) a funds usage fee equal to 0.035%, payable monthly in arrears. An aging and collection fee is charged at the time when the purchased invoice is collected, calculated as a percentage of the face amount of such invoice while unpaid (which percentage ranges from 0% to 0.35% depending upon the duration the invoice remains outstanding). The LSQ Financing will be effective for one year with automatic one-year renewals thereafter unless terminated by the Company at least 60 and not greater than 90 days from the end of the then-effective term; a termination fee is due upon early termination by the Company if such termination is not requested within such 30-day window. LSQ may terminate this agreement with 30 days written notice at which time the LSQ Financing will be terminated at the earlier of the 30-day period, the end of the current term, or the end of the then renewal term. The events of default under the LSQ Financing include failure to pay amounts due, failure to turn over amounts due to LSQ within a cure period, breach of covenants, falsity of representations, and certain insolvency events. The Company incurred $215,000 in financing-related costs as part of the LSQ Financing that were recorded as a debt discount and amortized to interest expenses over the initial one-year term. The unamortized portion of these financing costs was $0 and $54,000 as of December 31, 2018 and 2017. In April 2017, the Company began receiving advances under the LSQ Financing.

In March 2018, the Company and LSQ amended the LSQ Financing agreement and extended the term for an additional 60 days. In June 2018, the Company amended the LSQ Financing arrangement which effectively (i) decreased the invoice purchase fee from 1.00% to a range of 0.40% to 1.00%, ii) decreased the funds usage fee from 0.035% to a range of 0.020% to 0.035% and (iii) extended the terms of the agreement to June 30, 2019.

There was $2,073,000 and $1,222,000, respectively, net of discount, in outstanding balance under the LSQ Financing as of December 31, 2018 and 2017. Upon sale of the receivable, the Company may elect to set up a reserve where upon the cash for the sale remains with the third-party and the Company can draw on the available amount on the reserve account at any time. Since April 2017, there were times when the Company elected to utilize the reserve account, and the Company had $0 and $4,000, respectively in excess funds available on the reserve account outstanding as of December 31, 2018 and 2017. As of December 31, 2018 and 2017, the Company had $2,693,000 and $2,931,000, respectively included in accounts receivable that were transferred under this arrangement.

Equipment Financing

On August 22, 2017, the Company signed an equipment financing agreement (“Equipment Financing Agreement”) to purchase certain equipment it had leased under a capital lease. This equipment is included in property, plant and equipment, and amortization of assets under capital leases is included in depreciation expense. The total borrowed under the Equipment Financing Agreement was $496,000. As of December 31, 2018 and 2017, the Company had no equipment acquired under capital leases and there was no balance outstanding under the Equipment Financing Agreement.

Secured Convertible Promissory Note

On October 12, 2017, the Company and Dwight W. Anderson ("Anderson") entered into a $1,000,000 convertible promissory note, which was restated in its entirety by a convertible promissory note entered into on October 23, 2017 (the "October 2017 Convertible Note"). The October 2017 Convertible Note was an unsecured promissory note in the aggregate principal amount of up to $6,000,000. The Company's ability to borrow under the October 2017 Convertible Note were subject to Anderson's approval and due on October 23, 2020 (the "Maturity Date"). Under the terms of the October 2017 Convertible Note, from the date of the closing through December 31, 2017, the October 2017 Convertible Note bore interest at a rate of 1% per annum, payable in arrears on the Maturity Date, unless earlier converted into shares of the Company's common stock. Thereafter, beginning January 1, 2018, the October 2017 Convertible Note bore interest at a rate of 10% per annum, payable in arrears on the Maturity Date, unless earlier converted into shares of the Company's common stock as described below.

Any or all of the principal or accrued interest under the October 2017 Convertible Note was convertible into shares of the Company's common stock at a rate of one share of common stock per $1.00 of converting principal or interest, rounded down to the nearest share with any fractional amounts cancelled, at the election of Anderson by delivery of written notice to the Company. In addition, upon the consummation of a qualified equity financing of the Company prior to the Maturity Date, the aggregate outstanding principal balance of the October 2017 Convertible Note and all accrued and unpaid interest thereon may convert, at the option of Anderson, into that number of the securities issued and sold in such financing, determined by dividing (a) such aggregate principal and accrued interest amounts, by (b) the purchase price per share or unit paid by the purchasers of the Company's securities issued and sold in such financing. Notwithstanding the foregoing, Anderson's ability to affect any such conversions will be limited by applicable provisions governing issuances of shares of the Company's common stock under the rules of The Nasdaq Capital Market, subject to the Company's receipt of any applicable waivers thereof, and any amounts not issuable to Anderson in the Company's equity securities as a result of this limitation will be payable in cash.

The Company recognized a discount on the October 2017 Convertible Note in the amount of incurred $578,000 as a result of a derivative liability associated with the embedded conversion option in this debt to be amortized to interest expenses over the expected remaining term of the note. The unamortized portion of these financing costs was $367,000 as of December 31, 2017.

On December 15, 2017, the Company entered into a securities purchase agreement (the "Purchase Agreement") with Anderson, affiliate of Anderson and certain other accredited investors (collectively, the "Buyers"). In conjunction with the transaction contemplated in the Purchase Agreement, Anderson was entitled to convert any portion of the balance outstanding under the October 2017 Convertible Note and any accrued interest into shares of the Company's common stock at a rate of one share of common stock per $0.50. Anderson's ability to affect conversions at the $0.50 rate was subject to, among other things, approval of the Company's stockholders, which was received on January 31, 2018.

On December 22, 2017, the Company and Anderson amended and restated in its entirety the terms of the October 2017 Convertible Note (“Secured December 2017 Convertible Note”). Under the amendment, the Secured December 2017 Promissory Note became a secured promissory note and the maturity date was reverted to the original terms, due on October 12, 2020 (the “Maturity Date”). The interest rate and conversion terms of the Secured December 2017 Convertible Note remain unchanged from the terms of the October 2017 Convertible Note as described above. As of December 31, 2017, the outstanding principal balance under the Secured December Convertible Note was $4,000,000, exclusive of a $510,000 discount.

In January 2018, the Company borrowed the remaining available principal under the Secured December 2017 Convertible Note of $2,000,000, exclusive of an additional derivative liability discount of $574,000.

On February 5, 2018, the holder converted the entire outstanding principal of $6,000,000 under the Secured December 2017 Convertible Note into 12,000,000 each common stock and warrants units in accordance with the terms of the Securities Purchase Agreement which provided for conversion of the outstanding balance at a rate of $0.50 per common share. Upon the conversion on February 5, 2018, the outstanding principal balance under the Secured December 2017 Convertible Note was reduced to zero (See Note 15).

The Company accounted for the full conversion of the Secured December 2017 Convertible Note using the accounting guidance related to an induced debt conversion. Under the induced conversion guidance, the Company recognized a loss on conversion in the amount of $11,634,000 associated with the change between the debt's original terms and the induced conversion terms. This loss related to the induced conversion feature was partially offset by a gain on extinguishment of $6,424,000 related to the fair value of the derivative liability on the date of conversion.

The following table reflects the accounting for the activities under the Secured December 2017 Convertible Note as follows (in thousands):

Principal (pre-conversion)	6,000
Discount (pre-conversion)	(791)
Consideration of common stock and warrants provided at conversion	(16,843)
Derivative liability extinguished	6,424
Loss on extinguishment	5,210
Balance at December 31, 2018	$-

7. Warrants

The following table summarizes information about the Company's common stock warrants outstanding as of December 31, 2018 (in thousands, except exercise price data):

DESCRIPTION	ISSUE DATE	EXPIRATION DATE	NUMBER OF SHARES SUBJECT TO WARRANTS ISSUED	EXERCISE PRICE
In connection with June 2013 Credit Facility (June 2013 Warrants)	June 2013	June 2023 (1)	27	$ 8.40
In connection with August 2015 Senior Secured Promissory Notes (August 2015 Warrants)	August 2015	August 2023	4,000	$ 1.91
In connection with October 2012 and April 2013 Secured Promissory Notes (November 2016 Warrants)	November 2016	November 2026	125	$ 2.38
In connection with June 2017 Consulting Agreement (November 2017 Warrants)	June 2017	June 2027	80	$ 1.10
In connection with February 2018 Financing Transaction (February 2018 Warrants 1)	February 2018	December 2020	43,350	$ 1.00

In connection with February 2018 Financing Transaction (February 2018 Warrants 2)	February 2018	December 2020	5,065	$ 1.25
			52,647	

(1) The June 2013 Warrants expire upon the earlier to occur of (i) the date listed above; (ii) the acquisition of the Company by another entity by means of any transaction or series of related transactions (including, without limitation, any transfer of more than 50% of the voting power of the Company, reorganization, merger or consolidation, but excluding any merger effected exclusively for the purpose of changing the domicile of the Company); or (iii) a sale of all or substantially all of the assets of the Company unless the Company's stockholders of record as constituted immediately prior to such acquisition or sale will, immediately after such acquisition or sale (by virtue of securities issued as consideration for the Company's acquisition or sale or otherwise), hold at least fifty percent (50%) of the voting power of the surviving or acquiring entity.

100

The June 2013 Warrants became exercisable on the date of the IPO. The August 2015 and November 2016 were immediately exercisable and remain exercisable subject to certain exceptions. The November 2017 Warrants vested over a period of six months and remain exercisable. The February 2018 Warrants were immediately exercisable and remain exercisable subject to certain exceptions. Refer to Notes 2 and 16 of these consolidated financial statements for the valuation of these warrants and their impact to these consolidated financial statements.

As of December 31, 2018, the total warrants exercised was 78,000. The weighted average remaining contractual life and exercise price for the above warrants is 2.23 years and $1.10, respectively. The intrinsic value of the warrants on December 31, 2018 was $21,519,000.

8. Common Stock

In August 2013, the Company amended and restated its certificate of incorporation to increase the number of shares of common stock authorized for issuance to 250,000,000 shares with a par value of $0.00001. As of December 31, 2018, the Company had reserved shares of common stock for future issuances as follows (in thousands):

	SHARES
Shares available for future grant under stock incentive plans	6,175
Stock options outstanding	7,136
Warrants to purchase common stock	52,647
Restricted stock units	1,146
Common shares to be issued in lieu of agent fees	498
	67,602

9. Stock Option Plans

In July 2006, the Company authorized the 2006 Equity Incentive Plan, as amended, (“2006 Plan”). The 2006 Plan provided for the issuance of up to 1,434,000 shares of common stock underlying awards. The 2006 Plan was terminated in December 2011 and no new stock awards may be granted under the 2006 Plan.

The 2006 Plan allowed holders to exercise stock options prior to their vesting. The common stock received by the employee is restricted and follows the same vesting schedule as the underlying option. In the event the employee voluntarily or involuntarily terminates employment from the Company, the Company retains a right to repurchase the unvested common stock at the original option exercise price. As of December 31, 2018 and 2017, 34,987 and 0 options, respectively had been exercised that was subject to repurchase.

As of December 31, 2018, options to purchase 127,000 shares of the Company's common stock at a weighted-average exercise price of $1.19 per share were outstanding under the 2006 Plan, of which 127,000 were vested. During the year ended December 31, 2018, 57,353 and 30,000 options were exercised and cancelled, respectively, under the 2006 Plan.

In July 2011, and as amended in September 2012, the Company authorized the 2011 Stock Plan ("2011 Plan"). The 2011 Plan provided for the issuance of up to 1,167,000 shares of common stock underlying awards, plus any shares of common stock underlying awards previously issued under the 2006 Plan that terminate or expire after the date of authorization of the 2011 Plan, subject to certain adjustments. In addition, the 2011 Plan provided that the Company not deliver more than 2,446,000 shares upon the exercise of incentive stock options issued under both the 2006 Plan and 2011 Plan. The 2011 Plan was terminated in August 2013 and no new stock awards may be granted under the 2011 Plan.

As of December 31, 2018, options to purchase 285,000 shares of the Company's common stock at a weighted-average exercise price of $7.57 per share were outstanding under the 2011 Plan, of which 285,000 were vested. During the year ended December 31, 2018, 13,000 and 6,000 options were exercised and cancelled, respectively, under the 2011 Plan.

In August 2013, the Company's board of directors adopted the 2013 Stock Incentive Plan ("2013 Plan") covering officers, employees, and directors of, and consultants to, the Company. Under the 2013 Plan, the Company may grant incentive stock options, non-qualified stock options, stock appreciation rights, restricted stock, restricted stock units and dividend equivalent rights. At the time the 2013 Plan was established, the maximum aggregate number of shares of the Company's common stock that could be issued pursuant to the 2013 Plan was 1,600,000, plus the number of shares of common stock that were reserved for issuance pursuant to future grants under the 2011 Plan at that time. The number of shares authorized for issuance pursuant to the 2013 Plan automatically increases by any additional shares that would have otherwise returned to the 2011 Plan as a result of the forfeiture, termination or expiration of awards previously granted under the 2011 Plan. In addition, the number of shares authorized for issuance pursuant to the 2013 Plan will increase by a number equal to the lesser of (i) 3.5% of the number of shares of the Company's common stock outstanding on the last day of the immediately preceding fiscal year or (ii) a lesser number of shares determined by the administrator.

As of December 31, 2018, options to purchase 6,724,000 shares of the Company's common stock at a weighted-average exercise price of $3.17 per share were outstanding under the 2013 Plan, of which 1,880,000 were vested. During the year ended December 31, 2018, 9,000 and 419,000 options were exercised and cancelled, respectively, under the 2013 Plan.

Generally, options vest 25% on the first anniversary from the date of grant and 1/48 per month thereafter ("Standard Vesting Terms"); however, options may be granted with different vesting terms as determined by the Company's board of directors. During the year ended December 31, 2018, the Company granted 4,549,000 options with Standard Vesting Terms. During the year ended December 31, 2018, the Company granted restricted stock units under the 2013 Plan. The vesting periods for the restricted stock are subject to board approval and during the year ended December 31, 2018 varied from immediate to 36 months. During the year ended December 31, 2018, the Company granted restricted stock units under the 2013 Plan. On the date of grant, the restricted stock units can vest immediately or over a stated period of time as stated within award. One share of common stock is issuable for each vested restricted stock unit upon the earlier of the grantee's separation of service or a change in control in the case of non-employee directors, or in the case of employees the board can decide to provide for the immediate issuance of common stock once vesting has occurred. As of December 31, 2018, there were 1,146,000 restricted stock units outstanding under the 2013 Plan. The following table reflects the activity of restricted stock units for the year ended December 31, 2018:

	SHARES OUTSTANDING
Outstanding at December 31, 2017	822
Granted	707
Exercised	(337)
Forfeited	(46)
Outstanding at December 31, 2018	1,146

The following table summarizes the activity under the Company's stock option plans for the year ended December 31, 2018 (in thousands, except exercise price and remaining contractual life data):

	SHARES OUTSTANDING	WEIGHTED-AVERAGE EXERCISE PRICE	WEIGHTED-AVERAGE REMAINING CONTRACTUAL LIFE (IN YEARS)	AGGREGATE INTRINSIC VALUE
Balances at December 31, 2017	3,121	$ 5.45	6.9	$ 114
Options granted	4,549	1.78		
Options exercised	(79)	1.22		
Options cancelled	(455)	3.11		
Balances at December 31, 2018	7,136	3.31	8.1	469
Vested and expected to vest at December 31, 2018	5,912	3.63	7.8	430
Exercisable at December 31, 2018	2,292	6.61	5.8	316

The total intrinsic value of options exercised during the years ended December 31, 2018 and 2017 was $53,000 and $12,000, respectively.

The estimated fair value of options vested during the years ended December 31, 2018 and 2017 was $496,000 and $2,066,000, respectively. The weighted-average estimated fair value of options granted during the years ended December 31, 2018 and 2017 was $0.97 per share and $0.63 per share, respectively.

During the years ended December 31, 2018 and 2017, the Company recorded share-based compensation expense related to stock options of $1,040,000 and $1,937,000, respectively. During the years ended December 31, 2018 and 2017, the Company did not realize any tax benefit associated with its share-based compensation expense as certain of the option grants were incentive stock options for which share-based compensation expense is not deductible and as a result of the full valuation allowance on the Company's deferred tax assets (see Note 11).

As of December 31, 2018, the total share-based compensation expense related to unvested options granted to employees under the Company's stock option plans but not yet recognized was $2,780,000. This expense will be recognized on a straight-line basis over a weighted-average remaining term of 3.02 years. The following table summarizes shares available for grant under the Company's stock incentive plans for the year ended December 31, 2018 (in thousands):

	SHARES AVAILABLE FOR GRANT
Balances at December 31, 2017	2,340
Shares authorized	8,597
Options granted	(4,549)
Options cancelled	448
Restricted stock units granted	(707)
Restricted stock units cancelled	46
Balances at December 31, 2018	6,175

The following table summarizes the activity of restricted stock units for the year ended December 31, 2018 (in thousands, except weighted average grant date fair value):

	WEIGHTED AVERAGE GRANT

	SHARES OUTSTANDING	DATE FAIR VALUE
Non-vested at December 31, 2017	335	$ 0.94
Granted	707	1.68
Vested	(592)	1.50
Forfeited	(46)	1.24
Non-vested at June 30, 2018	404	$ 1.40

The fair value of restricted stock units is determined based on the closing bid price of the Company's common stock on the date of grant. During the years ended December 31, 2018 and 2017, the Company recognized $810,000 and $123,000, respectively, of share-based compensation expense related to restricted stock units. Total share-based compensation expense related to restricted stock units not yet recognized as of December 31, 2018 was $429,000, which is expected to be recognized over a weighted average period of .94 years.

As of December 31, 2018, the Company granted 105,000 restricted stock units, respectively, in partial satisfaction of incentive compensation due to certain executives as of December 31, 2017. These grants resulted in the reclassification of $205,000 from accrued liabilities to additional paid in capital as of December 31, 2018.

10. Commitments and Contingencies

Operating Leases

The Company has a non-cancelable lease for an aggregate of approximately 24,500 square feet of non-contiguous office space in an office complex in Davis, California under which a portion of the covered space terminated beginning in February 2014. The remaining portion of the space terminated in October 2016. The lease includes negotiated annual increases in the monthly rental payments.

In September 2013 and then amended in April 2014, the Company entered into a lease agreement for approximately 27,300 square feet of office and laboratory space located in Davis, California. The initial term of the lease is for a period of 60 months and commenced in August 2014. The monthly base rent is $44,000 per month for the first 12 months with a 3% increase each year thereafter. Concurrent with this amendment, in April 2014, the Company entered into a lease agreement with an affiliate of the landlord to lease approximately 17,400 square feet of office and laboratory space in the same building complex in Davis, California. The initial term of the lease is for a period of 60 months and commenced in August 2014. The monthly base rent is $28,000 with a 3% increase each year thereafter.

In November 2018, the Company elected to exercise the first extension option under the lease, extending the lease term for another 60 months. As of the date of the issuance of these consolidated financial statements an executed agreement has not been executed by the Company.

The Company recognizes expense under its operating leases on a straight-line basis over the terms of the leases. As of December 31, 2018, the Company’s aggregate contractual future minimum lease payments under non-cancelable lease agreements is as follows (in thousands):

	OPERATING LEASES
Year Ended December 31,	
2019	1,030
2020	1,167

2021	1,202
2022	1,238
2023 and beyond	2,141
Total minimum payments required	$ 6,778

The Company incurred rent expense of $609,000 and $625,000, during the years ended December 31, 2018 and 2017, respectively.

On January 19, 2016, the Company entered into an agreement with a sublessee to sublease approximately 3,800 square feet of vacant office space located in Davis, California pursuant to the terms of its lease agreement. The initial term of the sublease is for a period of approximately 43 months and commenced on February 1, 2016. The monthly base rent is approximately $5,000 per month for the first 12 months with a 5% increase each year thereafter. The Company recognized $60,000 from the sublease which offset the rental expense for the years ended December 31, 2018 and 2017.

Litigation

On April 3, 2018, the Company was named as a defendant in a complaint filed by Piper Jaffray, Inc. (“Piper”) with the Superior Court of the State of Delaware. The Company was informed of and received Piper’s complaint and related documents on April 5, 2018, following the filing of the Company’s Annual Report on Form 10-K for the year ended December 31, 2017. Piper’s complaint alleges one breach of contract claim, specifically, that the Company breached an engagement letter with Piper by failure to pay a $2,000,000 transaction fee, which Piper alleges is due under the engagement letter as a result of the Company’s consummation of its private placement and debt refinancing transactions in February 2018. Piper’s complaint includes a demand for payment the foregoing transaction fee, in addition to interest and costs and expenses incurred in pursuing the action, including reasonable attorneys’ fees. While the Company believes Piper’s complaint is without merit, this matter is at an early stage, and the outcome of this matter is not presently determinable. As of December 31, 2018, a trial date for the matter has been scheduled for July of 2020.

11. Income Taxes

The TCJA was enacted on December 22, 2017. The Act reduces the US federal corporate tax rate from 35% to 21%. As of December 31, 2018, the Company completed the accounting for the tax effects of enactment of the TCJA. The most significant impact of the legislation for the Company was a $27,971,000 reduction of the value of the Company's net deferred tax assets (which represent future tax benefits) as a result of lowered tax rate. As all deferred tax assets were fully offset by a valuation allowance, the impact of the TCJA also reduced the Company's valuation allowance by $27,971,000.

As of December 31, 2018, the Company had net operating loss carryforwards prior to 2018 for federal income tax reporting purposes of $215,966,000, which begin to expire in 2026, and California and various other state net operating loss carryforwards of $150,443,000 and $49,171,000, respectively, which will expire from 2028 through 2037. The federal net operating loss generated in 2018 in the amount of $28,760,000 will never expire. In addition, as of December 31, 2018, the Company had federal research and development tax credit carryforwards of $2,631,000, which begin to expire in 2026, and state research and development tax credit carryforwards of $2,761,000, which have no expiration date.

The Company's ability to utilize its federal and state net operating loss carryforwards and federal and state tax credit carryforwards to reduce future taxable income and future taxes, respectively, may be subject to restrictions attributable to equity transactions that may have resulted in a change in ownership as defined by Internal Revenue Code ("IRC") Section 382. In the event that the Company has such a change in ownership, the Company's utilization of these carryforwards could be severely restricted and could result in the expiration of a significant amount of these carryforwards prior to the Company recognizing their benefit.

As of December 31, 2018, deferred tax assets of $70,986,000, arising primarily as a result of the Company's net operating loss carryforwards, tax credits and certain costs capitalized for tax purposes, were fully offset by a valuation allowance. The valuation allowance increased $6,455,000 for the year ended December 31, 2018 and decreased by $15,473,000 during the years ended December 31, 2017.

The temporary timing differences that give rise to the deferred tax assets are as follows (in thousands):

	DECEMBER 31,	
	2018	2017
Components of deferred taxes		
Net operating loss carryforwards	$64,319	$56,945

Research and development tax credits	3,609	3,202
Other, net	3,058	4,384
Net deferred tax assets	70,986	64,531
Less valuation allowance	(70,986)	(64,531)
Net deferred tax assets	$-	$-

The Company had no deferred tax liabilities as of December 31, 2018 and 2017.

The Company recognized no income tax expense and received no benefit from income taxes during the years ended December 31, 2018 and 2017. The provision for income taxes is different than the amount computed using the applicable statutory federal income tax rate with the difference for each year summarized below:

	DECEMBER 31,	
	2018	2017
Federal tax benefit at statutory rate	21 %	34 %
State tax benefit, net of federal benefit	5	3
Interest Expense	(1)	(2)
Share-based compensation expense	(1)	5
Other	2	-
Debt-related	2	-
Change in accounting method	4	
Change in federal deferred tax rate	-	(90)
Adjustment due to change in valuation allowance	(32)	50
Provision for income taxes	- %	- %

On January 1, 2018, as discussed in Note 2, the Company adopted ASC 606 and all the related amendments. For purposes of the Company's income tax, the adoption was considered a change in accounting method, the impact of which was a favorable adjustment in the Company's provision of $3,058,000 and as disclosed in the tax rate table above.

As of December 31, 2018, the Company had unrecognized tax benefits of $1,348,000. The unrecognized tax benefits, if recognized, would not impact the Company's effective tax rate as the recognition of these tax benefits would be offset by changes in the Company's valuation allowance. The Company does not believe there will be any material changes in its unrecognized tax position during the next twelve months.

A reconciliation of the beginning and ending amount of unrecognized tax benefits is as follows (in thousands):

	DECEMBER 31,	
	2018	2017
Balance at January 1	$1,201	$1,083
Research and development tax credits	147	-
Other, net		118
Balance at December 31	$1,348	$1,201

The Company files income tax returns in the U.S. federal jurisdiction and various state jurisdictions. The Company is subject to U.S. federal and state income tax examination for 2007 through 2018 due to unutilized net operating loss carryforwards and research and development tax credit carryforwards.

12. Employee Benefit Plan

The Company offers a defined contribution plan to all eligible employees, which is qualified under Section 401(k) of the IRC. The Company currently provides a matching contribution based on a formula which provides for a dollar-for-dollar matching contribution of the employee's 401(k) contribution up to 3% of eligible pay plus a 50% matching contribution on the employee's 401(k) contribution between 3% and 5% of eligible pay. Each participant is 100% vested in elective contributions and the Company's matching contribution. The Company provided 401(k) matching contributions during the years ended December 31, 2018 and 2017 of $335,000 and $317,000, respectively.

13. Related Party Transactions

August 2015 Senior Secured Promissory Notes

On August 20, 2015, the Company entered into a purchase agreement with Ivy Science & Technology Fund, Waddell & Reed Advisors Science & Technology Fund and Ivy Funds VIP Science and Technology, each an affiliate of Waddell & Reed, which is a beneficial owner of more than 5% of the Company's common stock. Pursuant to such purchase agreement, the Company sold to such affiliates senior secured promissory notes ("August 2015 Senior Secured Promissory Notes") in the aggregate principal amount of $40,000,000. Until February 5, 2018, the August 2015 Senior Secured Promissory Notes bear interest at a rate of 8% per annum payable semi-annually on June 30 or December 31 of each year, commencing on December 31, 2015, with $10,000,000 payable three years from the closing, $10,000,000 payable four years from the closing and $20,000,000 payable five years from the closing. In connection with the note, the Company incurred $302,000 in financing-related costs. These costs were recorded as deferred financing costs as a component of current and non-current other assets to amortized to interest expense over the term of the note.

The August 2015 Senior Secured Promissory Notes provide for various events of default, including, among others, default in payment of principal or interest, breach of any representation or warranty by the Company or any subsidiary under any agreement or document delivered in connection with the notes, a continued breach of any other condition or obligation under any loan document, certain bankruptcy, liquidation, reorganization or change of control events, the acquisition by any person or persons acting as group, other than the lenders, of beneficial ownership of 40% or more of the outstanding voting stock of the Company and certain events in which Pamela G. Marrone, Ph.D. ceases to serve as the Company's Chief Executive Officer. Upon an event of default, the entire principal and interest may be declared immediately due and payable. As of December 31, 2018, the Company was in compliance with its covenants under the August 2015 Senior Secured Promissory Notes.

In addition, from the date of the agreement through May 31, 2016, these notes contained the contractual obligation to maintain cash and cash equivalents of at least $15,000,000. The Company recorded the $15,000,000 as restricted cash and included the amount in non-current assets. On May 31, 2016, the terms of the August 2015 Secured Promissory Notes were amended to remove this minimum cash balance requirement.

The August 2015 Senior Secured Promissory Notes are secured by substantially all the Company's personal property assets. The agent, acting on behalf of the lenders, shall be entitled to have a first priority lien on the Company's intellectual property assets, pursuant to intercreditor arrangements with certain of the Company's existing lenders.

In connection with the August 2015 Senior Secured Promissory Notes, the Company issued warrants ("August 2015 Warrants") to purchase 4,000,000 shares of common stock of the Company. The August 2015 Warrants are immediately exercisable at an exercise price of $1.91 per share and may be exercised at a holder's option at any time on or before August 20, 2023 (subject to certain exceptions). The fair value of the August 2015 Warrants at the date of issuance of $4,610,000 was recorded as a discount to the August 2015 Senior Secured Promissory Notes as a component of non-current other liabilities and amortized to interest expense to related parties over the term of the arrangement.

As of December 31, 2017 the total amount outstanding under the note was $37,822,000, net of unamortized debt discount of $2,178,000.

On February 5, 2018, the holders of the August 2015 Senior Secured Promissory Notes, pursuant to an amendment, converted $35,000,000 of the then outstanding debt into 20,000,000 shares of common stock and warrants to purchase 4,000,000 shares of common stock (such conversion, the "Waddell Debt Conversion"). After the conversion, $5,000,000 in principal remained outstanding. Simultaneously with the Waddell Debt Conversion, the maturity of the August 2015 Senior Secured Promissory Notes was extended to December 31, 2022, and payment of all future interest was deferred to maturity on December 31, 2022 (See Note 15 for further discussion).

In conjunction with the Waddell Debt Conversion, the Company accounted for the partial debt extinguishment under the troubled debt restructuring accounting guidance, including consideration for the treatment of the transaction as a gain given the terms of the agreement. The Company recognized a gain of $9,183,000, including $2,171,000 related to debt discount and other cost, on partial extinguishment of the August 2015 Senior Secured Promissory Notes as of December 31, 2018. Because the Company recognized a gain on the partial extinguishment of debt, the Company was required to include all future interest and additional consideration, which included accrued interest, under the terms of this agreement as a reduction of the gain. As a result, the amount of the debt on the Company's balance sheet related to the August 2015 Senior Secured Promissory Notes is $7,300,000, as compared to $5,000,000 of contractual principal amount outstanding thereunder. Going forward, subject to future amendments to debt agreement or costs, the Company will not recognize future interest expense on the August 2015 Senior Secured Promissory Notes.

The accounting for the change due to the August 2015 Senior Secured Promissory Notes is as follows (in thousands):

Principal (pre-conversion)	$40,000
Accrued interest to be paid at maturity	339
Discount (pre-conversion)	(2,171)
Consideration of common stock and warrants provided at conversion	(21,685)
Gain on extinguishment	(9,183)
Principal and future interest at December 31, 2018	$7,300

14. Common Stock Offering

In April 2017, using a shelf registration statement, the Company completed an underwritten public offering of 6,571,000 registered shares of the Company's common stock. The public offering price of the shares sold in the offering was $1.40 per share and after deducting underwriting discounts and commissions and other offering expenses payable by the Company, the aggregate net proceeds to the Company from the offering totaled $8,200,000 million. As of December 31, 2017, the Company had sold 104,000 shares of common stock under at-the-market program at a weighted average exercise price of $2.22 per share for proceeds (net of commission) of $0.2 million, and $14.8 million remained available for sale under the agreement with H.C. Wainwright.

In April 2018, the Company completed an underwritten public offering of 8,366,250 registered shares of its common stock. The public offering price of the shares sold in the offering was $1.65 per share. The total gross proceeds to the Company from the offerings were $13,804,000. The aggregate net proceeds to the Company from common stock sold in the offering totaled approximately $12,665,000.

15. Equity Financing and Debt Conversion to Equity

On December 15, 2017, the Company entered into a securities purchase agreement (the "Purchase Agreement") with certain investors named therein, including Ospraie Ag Science LLC ("Ospraie"). On February 5, 2018, pursuant to the Purchase Agreement, the Company issued to these investors, an aggregate of 44,000,001 units, with each unit purchased consisting of one share of the Company's common stock and one warrant to purchase one share of common stock, and each unit purchased by the investors consisting of one share of common stock and one warrant to purchase 0.8 shares of Common Stock, for an aggregate purchase price of $30,000,000, including the conversion to units of all aggregate principal amounts outstanding under the Purchase Agreement. Also on February 5, 2018, the Company converted, pursuant to an amendment, dated December 15, 2017, to the senior August 2015 Senior Secured Promissory Notes $35,000,000 aggregate principal amount of the August 2015 Senior Secured Promissory Notes into an aggregate of 20,000,000 shares of common stock and warrants to purchase 4,000,000 shares of common stock (such conversion, the "Waddell Debt Conversion"), such that $5,000,000 of principal under the August 2015 Senior Secured Promissory Notes now remains outstanding.

Also on February 5, 2018, the Company converted, pursuant to an amendment, dated December 15, 2017, to the October 2012 and April 2013 Secured Promissory Notes, $10,000,000 aggregate principal amount of indebtedness outstanding under the October 2012 and April 2013 Secured Promissory Notes to an aggregate of 5,714,285 shares of common stock and warrants to purchase 1,142,856 shares of common stock (such conversion, the "Snyder Debt Conversion"), such that $2,450,000 of principal under the October 2012 and April 2013 Secured Promissory Notes now remains outstanding.

In addition, in connection with its role as exclusive placement agent and financial adviser with respect to the transactions contemplated by the Purchase Agreement, National Securities Corporation (the “Placement Agent”) received warrants to purchase 2,017,143 shares of Common Stock, as well as 800,000 shares of Common Stock.

The estimated net proceeds from this private placement, inclusive of the cash received from the December 2017 Convertible Note, was $27,300,000. The Company incurred $2,700,000 in expenses associated with the private placement and debt conversion of which $2,180,000 was related to the equity component of these transactions.

The Company classified the warrants issued in connection with the Securities Purchase Agreement and conversion of debt into equity as equity. As a result of the financing transaction discussed above, the Company’s additional paid in capital and common stock increased by $66,644,000 and $1,000, respectively. The Company allocated the value of the financing transaction to the common shares issued in the amount of $52,439,000 and to the warrants issued in the amount of $14,206,000 based on the relative fair values of each on the transaction date. See Note 16 for further discussion.

16. Revisions

During the fourth quarter ended December 31, 2018, the Company identified errors related to the volatility assumption used in the fair value of warrants issued in the February 2018 Financing Transactions, and the accounting treatment for certain deferred debt issuance costs, which resulted in the Company revising certain amounts previously reported during the three, six and nine months ended March 31, June 30 and September 30, 2018, respectively, related to Other, Income (Expense), Additional paid in capital and the related captions in the balance sheet, income statement, and statement of cash flows. Management concluded that the errors are not material to the condensed financial statement for the interim periods and that the Form 10-Q filed for those periods can continue to be relied upon.

	PREVIOUSLY REPORTED	REVISED
	YEAR TO DATE	YEAR TO DATE
Interim period ending March 31, 2018		
Loss on extinguishment of debt	$ (303)	$ (2,196)
Gain on extinguishment of debt, related party	9,622	9,183
Net Loss	(2,918)	(5,257)
Basic and diluted net loss per common share:	(0.04)	(0.07)
Interim period ending June 30, 2018		
Loss on extinguishment of debt	$ (303)	$ (2,196)
Gain on extinguishment of debt, related party	9,622	9,183
Net Loss	(7,762)	(10,127)
Basic and diluted net loss per common share:	(0.08)	(0.11)
Interim period ending September 30, 2018		
Loss on extinguishment of debt	$ (303)	$ (2,196)
Gain on extinguishment of debt, related party	9,622	9,183
Net Loss	(12,201)	(14,610)
Basic and diluted net loss per common share:	(0.12)	(0.15)

17. Subsequent Event

The Company has evaluated its subsequent events from December 31, 2018 through the date these consolidated financial statements were issued, and has determined that there are no subsequent events required to be disclosed in these consolidated financial statements.

109

ITEM 9. CHANGES IN AND DISAGREEMENTS WITH ACCOUNTANTS ON ACCOUNTING AND FINANCIAL DISCLOSURE

Not applicable.

ITEM 9A. CONTROLS AND PROCEDURES

Evaluation of Disclosure Controls and Procedures

Disclosure controls and procedures are controls and other procedures that are designed to ensure that information required to be disclosed in our reports filed or submitted under the Securities Exchange Act is recorded, processed, summarized and reported, within the time periods specified in the Securities and Exchange Commission's rules and forms. Disclosure controls and procedures include, without limitation, controls and procedures designed to ensure that information required to be disclosed in our reports filed under the Exchange Act is accumulated and communicated to management, including our principal executive officer and our principal financial officer, as appropriate, to allow timely decisions regarding required disclosure. As of the end of the period covered by this report, we carried out an evaluation under the supervision and with the participation of our management, including our Chief Executive Officer (CEO) and our Chief Financial Officer (CFO), of the effectiveness of the design and operation of our disclosure controls and procedures in ensuring that material information required to be disclosed in our reports filed or submitted under the Exchange Act, has been made known to them in a timely fashion. Based on this evaluation, our CEO and CFO concluded that the Company's disclosure controls and procedures were effective as of December 31, 2018.

Management's Report on Internal Control over Financial Reporting

Our management is responsible for establishing and maintaining adequate internal control over financial reporting as such term is defined in Rule 13a-15(f) of the Exchange Act. Our management assessed, with the oversight of the board of directors, the effectiveness of our internal control over financial reporting as of December 31, 2018. In making this assessment, management used the criteria established in Internal Control-Integrated Framework (2013) issued by the Committee of Sponsoring Organizations of the Treadway Commission ("COSO"). Based on this assessment, management has concluded that our internal control over financial reporting was effective as of December 31, 2018.

The effectiveness of our internal controls over financial reporting as of December 31, 2018, has been audited by Marcum LLP, our independent registered public accounting firm. Their report appears in Item 8 of this Form 10-K.

Changes in Internal Control

For the quarter ending December 31, 2018, we have completed enhancements to the design and testing of operating effectiveness of certain internal controls over financial reporting, including the controls implemented in the first half of 2018 in response to the previously reported material weakness as disclosed in our Form 10-k for the year ended December 31, 2017. There were no other changes in our internal control over financial reporting identified in management's evaluation pursuant to Rules 13a-15(d) or 15d-15(d) of the Exchange Act during the year ended December 31, 2018 that materially affected, or are reasonably likely to materially affect, our internal control over financial reporting.

Limitations on Effectiveness of Controls and Procedures

In designing and evaluating the disclosure controls and procedures, management recognizes that any controls and procedures, no matter how well designed and operated, can provide only reasonable, not absolute, assurance of achieving the desired control objectives. Because of the inherent limitations in internal control over financial reporting, no evaluation of controls can provide absolute assurance that all control issues and instances of fraud, if any, within the Company have been detected. These inherent limitations include the realities that judgments in decision making can be faulty and that breakdowns can occur because of a simple error or mistake. Controls can also be circumvented by the individual acts of some persons, by collusion of two or more people, or by management override of the controls. The design of any system of controls is based in part on certain assumptions about the likelihood of future events, and there can be no assurance that any design will succeed in achieving its stated goals under all potential future conditions. Over time, controls may become inadequate because of changes in conditions or deterioration in the degree of compliance with policies or procedures. In addition, the design of disclosure controls and procedures must reflect the fact that there are resource constraints and that management is required to apply judgment in evaluating the benefits of possible controls and procedures relative to their costs. Because of the inherent limitations in a cost-effective control system, misstatements due to error or fraud may occur and not be detected.

ITEM 9B. OTHER INFORMATION

None.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

The information required by this item will be contained under the heading “Election of Directors” in our definitive Proxy Statement for the Annual Meeting of Stockholders and is incorporated herein by reference.

ITEM 11. EXECUTIVE COMPENSATION

The information required by this item will be contained under the caption *Executive Officer and Director Compensation* in our definitive Proxy Statement for the Annual Meeting of Stockholders and is incorporated herein by reference.

ITEM 12. SECURITY OWNERSHIP OF CERTAIN BENEFICIAL OWNERS AND MANAGEMENT AND RELATED STOCKHOLDER MATTERS

The information required by this item will be contained under the caption *Ownership of Certain Beneficial Owners* in our definitive Proxy Statement for the Annual Meeting of Stockholders and is incorporated herein by reference.

ITEM 13. CERTAIN RELATIONSHIPS AND RELATED TRANSACTIONS, AND DIRECTOR INDEPENDENCE

The information required by this item will be contained under the captions *Transactions with Related Persons* and *Director Independence* in our definitive Proxy Statement for the Annual Meeting of Stockholders and is incorporated herein by reference.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

The information required by this item will be contained under the heading "*Selection of Independent Registered Public Accounting Firm*" in our definitive Proxy Statement for the Annual Meeting of Stockholders and is incorporated herein by reference.

PART IV

ITEM 15. EXHIBITS, FINANCIAL STATEMENT SCHEDULES

We have filed the following documents as part of this Form 10-K:

1. Consolidated financial statements:

2. Financial Statement Schedules

All schedules have been omitted because they are not required, not applicable, not present in amounts sufficient to require submission of the schedule, or the required information is otherwise included.

3. Exhibits

See the Exhibit Index immediately preceding the signature page of this Annual Report on Form 10-K, which is incorporated by reference here.

ITEM 16. FORM 10-K SUMMARY

The Company has elected not to include summary information.

INDEX TO EXHIBITS

EXHIBIT NUMBER	EXHIBIT DESCRIPTION	FORM	FILE NO.	EXHIBIT NUMBER	FILING DATE	FILED HEREWITH
3.1	Fourth Amended and Restated Certificate of Incorporation of Marrone Bio Innovations, Inc.	10-K	001-36030	3.1	March 25, 2014	
3.2	Third Amended and Restated Bylaws of Marrone Bio Innovations, Inc.	8-K	001-36030	3.1	August 8, 2017	
4.1	Form of Marrone Bio Innovations, Inc.'s common stock certificate.	S-1/A	333-189753	10.4	July 22, 2013	
4.2	Form of Senior Secured Promissory Notes issued by Marrone Bio Innovations, Inc. to Ivy Science & Technology Fund, Waddell & Reed Advisors Science & Technology Fund and Ivy Funds VIP Science & Technology dated August 20, 2015.	8-K	001-36030	4.1	August 25, 2015	
4.3	Form of Warrants issued by Marrone Bio Innovations, Inc. to Ivy Science & Technology Fund, Waddell & Reed Advisors Science & Technology Fund and Ivy Funds VIP Science & Technology dated August 20, 2015.	8-K	001-36030	4.2	August 25, 2015	

4.4	Form of Warrants issued by Marrone Bio Innovations, Inc. pursuant to the Third Amendment to Loan Agreement, dated as of November 11, 2016, by and between Marrone Bio Innovations, Inc. and Gordon Snyder, as agent.	10-K	001-36030	4.4	April 5, 2018

EXHIBIT NUMBER	EXHIBIT DESCRIPTION	FORM	FILE NO.	EXHIBIT NUMBER	FILING DATE	FILED HEREWITH
4.5	Warrant issued by Marrone Bio Innovations, Inc. to MZHCI, LLC, dated June 6, 2017.	10-Q	001-36030	4.1	August 14, 2017	
4.6	Form of Warrants issued by Marrone Bio Innovations, Inc. on February 5, 2018 to the Buyers listed in that certain Securities Purchase Agreement dated December 15, 2017.	8-K	001-36030	4.1	December 18, 2017	
4.7	Form of Warrants issued by Marrone Bio Innovations, Inc. on February 5, 2018 to Ivy Science & Technology Fund, Waddell & Reed Advisors Science & Technology Fund and Ivy VIP Science & Technology.	8-K	001-36030	4.2	December 18, 2017	
4.8	Form of Warrants issued by Marrone Bio Innovations, Inc. on February 5, 2018 to Gordon Snyder, as agent, and certain of its affiliates to that certain Loan Agreement, as amended.	8-K	001-36030	4.3	December 18, 2017	
4.9	Form of Warrants issued by Marrone Bio Innovations, Inc. on February 5, 2018 to National Securities Corporation and certain of its affiliates.	8-K	001-36030	4.3	December 18, 2017	
10.1(a)	Office Lease, dated September 9, 2013, by and between Bio Innovations, Inc. and Six Davis, LLC.	10-Q	001-36030	10.1	September 13, 2013	
10.1(b)	First Amendment to Lease, dated April 30, 2014, by and between Marrone Bio Innovations, Inc. and Six Davis, LLC.	10-Q	001-36030	10.3	May 15, 2014	
10.2	Office Lease, dated April 30, 2014, by and between Marrone Bio Innovations, Inc. and Seven Davis, LLC.	10-Q	001-36030	10.4	May 15, 2014	
10.3#	Marrone Bio Innovations, Inc. Stock Option Plan and related documents.	S-1	333-189753	10.1	July 1, 2013	

EXHIBIT NUMBER	EXHIBIT DESCRIPTION	FORM	FILE NO.	EXHIBIT NUMBER	FILING DATE	FILED HEREWITH
10.4#	Marrone Bio Innovations, Inc. 2011 Stock Plan and related documents.	S-1	333-189753	10.2	July 1, 2013	
10.5#	Marrone Bio Innovations, Inc. 2013 Stock Incentive Plan and related documents.	S-1/A	333-189753	10.3	July 22, 2013	
10.6#	Indemnification Agreement by and between Marrone Bio Innovations, Inc. and each of its directors and executive officers.	S-1/A	333-189753	10.4	July 22, 2013	
10.7#	Offer letter, dated June 29, 2006, between Marrone Organic Innovations, Inc. and Dr. Pamela G. Marrone.	S-1	333-189753	10.5	July 1, 2013	
10.8(a)#	Offer letter, dated February 10, 2014, between Marrone Bio Innovations, Inc. and James B. Boyd.	10-K	001-36030	10.8	March 25, 2014	
10.8(b)#	Letter Agreement, dated March 3, 2015, between Marrone Bio Innovations, Inc. and James B. Boyd.	10-K	001-36030	10.9	November 10, 2015	
10.8(c)#	Promotion Agreement, dated August 14, 2017, between Marrone Bio Innovations, Inc. and James Boyd.	10-Q	001-36030	10.46	November 14, 2017	
10.9(a)#	Offer letter, dated February 26, 2014, between Marrone Bio Innovations, Inc. and Linda V. Moore.	10-K	001-36030	10.6	November 10, 2015	
10.9(b)#	Letter Agreement, dated March 3, 2015, between Marrone Bio Innovations, Inc. and Linda V. Moore.	10-K	001-36030	10.7	November 10, 2015	
10.10#	Offer letter, dated April 16, 2018, between the Company and Kevin Hammill.	10-Q	001-36030	10.2	August 14, 2018	
10.11	License Agreement, dated November 13, 2007, between the U.S. Government, as represented by the U.S. Department of Agriculture, Agricultural Research Service, and Marrone Organic Innovations, Inc.	S-1	333-189753	10.25	July 1, 2013	

114

EXHIBIT NUMBER	EXHIBIT DESCRIPTION	FORM	FILE NO.	EXHIBIT NUMBER	FILING DATE	FILED HEREWITH
10.12	License Agreement, dated December 28, 2009, between the University of the State of New York and Marrone Bio Innovations, Inc.	S-1/A	333-189753	10.26	July 31, 2013	
10.13	Asset Purchase Agreement, dated May 25, 2012, between Bankruptcy Trustee for Michigan BioDiesel, LLC and Marrone Bio Innovations, Inc.	S-1	333-189753	10.30	July 1, 2013	
10.14	Business Loan Agreement, dated June 13, 2014, by and between Five Star Bank and jointly and severally Marrone Michigan Manufacturing LLC and Marrone Bio Innovations, Inc.	10-Q	001-36030	10.4	August 13, 2014	
10.15(a)	Invoice Purchase Agreement, made on March 24, 2017 between Marrone Bio Innovations, Inc. and LSQ Funding Group, L.C.	10-Q	001-36030	10.44	May 15, 2017	
10.15(b)	First Amendment to Invoice Purchase Agreement, dated June 30, 2018, between Marrone Bio Innovations, Inc. and LSQ Funding Group, L.C.	10-Q	001-36030	10.3	August 14, 2018	
10.16	Subordination Agreement, dated as of March 28, 2017 by and among Five Star Bank, Marrone Bio Innovations, Inc., and LSQ Funding Group L.C.	10-Q	001-36030	10.45	May 15, 2017	
10.17	Intercreditor Agreement, dated as of March 22, 2017, between Ivy Investment Management Company, administrative agent for the Waddell Lenders (defined therein), Gordon Snyder, administrative agent for Snyder Lenders (defined therein) and LSQ Funding Group, L.C.	10-Q	001-36030	10.43	May 15, 2017	
10.18(a)	Loan Agreement, dated October 2, 2012, by and among Marrone Bio Innovations, Inc., the Investors party thereto and Gordon Snyder, as agent, including form of promissory note and warrant.	S-1	333-189753	10.17	July 1, 2013	

115

EXHIBIT NUMBER	EXHIBIT DESCRIPTION	FORM	FILE NO.	EXHIBIT NUMBER	FILING DATE	FILED HEREWITH
10.18(b)	Amendment and Consent, dated April 10, 2013, by and among Marrone Bio Innovations, Inc. and the administrative agent party thereto.	S-1	333-189753	10.23	July 1, 2013	
10.18(c)	Omnibus Amendment to Loan Agreement, dated as of August 19, 2015, by and between Marrone Bio Innovations, Inc. and Gordon Snyder, as agent.	8-K	001-36030	10.2	August 25, 2015	
10.18(d)	Third Amendment to Loan Agreement, dated as of November 11, 2016, by and between Marrone Bio Innovations, Inc. and Gordon Snyder, as agent.	10-K	001-36030	10.42	April 3, 2017	
10.18(e)	Fourth Amendment to Loan Agreement, dated as of October 12, 2017, by and between Marrone Bio Innovations, Inc. and Gordon Snyder, as agent.	10-K	001-36030	10.18(e)	April 5, 2018	
10.18(f)	Fifth Amendment to Loan Agreement, dated as of October 23, 2017, by and between Marrone Bio Innovations, Inc. and Gordon Snyder, as agent.	10-K	001-36030	10.18(f)	April 5, 2018	
10.18(g)	Sixth Amendment to Loan Agreement, dated as of December 15, 2017, by and between Marrone Bio Innovations, Inc. and Gordon Snyder, as agent.	8-K	001-36030	10.3	December 18, 2017	
10.19	Security Agreement, dated October 2, 2012, by and among Marrone Bio Innovations, Inc. and the administrative and collateral agent.	S-1	333-189753	10.18	July 1, 2013	
10.20(a)	Omnibus Amendment No. 1 to Notes, dated as of May 31, 2016, by and among Ivy Science & Technology Fund, Waddell & Reed Advisors Science & Technology Fund and Ivy Funds VIP Science & Technology and Marrone Bio Innovations, Inc.	8-K	001-36030	10.01	June 2, 2016	
10.20(b)	Omnibus Amendment No. 2, dated as of October 6, 2017, by and among Ivy	10-K	001-36030	10.20 (b)	April 5, 2018	

Science & Technology Fund, Waddell &
Reed Advisors Science & Technology
Fund Ivy Funds VIP Science &
Technology and Marrone Bio Innovations,
Inc.

116

EXHIBIT NUMBER	EXHIBIT DESCRIPTION	FORM	FILE NO.	EXHIBIT NUMBER	FILING DATE	FILED HEREWITH
10.20(c)	Omnibus Amendment No. 3, dated as of October 23, 2017, by and among Ivy Science & Technology Fund, Waddell & Reed Advisors Science & Technology Fund, Ivy Funds VIP Science & Technology and Marrone Bio Innovations, Inc.	10-K	001-36030	10.20 (c)	April 5, 2018	
10.20(d)	Omnibus Amendment No. 4 to Notes, dated December 15, 2017, by and among Ivy Science & Technology Fund, Waddell & Reed Advisors Science & Technology Fund, Ivy VIP Science & Technology, Marrone Bio Innovations, Inc. and Ospraie Management LLC.	8-K	001-36030	10.2	December 18, 2017	
10.21	Security Agreement, dated as of August 20, 2015, by and among Marrone Bio Innovations, Inc. and the counterparties thereto.	8-K	001-36030	10.1	August 25, 2015	
10.22(a)	Promissory Note, dated October 12, 2017, by and between Marrone Bio Innovations, Inc. and Dwight W. Anderson.		001-36030	10.22(a)	April 5, 2018	
10.22(b)	Amended and Restated Promissory Note, dated October 23 2017, by and between Marrone Bio Innovations, Inc. and Dwight W. Anderson.		001-36030	10.22(b)	April 5, 2018	
10.22(c)	Secured Promissory Note, dated December 22, 2017 between Marrone Bio Innovations, Inc. and Dwight W. Anderson.	8-K	001-36030	10.1	December 29, 2017	
10.23	Security Agreement, dated as of December 22, 2017 between Marrone Bio Innovations, Inc. and Dwight W. Anderson.	8-K	001-36030	10.1	December 29, 2017	
10.24	Securities Purchase Agreement, dated December 15, 2017, by and among Marrone Bio Innovations, Inc. and the investors listed on the Schedule of Buyers attached therein.	8-K	001-36030	10.1	December 18, 2017	

EXHIBIT NUMBER	EXHIBIT DESCRIPTION	FORM	FILE NO.	EXHIBIT NUMBER	FILING DATE	FILED HEREWITH
10.25	Registration Rights Agreement, dated as of December 15, 2018, by and among Marrone Bio Innovations, Inc., and the Investors (defined therein).	8-K	001-36030	10.1	December 18, 2017	
10.26(a)	At the Market Offering Agreement, dated December 9, 2016, by and between the Company and H.C. Wainwright & Co., LLC	S-3	333-215024	1.1	December 9, 2016	
10.26(b)	Amendment to At the Market Offering Agreement, dated December 27, 2016, by and between the Company and H.C. Wainwright & Co., LLC	S-3/A	333-215024	1.2	December 29, 2016	
10.27#	Change in Control Agreement, dated as of June 17, 2016, by and between Marrone Bio Innovations, Inc. and Pamela G. Marrone.	10-K	001-36030	10.35	April 3, 2017	
10.28#	Change in Control Agreement, dated as of June 17, 2016, by and between Marrone Bio Innovations, Inc. and James B. Boyd.	10-K	001-36030	10.36	April 3, 2017	
10.29#	Change in Control Agreement, dated as of June 17, 2016, by and between Marrone Bio Innovations, Inc. and Linda V Moore.	10-K	001-36030	10.37	April 3, 2017	
14.1	Code of Business Conduct and Ethics	8-K	001-36030	14.1	August 8, 2017	
21.1	List of Subsidiaries of Marrone Bio Innovations, Inc.	10-K	001-36030	10.36	April 3, 2017	
23.1	Consent of Marcum LLP, Independent Registered Public Accounting Firm.					X
23.2	Consent of Ernst & Young LLP Registered Public Accounting Firm					X
24.1	Power of Attorney (included on signature page).					X
31.1	Certification of Principal Executive Officer Required Under Rule 13a-14(a)					X

and 15d-14(a) of the Securities Exchange
Act of 1934, as amended.

EXHIBIT NUMBER	EXHIBIT DESCRIPTION	FORM	FILE NO.	EXHIBIT NUMBER	FILING DATE	FILED HEREWITH
31.2	Certification of Principal Financial Officer Required Under Rule 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as amended.					X
32.1	Certification of Principal Executive Officer and Principal Financial Officer Required Under Rule 13a-14(b) of the Securities Exchange Act of 1934, as amended, and 18 U.S.C. §1350					X
101	Interactive Data Files Pursuant to Rule 405 of Regulation S-T: (i) Consolidated Balance Sheets as of December 31, 2018 and 2017; (ii) Consolidated Statements of Operations for the years ended December 31, 2018, 2017 and 2016; (iii) Consolidated Statements of Comprehensive Loss for the years ended December 31, 2018, 2017 and 2016; (iv) Consolidated Statements of Convertible Preferred Stock and Stockholders' Equity (Deficit) for the years ended December 31, 2018, 2017 and 2016; (v) Consolidated Statements of Cash Flows for the years ended December 31, 2018, 2017 and 2016 and (vi) Notes to Consolidated Financial Statements					X

#Indicates a management contract or compensatory plan or arrangement.

† Confidential portions of this document have been redacted and filed separately with the Securities and Exchange Commission.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this Annual Report on Form 10-K to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of Davis, State of California, on March 28, 2019.

MARRONE BIO INNOVATIONS, INC.

/s/ Pamela G. Marrone
Pamela G. Marrone
Chief Executive Officer

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints Pamela G. Marrone her or his true and lawful attorney-in-fact and agent, with full power of substitution and, for her or him and in her or his name, place and stead, in any and all capacities to sign any and all amendments to this Annual Report on Form 10-K, and to file the same, with all exhibits thereto and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorney-in-fact and agent full power and authority to do and perform each and every act and thing requisite and necessary to be done in connection therewith, as fully to all intents and purposes as she or he might or could do in person, hereby ratifying and confirming all that said attorney-in-fact and agent, or her substitute or substitutes, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this Annual Report on Form 10-K has been signed by the following persons on behalf of the Registrant and in the capacities and on the dates indicated:

SIGNATURE	TITLE	DATE
/s/ Pamela G. Marrone Pamela G. Marrone	Chief Executive Officer (Principal Executive Officer)	March 28, 2019
/s/ James B. Boyd James B. Boyd	President and Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	March 28, 2019
/s/ Robert A. Woods Robert A. Woods	Chair of the Board	March 28, 2019

/s/ George Kerckhove George Kerckhove	Director	March 28, 2019
/s/ Yogesh Mago *Yogesh Mago*	Director	March 28, 2019
/s/ Zachery Wochok Zachary Wochok	Director	March 28, 2019
/s/ Keith McGovern Keith McGovern	Director	March 28, 2019
/s/ Stuart Woolf Stuart Woolf	Director	March 28, 2019