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, 2019

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:

Title of each class	Trading Symbol(s)	Name of each exchange on which registered
Common Stock, $0.00001 par value	MBII	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 [ ] No [X]

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 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, 2019, 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 $81,572,070 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, 2019. 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 13, 2020**
Common Stock, $0.00001 par value	**145,531,261**

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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" or "continue" and 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., together with its subsidiaries, including Pro Farm Technologies OY (or "Pro Farm"), 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 SakaliaTM. Our logos, Grandevo®, Regalia®, Venerate®, Zequanox®, Haven®, Majestene®, Stargus®, Zelto®, Amplitude®, Jet-Ag®, Jet Oxide®, Ennoble TM , UBP-110®, LumiBio™, LumiBio Valta™, LumiBio Kelta™, Foramin® and other trade names, trademarks or service marks of MBI appearing herein are the property of MBI. 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 strive to lead the sustainable agriculture movement through the discovery, development, production and promotion of effective, efficient and environmentally responsible biological products for pest management, plant nutrition and plant health. We target the major markets that use conventional chemical pesticides and fertilizers, where our biological products are used as alternatives for, or mixed with, conventional products. We also target new markets for which there are no available conventional chemical products or where the use of conventional chemical products may not be desirable (including for organically certified crops) or permissible either because of health and environmental concerns, or because the development of pest resistance has reduced the efficacy of conventional chemical pesticides.

Biological products for pest management (or crop protection) are referred to as biopesticides, or bioprotection products. Biological fertilizers and fertilizer enhancers are referred to as bionutrition products, and biological products for plant health are referred to as biostimulants. The United States Environmental Protection Agency ("EPA") registers two major categories of biopesticides, including microbial pesticides, which contain a microorganism such as a bacterium or fungus as the active ingredient, and biochemical pesticides, which are naturally occurring substances such as pheromones that disrupt insect mating or plant extracts and fatty acids that inhibit feeding or stop development. Bioprotection products and biostimulants are both comprised of naturally occurring microorganisms, such as bacteria and fungi, biochemicals, such as humic acid and fulvic acids, and plant extracts, such as seaweed extract. Our product lines for crop protection are all EPA registered biopesticides. Our biostimulant and bionutrition product lines do not require federal registration and are more lightly regulated around the globe than bioprotection products.

We sell our products through distributors and other commercial partners to growers who use our bioprotection products to manage pests and plant diseases, our biostimulants to reduce crop stress and both our biostimulants and bionutrition products to increase yields and quality. Out of our Davis, California facilities we have developed and commercialized several patent-protected product lines based on various active ingredients, which we refer to in this Annual Report as our Marrone products, including our Regalia product line (based on the active ingredient knotweed), for controlling plant disease and increasing plant health, our Grandevo and Venerate product lines (based on two new species of bacteria, *Chromobacterium subtsugae* and *Burkholderia rinojensis*), each for insect and mite control, our Majestene product line and its turf and ornamentals counterpart brand Zelto (based on the same active ingredient bacterium in Venerate), each for nematode control, and our Stargus product line (based on a new strain of *Bacillus nakamurai)*, for downy mildew and white mold control and increased plant health. In addition, in 2019, we acquired the peroxyacetic acid-based plant health product lines Jet-Ag and Jet-Oxide from Jet Harvest Solutions, which we refer to in this Annual Report as our Jet products, and through our 2019 acquisition of Pro Farm Technologies OY ("Pro Farm"), we added to our portfolio bionutrition and biostimulant product lines, which we refer to in this Annual Report as our Pro Farm products, including UBP and Foramin.

All our products can be used in both conventional and organic crop production. Historically, our bioprotection products have been primarily sold to growers of specialty crops such as grapes, tree fruit, fruiting and leafy vegetables, nuts, leafy greens, medicinal plant and hemp crops and turf and ornamentals. In recent years, selling seed treatments for row crops has become a strategic focus. In January 2017, we entered into a strategic collaboration with Albaugh, LLC ("Albaugh"), to bundle our Venerate product into a seed treatment platform, which expanded our reach to row crops, including cotton, soybeans, corn and wheat. In addition, we sell our Pro Farm products as a seed treatment for corn, soybeans, sunflower and canola, and are expanding our Pro Farm product platform for seed treatment globally.

In addition to our agricultural biological products for crop protection, plant nutrition and plant health, our Marrone products also include Zequanox, a pest management 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 invasive mussel-infested Great Lakes ecosystems, including fishery habitats. As resources have necessitated our focus on our agricultural business, we are working on a strategy that will allow us to better monetize Zequanox and our algaecide water technologies.

We continue to execute on our strategic plan, which focuses our resources on improving and promoting our commercially available products, making accretive acquisitions that can accelerate our growth and revenues, 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, in the past two years, we have invested in new headcount in 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. Our research and development efforts are concentrated primarily on supporting existing commercial products with a focus on reducing cost of product revenues, further understanding the modes of action, enhancing product potency, supporting commercial manufacturing and improving formulations while also advancing a select list of pipeline products such as our herbicide and enhanced Majestene products under development.

Industry Overview

Most of the markets we currently target or plan to target primarily rely on conventional chemical pesticides and fertilizers, or, in the cases of corn, soybean, canola and cotton, genetically modified crops. However, the agrichemical industry for crop protection and the fertilizer industry for crop nutrition are facing rapid change due to regulatory actions, consumer concerns and climate change, with slower overall market growth rates worldwide and most conventional agrichemical markets maturing despite more rapid growth in some emerging agricultural markets. Phillips McDougall, an independent advisory firm, estimates the 2019 world agrichemical market at the distributor level at $57.8 billion, increasing only 0.4% from 2018, with Asia Pacific first at $17.2 billion in size, followed by Latin America at $16.7 billion, Europe at $11.3 billion, the NAFTA region at $10.4 billion and the Middle East and Africa at $2.2 billion. All regions declined in growth except Latin America, which grew at 17.6%. Non-crop pesticides such as those used for home, water, pets and animal production also grew modestly, at 3.5% to $7.8 billion. Phillips McDougall also estimates the market for genetically modified crop seeds at $22.0 billion in 2018, a decrease of 1.1% from 2017. According to the Mordor Intelligence, the global fertilizer market was $155.8 billion in 2019 and is expected to grow at 3.8% annually through 2025, with Asia-Pacific accounting for 60% of the global fertilizer market.

In contrast to these low or flat growth rates, demand for effective and environmentally responsible agricultural products continues to expand as growers increasingly turn to biological products to enhance their return on investment. The global market for biocontrol (bioprotection) products was valued by Dunham Trimmer, an independent market research firm, at $3.8 billion in 2018, and has projected this market to grow to $10 billion in 2025, reflecting a 16.5% compound annual growth rate over the period. While the biofertilizer (bionutrition) market only comprises about $2.0 billion of the global fertilizer market, according to MarketsandMarkets, it is projected to have a compound annual growth rate of 11.2% from 2019 through 2025. According to Dunham Trimmer the biostimulant market, which does not have a direct chemical comparison, has a global market value of about $2.5 billion, and is growing at 13% annually as well. We believe our current product portfolio and pipeline of technologies address this global demand, particularly in burgeoning agricultural categories like seed treatment and organic production.

Disruptive Biological Technologies

Pest Management

Growers are constantly challenged to supply the escalating global demand for food, while reducing the potentially 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. The cost and time to bring one new chemical pesticide to market is estimated to cost over $286.0 million and take an average of 11 years. In addition, major agrichemical companies have invested billions of dollars to develop genetically modified crops that resist pests or have selectively high tolerance to certain conventional chemical pesticides.

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 classes of conventional chemical pesticide usage. In the European Union ("EU"), many conventional chemical pesticide products have been phased out by key agriculture producing nations, such as France. Also, this trend to ban certain chemical pesticides has expanded into local government levels, where many city and county governments have prohibited the use 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 potential unintended effects of genetically modified crops, including pest and weed resistance. Many weed species have developed resistance to glyphosate, the most widely used herbicide that is sprayed over soybean, corn and cotton crops genetically engineered to tolerate this chemical. Crops resistant to the herbicide dicamba have been recently developed to partially address expanding resistance of weeds to glyphosate, but they are already are facing resistance from growers and state governments due to damage to neighboring crops from dicamba drift. Corn rootworm, a key pest of corn in the United States, has evolved resistance to most of the engineered traits.

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. We have focused attention to the benefits of integrated programs, branding programs that use our products together with traditional products in tank mixtures or rotations as BioUnite™ - the power of biology with the performance of chemistry. With field trials and demonstrations in various crops, we have quantified the added economic return to growers of the combined program compared to their chemical-only program, showing a higher yield and quality.

Plant Nutrition

Crop nutrition products can be based on natural or synthetically made materials. Chemical fertilizers are under scrutiny because their overuse causes run off and pollution of surface and ground waters. For example, nitrate pollution from nitrogen fertilizers and animal wastes in groundwater has created a widespread water quality problem that can pose serious health risks to pregnant women and infants. As such, a number of mandatory and voluntary programs have been developed by the California State Water Resource Control Board and California Regional Water Quality Control Board to address past and future nitrate pollution. Phosphorus is also a common component of mineral and manure fertilizers, but a large portion of phosphorus applied as fertilizer is not taken up by plants and either builds up in the soil or washes into rivers, lakes and coastal seas or seeps into ground water. This has caused dead zones in the Gulf of Mexico, algal blooms in the Great Lakes and eutrophication. Also, research is increasingly demonstrating the negative impact that synthetic fertilizers have on soil health and the soil microbiome. The support and promotion of soil health has become a key focus and goal of more sustainable agricultural practices that reduce chemical inputs, help mitigate climate change and increase farm profitability, e.g. regenerative agriculture.

On the other hand, bionutrition products can reduce the need for chemical fertilizers by increasing the efficiency of plant uptake of crop nutrients and by providing or generating necessary plant nutrients without the need for chemical fertilizers, such as with nitrogen-fixing bacteria. Our Pro Farm portfolio of technologies of foliar, soil and seed treatment products, enhances growth and yields with much smaller quantities of plant nutrients than would normally be applied to crops by combining key micronutrients with bio-based macromolecules from processed wood waste. We also formally collaborate with the Plant Nutrition division of Compass Minerals to mine our collection of microorganisms for those that help plants take up nutrients more efficiently.

Plant Health

Plant health products are generally referred to in the industry as plant biostimulants, which the Agriculture Improvement Act of 2018 (the "2018 Farm Bill") proposed to define as "a substance(s) or micro-organism(s) that, when applied to seeds, plants, or the rhizosphere, stimulates natural processes to enhance or benefit nutrient uptake, nutrient efficiency, tolerance to abiotic stress, or crop quality and yield." Since plant stimulants are registered by individual states instead of by the EPA, this is the first time that there is a proposed national definition for this category in the United States.

While various coalitions around the world continue work on a common national or international regulatory framework for biostimulants, because of the lower regulatory barriers, there are many more companies developing and selling biostimulants than bioprotection products, and the quality and efficacy of some of the biostimulant products may not match the manufacturers' claims. We entered this market in 2018 with Haven, a coconut extract based abiotic stress protectant developed for increasing crop yields and quality, especially when crops are stressed by drought and UV radiation (sunburn) conditions.

Key Agricultural Categories

Seed Treatments

We believe that seed treatments, where crop protection, crop nutrition and plant stimulant products are applied to the surface of seeds before or at planting, are the breakout category for biological agricultural products. While industry estimates vary, our research shows that the global seed treatment market was approximately $4.7 billion in 2018, and Absolute Reports, a market research firm, estimates the biological seed treatment market to grow at a compounded annual growth rate of 11% to $1.38 billion in 2023. Most seed treatments today consist of chemical pesticides enhanced with biostimulant and bioprotection technologies. Indeed, one of our Marrone product lines is now used as a seed treatment, both alone and stacked with other Marrone products, and two other product lines as well as our Pro Farm products are in development as seed treatments.

Organic Production

Certified organic crops such as food, feed, fiber and ornamental plants, are produced without the use of synthetic chemical pesticides and fertilizers, genetic modification or any other bioengineering or adulteration. As such, organic growers are limited in the number of alternatives for pest management and crop nutrition. The U.S. Department of Agriculture, or the USDA, published national production and labeling standards for organic food marketed in the United States in 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 2019, U.S. organic sales of food and fiber were $52.5 billion, of which $47.9 billion were organic food sales, representing 5.7% of all food sales. In 2018, organic food sales grew 6.3% compared to only 2.3% growth for total food sales. Organic fruits and vegetables comprised $17.4 billion of sales in 2018, up 5.4% from 2017. Globally, organic food sales surpassed $100 billion in 2018, with 71.5 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. All of our EPA-registered products on the market today are certified for use in organic farming.

Regenerative Production

Regenerative agriculture, while not a new concept, has experienced a resurgence as growers seek to bring further resilience and sustainability to farming. Regenerative agriculture is a system of farming principles and practices that increases biodiversity, enriches soils, improves watersheds, enhances the ecosystem and promotes higher health and vitality for farming and ranching communities, while at the same time offering increased crop yields and resilience to climate instability. Robert Rodale, founder of the Rodale Institute, recently coined the term "regenerative organic" to describe a holistic approach to farming that goes beyond the current organic certification to also consider pasture-based animal welfare, fairness for farmers and workers, soil health and land management. Biological products fit well into regenerative agriculture by improving growers' bottom line without harm to the environment and in some cases improving soil health. In February 2020, we announced a study conducted with the help of the University of California Graduate School of Management that showed that our products have a lower carbon footprint than competing chemical pesticides. In addition, Ennoble, a biofumigant we are developing, was shown in an internal study to reduce harmful plant pathogens while enhancing the microbiome of soil microorganisms, known to be beneficial to soil and plant health.

Other Target Markets

We are also taking steps to commercialize our existing crop protection products, or variations thereof, for other markets. For example, we have launched our Cultivated Garden (CG) versions of Regalia, Grandevo and Venerate for greenhouse, ornamental and medicinal plant use. Although conventional chemical pesticides have traditionally serviced these 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.

In addition, we have developed Zequanox to address the damage caused by invasive zebra and quagga mussels, which clog pipes, disrupt ecosystems, encrust infrastructure and blanket beaches with razor-sharp shells. 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 human health and are coming increasing scrutiny by regulatory agencies.

Benefits of Biological Agricultural Products

While conventional chemical pesticides are often effective in controlling pests, some of these chemicals are acutely toxic, some are suspected carcinogens, and neurotoxins, and some can have other harmful effects on the environment and non-target organisms, such as pollinators and fish. 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 are banned or severely limited and the importation of produce is subject to strict regulatory standards on pesticide residues. Over the past two decades, U.S. regulatory agencies have also developed stricter standards and regulations, especially California, which, for example, recently restricted the use of the insecticide chlorpyrifos, along with New York and Hawaii. 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. 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. Twenty-five percent of carbon emissions come from agriculture. Therefore the carbon footprint of agricultural production is under scrutiny, with an increased focus on production practices, tools and technologies that can be more climate friendly, including reduced and more efficient use of crop inputs, including and pest management, plant nutrition and plant health products.

With increasing costs, regulatory and consumer pressure on conventional chemical pesticides, fertilizers and genetically modified crops and the efficacy of biological pest management, plant nutrition and plant health products become more widely recognized among growers, biological agricultural products are gaining popularity and represent a strong growth sector. Growers are increasingly incorporating biological products into their integrated pest management (IPM) production programs as they recognize biological products can increase yields, quality and return on investment. Biological products help create the type of sustainable, regenerative agriculture programs that growers, consumers and food companies increasingly emphasize.

Many biological products can perform as well as or better than conventional agricultural products. The low cost of gene sequencing and advancements in molecular tools, such as tools to measure plant and microbe responses, at a genetic level, to external stimuli (e.g. fermentation media, bioprotectants and biostimulants) and new formulation technologies have led to significant improvements in the development of biological products. When used in rotation or in spray tank mixtures or combined on the seed with conventional chemical products, biological products can increase crop yields and quality over chemical-only programs. Industry reports, as well as our own research, indicate that biological products can affect plant physiology and morphology in ways that may improve crop yield and can increase the efficacy of conventional chemical products. In addition, pests rarely develop resistance to bioprotection products due to their complex modes of action. Likewise, bioprotection 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 biological products are listed for use in organic farming, providing those growers with compelling options to protect or increase yields and quality. Given their generally lower toxicity compared with many conventional chemical products, biological products can add flexibility to harvest timing and worker re-entry times and can improve worker safety. Many bioprotection products are also exempt from regulations limiting residues levels that apply to conventional chemical pesticides. Bioprotection products may not be subject to chemical residue restrictions by food retailers and governmental agencies (“exempt from tolerance”), which provides growers with greater flexibility to use biological products in the critical last few sprays before harvest and still allow growers export their crops to the higher priced and array of export markets.

From an environmental perspective, biological products have significant advantages over conventional agricultural products, which not only helps growers and consumers, but also can reduce development and commercialization costs. Biological products have low toxicity, posing low risk to most non-target organisms, including humans, other mammals, birds, fish and beneficial insects. Biological products are biodegradable, resulting in less risk to surface water and groundwater and generally have low air-polluting volatile organic compound content. In addition, biological products can increase soil health, fit into regenerative agriculture systems and reduce growers' carbon footprint, largely due to the significantly lower overall energy consumption in the manufacture of biological products. Because biopesticides tend to pose fewer risks than conventional pesticides, bio pesticides typically require significantly fewer toxicological and environmental safety studies to demonstrate product safety. The reduced time to review a smaller data package usually associated with biopesticides results in a lower registration fee. As a result, both the time and money required to bring a new product to market are significantly reduced.

Our Solution

We produce novel, cost competitive and effective biopesticide/bioprotection, bionutrition, and biostimulant products that are designed to be compatible with existing pest management and crop production practices, equipment and infrastructure. This allows them to be used as alternatives to, or mixed with, conventional chemical pesticides and fertilizers. Additionally, our products are available in markets for which there are no available conventional chemicals or the use of conventional chemical products may not be desirable or permissible because of health and environmental concerns, or because the development of pest resistance has reduced the efficacy of conventional chemical pesticides. We believe that compared with conventional chemical products, our products:

- can be competitive from a cost benefit perspective and provide added return on investment to our customers;
- 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 fertilizers and genetically modified crops are subject to regulatory restrictions;
- meet stringent organic farming and regenerative organic requirements;
- comply with market-imposed requirements for sustainability 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;
- can result in significant net reductions in greenhouse gas emissions; and
- are environmentally and pollinator friendly.

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

- increase the effectiveness of conventional chemical products while reducing their required application levels;
- increase levels of pest control and consistency of control;
- increase plant vigor and 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.

Finally, we are proud of the results of our recently completed study, conducted in cooperation with the UC-Davis Graduate School of Management, showing that switching from conventional chemical pesticide products to our current biopesticides would, potentially, result in average net reductions of greenhouse gas emissions of 69% to 91% (or 39 to 46 Kilograms of CO_2 equivalents per acre per year). We believe the environmental benefits of our products and our promotion of environmental stewardship, social responsibility and good governance ("ESG") through our leadership in the sustainable agriculture movement puts our Company in a strong market position as customers, strategic partners, investors and other stakeholders continue to assess ESG factors in their decision making.

Our Competitive Strengths

Commitment to Biological Products

Our belief in and commitment to our vision is our greatest strength. We believe that the world needs more regenerative, organic and sustainable products and practices, and our goal is to champion that cause with transparency for consumers, and affordability and high performance for growers. Our experience has shown that by using biological pest management, plant nutrition and plant health products, growers can benefit the environment and produce healthier food while improving yields. Additionally, biological products have modes of action that differ fundamentally from conventional chemical products. We believe MBI has long been recognized as a thought leader in the biological 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 agricultural acres to these sustainable practices will make us disruptive. We believe biological products are the future of agriculture.

Commercially Available Products for Fast Growing Market Categories

Our commercially available biological product portfolio provides growers with comprehensive solutions from planting to harvest: increasing plant vigor and health, controlling pests and diseases, reducing crop stress, increasing yields and improving plant nutrient use efficiency, all of which provide growers a better return on investment for their farming operation. We currently offer six EPA-approved crop protection lines, including Regalia, Grandevo, Venerate, Majestene/Zelto, Stargus, and our recently acquired Jet-Ag/Jet-Oxide offering. We also offer Haven, an abiotic stress solution that is not subject to EPA registration and that we introduced in 2018, and our subsidiary Pro Farm, which we acquired in September 2019, has a portfolio of bionutrition and fertilizer products based on the similar technology for use as seed, soil and foliar treatments, including UBP Seed Treatment, UBP-110, Foramin ST 0-0-11, and Foramin 0-0-8. In addition, in January 2017, we entered into a strategic collaboration with Albaugh for our Venerate product, to be included in their seed treatment platform, which expanded our reach to seed treatment and several millions of acres of row crops including cotton, soybeans and corn. In 2018 we launched the CG (Cultivated Garden) line for Regalia, Grandevo and Venerate, which is targeted for medicinal plant growers, greenhouse flower and vegetable growers, home gardeners and small acreage farmers.

We believe we will be able to leverage growers' positive experiences using our older products to accelerate adoption of our newer products, increasing the number of product applications in the same season and optimizing our product portfolio. 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, we will continue to pursue opportunities to broaden the commercial applications and expand the use of our industry-leading portfolio of existing products lines into several key end markets, including large-acre row crop applications, seed treatment, turf, medicinal plant and hemp crops, forestry and public health to help drive significant growth for our company.

Highly Characterized and Proprietary Natural Product Chemistries

Our products generally have modes of action that are often both complex and novel. Our expertise in natural product chemistry and analytical chemistry enables us to identify and characterize the compounds produced by the microorganisms, which we optimize and patent. Because we can measure key active compounds in product fermentation and formulation, and do not need to rely on live microbes, we have developed products that are more consistent from batch to batch, have longer shelf lives and allowing them to be more effective against a broader spectrum of pests and applications. We believe this also enables our products to be more effective than competitor biological products that are based solely on live microorganism with little or no characterization of the active biochemical compounds. Our focus on the natural product chemistries allows us to continually drive lower costs, higher product gross margins and efficacy through higher yields and potency. Further, as a result, our technology does not just include patents related to microbes, but also patents and trade secrets related to the work we have done to characterize, formulate, develop and manufacture our products, giving us a strong proprietary position in all our commercialized product lines.

Rapid and Efficient Development Process

We believe we have demonstrated our ability to develop and commercialize novel and effective products faster and at a lower cost than most developers of biological products. For example, we have moved each of Regalia, Grandevo, Venerate, Majestene/Zelto, Stargus, 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 per product. Thereafter, we have continued to develop and refine these products, reducing manufacturing costs, producing new formulations, applying for expanded use labels and seeking new overseas markets, in each case at a cost of less than $10.0 million per product line internationally. 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.

In-House Manufacturing Capabilities

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 certain of our products in-house, including our National Organic Program compliant products. In 2017, we completed a medium-scale granulation line for Grandevo WDG (Wettable Fry Granule). In 2018, we completed the installation of an automated packaging and labeling line. 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 our Venerate, Majestene/Zelto, Haven, Pro Farm and Jet-Ag products and for spray-dried powder formulations of Grandevo and Zequanox. We are developing plans to retrofit our fermentation tanks in order to permit manufacture of Venerate and Majestene at our plant, and we also expect to bring Haven production into the plant in 2020. We also have a 12% ownership interest in the Russian plant that supplies third party vendors with raw materials for and produces some of our Pro Farm products.

Our Growth Strategy

Develop Integrated Programs Under the BioUnite Brand

Our products are not "for organic use only." We have shown that integrating biologicals into agricultural programs with conventional products can provide higher yields and quality than chemical-only programs across a broad range of specialty and row crops. We have branded the integrated program "BioUnite": "the power of biology with the performance of chemistry." We believe this approach is driving growth and market share in our targeted key crops.

Promote and Enhance Seed Treatment Portfolio

We expect that eventually, substantially all seeds for use in modern agriculture will be treated with one or more biological products. Accordingly, promoting and enhancing our seed treatment portfolio has been a strategic focus for our company. Since 2017, our Venerate technology has been used in Albaugh's BIO st-branded seed treatment products, stacked along with their traditional chemistries and our technology is also used in Albaugh's all-biological seed treatment for organic production. We have also developed an all-biological treatment with Groundwork BioAg's *mycorrhizae* technology, which has shown efficacy as good as or better than competing seed treatments, whether using synthetic chemicals alone or in combinations with other biological products. Our recently acquired subsidiary Pro Farm is rapidly expanding our global revenues from seed treatments, especially in Europe, where Pro Farm has entered into a strategic, long-term exclusive commercial agreement with Corteva, Inc., one of the two largest seed companies in the world, to develop and commercialize a suite of seed-applied biological products based on our proprietary Pro Farm technology platform. In Latin America, hundreds of trials and demos are underway for seed treatment use of our portfolio of Marrone and Pro Farm bionutrient and bioprotection products.

Acquire or License Accretive Products and Technologies

We actively search for products and technologies that can enhance our portfolio and grow our business. In the third quarter of 2019, we acquired Pro Farm and two product lines from Jet Harvest Solutions. The Pro Farm acquisition provides us with an expanded international footprint in markets where biologicals are growing faster than the United States and significantly expanded our seed treatment portfolio. We expect sales of our Pro Farm products to drive rapid growth at gross margins that are expected to be higher than our current bioprotection products, and such sales contributed significantly to our revenues in the fourth quarter of 2019. Our Jet products are complementary to our fungicide product lines, Regalia and Stargus: Regalia and Stargus prevent fungal and bacterial diseases, while Jet-Ag and Jet-Oxide can clean them up after they are already present.

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. Our acquisition of Pro Farm has catapulted our international business, especially in Europe where we expect Pro Farm products to be applied to 10 million hectares in the 2020 and 2021 growing seasons through a collaboration with Corteva, Inc. one of the largest global seed companies. As bionutrition and biofertilizer products, our Pro Farm lines can enter international markets sooner than our bioprotection products. We also expect our acquisition of Pro Farm will be a driver of growth in Latin America, where we are conducting hundreds of trials and demonstrations.

Leverage Our Technology Through Collaborations

Our focus and expertise in biological products and natural product chemistries, as well as our 18,000-specimen microbial collection that is rich in pipeline product candidates, allow us to be a partner of choice for other businesses looking for development partners and for larger companies wanting to leverage their technology into new combination products. For example, Compass Minerals has partnered with us to tap into our microbial collection and potentially combine our technologies and resources with their plant nutrients to develop new products that improve the efficiency of plant nutrient uptake. In addition, Valagro has partnered with us to combine their seaweed extracts with our microorganisms to create products with enhanced functionality and value for growers.

Our Products Lines

Marrone Product Lines

The table below summarizes our current portfolio of commercially available Marrone product lines, 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	USE	DESCRIPTION	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, 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, 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/Soil-Borne Insects	Controls soil-dwelling nematodes by preventing and reducing root galls, and by reducing adult reproduction and egg hatch. Also control certain soil borne insects.	Commercially Available Domestically, International Expansion Efforts Underway
Stargus (liquid formulation)	Crop Protection, Home and Garden, Turf and Ornamentals, Seed Treatment	Plant Disease/Plant Health	Protects against fungal and bacterial diseases and enhances yields	Commercially Available Domestically, Canada and Mexico. International Expansion Efforts Underway
Haven (liquid formulation)	Crops, Home and Garden, Turf	Sun stress/Plant Health/Quality	Reduces sun stress and dehydration and increases yields and quality	Commercially Available Domestically and in Canada
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 Product Line

- Biofungicide,
- Crop Protection (Specialty and Row Crops), Home and Garden, Ornamentals, Seed Treatment
- Commercially Available Domestically and Internationally

Regalia is the master brand name for our plant extract-based fungicidal biopesticide, or "biofungicide," product line.

Regalia is a liquid formulation 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 have field tests underway, 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 first 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 have since developed improved and expanded product versions as shown in the table below.

LABEL	APPROVAL YEAR	USDA NOP STATUS	CONCENTRATION	KEY DEVELOPMENT / NEW USE
Regalia SC	2008	Not organic	5%	Limited label
Regalia	2010	Organic	5%	Expanded crops; California label
Regalia	2011	Organic	5%	Soil applications
Regalia Rx	2012	Organic	5%	Row crops plant health, yield claims
Regalia Maxx	2012	Organic	20%	International market formulation
Regalia	2016	Organic	5%	Better mixing formulation
Regalia CG	2018	Organic	5%	Medicinal plant and other indoor uses
Regalia	2020	Organic	5%	Hemp
Pacesetter™	2020	Organic	12%	Concentrate for row crops

Grandevo Product Line

- Bioinsecticide, Biomiticide and Bionematicide
- Crop Protection (Specialty and Row Crops), Home and Garden, Turf and Ornamentals, Seed Treatment
- 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-ARS in Beltsville, Maryland, and which we have licensed and commercialized. Grandevo is a powerful feeding inhibitor: insects and mites become agitated when encountering it, stop feeding in less than one minute, and will starve, or, if they do ingest it, die from disruption to their digestive system. Grandevo also reduces the number of eggs or offspring of many target insects and mites. Grandevo is particularly effective against certain chewing insects (such as caterpillars, some weevils such as pecan weevil and beetles) and sucking insects (such as *Lygus* 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*. 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, white grubs in turf grass. Grandevo has also shown efficacy against corn rootworm, a major pest of corn, which has reportedly developing been resistance to corn engineered for rootworm control. Grandevo has also 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. Grandevo has been tested over three years in the United States in-furrow and as a seed treatment for soil insects and nematodes on corn, soybeans, cotton and wheat. In 2019 seed treatment trials in Europe showed good performance, resulting in higher yields on corn. As liquid formulations are favored in the seed treatment market, a key strategic area for our company, we have developed and are testing a new liquid formulation of Grandevo that is not yet commercially available.

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 also have an issued patent on the water dispersible granule formulation of Grandevo. All Grandevo formulations are USDA National Organic Program compliant.

Field trials supporting international expansion of Grandevo are underway or completed in many key countries around the world. 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 bacterial cells, to be evaluated as a microbial pesticide. Until this EU decision, only pesticides containing live microbes could be evaluated under EU regulation. Grandevo is also 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." Grandevo has received completeness determination from the Netherlands, and the process has begun for the evaluation for Annex 1 listing and commercialization in the EU. A draft decision completed by the Netherlands in 2016 recommended we conduct certain additional toxicology and product characterization studies which are scheduled for completion in 2020. Thereafter, we plan to re-submit Grandevo to the EU in 2021. Our main product labels for our Grandevo product line, as well as our next anticipated label, are summarized in the table below:

LABEL	YEAR	FORUMLA TYPE	KEY DEVELOPMENT / NEW USE
Grandevo SC	2011	Liquid	Limited label in Florida
Grandevo	2012	Wettable Powder	Expanded crops and states
Grandevo	2016	Wettable Powder	Bee friendly EPA label
Grandevo	2016	Wettable Powder	Mexico approval
Grandevo WDG	2016	Water Dispersible Granule	U.S. approval and launch
Grandevo CG	2018	Water Dispersible Granule	Cannabis; other indoor applications
Crescendo	2018	Water Dispersible Granule	Turf applications for Albaugh
Grandevo ST	2018	Wettable Powder	Seed treatment
Grandevo SC v2	*Anticipated*	Liquid	For all crops; in development

Venerate Product Line

- Bioinsecticide and Biomiticide
- Crop Protection, Home and Garden, Turf and Ornamentals
- Commercially Available Domestically and in Mexico, International Expansion Efforts Underway

Venerate, a liquid formulation, 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, that on contact, act as a novel growth regulator, disrupting molting and development to the next stage. This mode of action is complementary to the anti-feeding effects of Grandevo and we often recommend them both in programs, starting with Grandevo before populations increase then with Venerate for population control. We have conducted field trials on several crops and insects and mites, many of which show efficacy as good as leading conventional chemical pesticides. Like Grandevo, 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, and certain caterpillars and weevils. Venerate controls some pests that Grandevo is weaker on such as scales, walnut husk fly and pepper weevil, while Grandevo is better on spotted wing drosophila and pecan weevil. Both work well on mites, Lygus, thrips, whiteflies, psyllids and mealybugs. We have focused on the application of Venerate against navel orangeworm on almonds with our BioUnite program in California. All commercial formulations of Venerate are USDA National Organic Program Compliant.

We have received a U.S. patent on the microorganism and received patents on the natural product compounds that demonstrate insecticidal and nematicidal activity, and 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 BIO ST products. In 2019, Venerate was applied to five million acres of cotton, corn and soybeans in the United States.

Field trials for international expansion of Venerate are underway or completed in many key countries around the world. Our main product labels for our Venerate product line, as well as our next anticipated label, are summarized in the table below:

LABEL	YEAR	FORMULA TYPE	KEY DEVELOPMENT / NEW USE
Venerate	2014	Liquid	US Launch
Venerate XC	2016	Liquid	Increased natural product compounds, reduced rate by approximately 2X
Venerate XC	2016	Liquid	Approved in Mexico
Venerate XC	2016	Liquid	Used by Albaugh in their BIOST seed treatment
Venerate CG	2018	Liquid	Medicinal plant; other indoor applications
Venerate	*Anticipated*	Liquid	Increased potency formulation

Majestene Product Line

- Bionematicide and Bioinsecticide
- Crop Protection, Ornamentals and Turf, Seed Treatment;
- Commercially Available Domestically; International Expansion Efforts Underway

Majestene is a bionematicide and soil insecticide we have developed based on the microorganism in Venerate. This nematicide is active against a broad range of nematodes, and in field trials it has been as effective as 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, sweet potato, and banana. We consider our new improved Majestene product (MBI-306) that we are developing to be one of the most promising new products for the company. In 2019, we demonstrated high performance of this version in furrow on corn and soybeans and for soil and foliar treatments of nematode and insect pests at substantially lower rates per acre than our current product. In some trials, it outperformed Majestene and the current commercial chemical standard, and also outperformed Venerate XC against foliar insects. R&D and Regulatory are conducting all the work to submit MBI-306 to the EPA in late 2020 or early 2021. All commercially available Majestene formulations are USDA National Organic Program compliant. We have been issued a U.S. patent for use of the bacterial strain in Majestene/Zelto for use as a nematicide. Our main product labels for our Majestene product line, as well as our next anticipated label, are summarized in the table below:

LABEL	YEAR	FORMULA TYPE	KEY DEVELOPMENT / NEW USE
Majestene	2014	Liquid	EPA label approval
Majestene	2015	Liquid	Expanded label
Majestene	2016	Liquid	US launch
Zelto	2018	Liquid	Turf and ornamentals
MBI-306	*Anticipated*	Liquid	Active R&D program; reduce use rate

We have been issued a U.S. patent for use of the bacterial strain in Majestene/Zelto for use as a nematicide.

Stargus Product Line

- Biofungicide
- Crop Protection, Home and Garden, Turf and Ornamentals, Row Crops
- Commercially Available Domestically, Approved in Canada and Mexico; International Expansion Efforts Underway

Stargus is based on microbial fermentations of a newly identified *Bacillus nakamurai* strain we isolated using our proprietary screening platform. Stargus is a biofungicide, 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 that control a broad range of plant diseases. We have received a U.S. patent covering fungicidal uses and have been issued a U.S. patent on related claims. We have also completed sufficient field trials in Europe to support uses on potatoes, grapes and sugar beets, and anticipate submitting Stargus to the Netherlands, as our EU rapporteur member state, in 2020. We are producing Stargus with a third-party manufacturer. All Stargus formulations are USDA National Organic Program compliant. Our main product labels for our Stargus product line, as well as our next anticipated label, are summarized in the table below:

LABEL	YEAR	KEY DEVELOPMENT / NEW USE
Stargus	2017	EPA approval; 4th quarter launch in selected states
Stargus	2018	US launch
Stargus	2019	Canada and Mexico approval
Stargus	2020	California approval and EPA approval for hemp
Stargus	*Anticipated*	Concentrated version for international markets

Haven Product Line

- Plant Health
- Crops, Turf and Ornamentals
- 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 (coconut) 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. Haven also increases the plant's uptake of water and nutrients when under stress. 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 over the last four years have demonstrated increased yields, plant growth and/or quality of almonds, walnuts, apples, corn, tomatoes, blackberries, grapes and citrus. As an abiotic stress solution, Haven does not require EPA registration, and we launched Haven commercially in March 2017. We received California approval in January 2018 and approval for Canada in December 2018. Commercialization efforts are also underway in the European Union, Mexico, Brazil and other Latin American countries. Our main product labels for Haven product lines are summarized in the table below:

LABEL	YEAR	KEY DEVELOPMENT / NEW USE
Haven	2017	U.S. launch
Haven	2018	California
Haven	2019	Canada

Zequanox

- Biomolluscicide
- Water Treatment: Targets Invasive Mussels (In-Pipe and Open Water Habitat Restoration)
- Commercially Available Domestically and in Canada
- 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.

Zequanox is the only EPA-approved product for open water application in the United States other than copper, which is rarely used due to its negative environmental effects. 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. Their patents under this license have since expired and we have no further obligations under this agreement.

We have not allocated any research and development resources to Zequanox since 2014, as we have elected to prioritize our agriculture business, however we continue to work with selected power and industrial customers for in-pipe treatments, as well as with government and non-governmental organizations for open water treatments, including a successful fisheries habitat restoration treatment in Lake Michigan.

Pro Farm and Jet Product Lines

The table below summarizes our current portfolio of commercially available Pro Farm and Jet product lines:

NAME	MARKET	USE	DESCRIPTION	STATUS
UBP / Foramin (dry formulation)	Crops, Home and Garden	Fertilizer; Foliar; Seed Treatment	Nutrient complex for increasing plant health, yield and quality	Commercially Available Internationally (UBP) and Domestically (Foramin)
LumiBio Valta / Kelta (liquid formulation)	Crops, Home and Garden	Seed Treatment	Nutrient complex for increasing plant health, yield and quality	Commercially Available Internationally
Jet-Ag and Jet-Oxide (liquid formulation)	Crops, Turf and Ornamentals	Plant Disease; Sanitation	Stops molds and bacteria on plants and other surfaces	Commercially Available Domestically and in Canada

Pro Farm Product Lines

- Bionutrition (Fertilizer, Foliar, Seed Treatment)
- Crops, Home and Garden
- Commercially Available Domestically and Internationally

Our commercially available Pro Farm product lines are biological fertilizers in various formulations based on the same underlying technology. We use renewable forestry industry byproducts, specifically tree waste from pulp and paper manufacturing processes to produce a molecular level complex that contains macro- and micronutrients in its matrix. In our proprietary process, organic acids and biopolymers are complexed with nutrients into a single organic molecular complex that allows plants to absorb up to 16 beneficial elements in a novel and more effective way (i.e., at a lower dose and lower cost). The nutrient composition and novel nutrient delivery mechanism are designed to have an overall positive effect on the plant physiology, mitigating adverse effects of abiotic stress and improving both yield and quality, especially under less favorable conditions. The technology is protected by two issued patents with a U.S. patent application pending. Our Pro Farm subsidiary has entered into a strategic, long-term exclusive commercial agreement with Corteva, Inc. to develop and commercialize a suite of seed-applied biological products based on our proprietary Pro Farm technology platform. Corteva has announced that they intend to use our Lumi-Bio-branded seed treatment products on 10 million hectares (corn, sugar beets and canola) for the 2020/2021 growing season.

Jet-Ag and Jet-Oxide Product Lines

- Fungicide and bactericide
- Crops, Turf and Ornamentals. Structures, surfaces and pipes
- Commercially Available Domestically and Canada

Jet-Ag and Jet-Oxide are peroxyacetic acid-based plant health product lines. Prior to acquiring our Jet products in September 2019, we distributed Jet-Ag in certain regions of the United States pursuant to an agreement we entered into an agreement with Jet Harvest Solutions in May 2017. This prior experience as a distributor has allowed us to quickly begin integrating the acquired Jet-Ag and Jet-Oxide technology into our overall platform. For example, we have conducted early research into the use of Jet-Ag in conjunction with our Stargus fungicide to control white mold in dry bean production. Compared with the untreated control, we saw a 66% reduction in the incidence of white mold, and somewhat improved control versus the standard chemical treatment. We believe this is one of the many possible applications for growers to use Jet-Ag/Jet-Oxide in an integrated disease management system. We are also aware that many growers have been using a tank-mix of Regalia and Jet-Ag/Jet-Oxide for disease control on a variety of horticultural crops.

We believe that our Jet-Ag portfolio opens opportunities for us in the disinfectant market, as sanitation is an increasing concern in agriculture particularly with the recent implementation of portions of the federal Food Safety Modernization Act, that targets management and reduction of food-borne microbial pathogens. In addition, a new regulation in California will require sanitation of water used on leafy greens. We believe the Jet-Ag biological solution can give organic and conventional growers alike a proven option with a strong crop safety profile.

Product Pipeline

Our pipeline of Marrone products consists of two product lines under active development, MBI-306 and MBI-014/015, as well as 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 Marrone pipeline candidates, focusing first on those that are expected to have the greatest near-term growth potential and fill the greatest unmet market need.

MBI-306 ("Majestene 3.0")

- Bionematicide, Bioinsecticide and Biomiticide
- *Crop Protection, Home and Garden, Turf*
- *Under Development*

MBI-306 is an enhanced version of Majestene (which we refer to as "Majestene 3.0" or "Super Majestene")) that significantly increases the level of the pesticidal compounds produced in fermentation. As a result, the dose rate used on crops is much lower than the present version of Majestene, with targeted reduction of the amount of product used on the seed from approximately 6.0 oz/acre to 0.5-1.0 oz/acre. We believe this will provide us a more competitive product for seed treatment. For soil uses, such as in-furrow applications, 2019 field trials showed that the use rate can drop from the current 128 oz/Acre to a significantly lower 10.5-21.0 oz/acre while still providing the same control of corn rootworms and seed corn maggots. MBI-306 is different enough from Majestene that it requires a new submission to the EPA. We are currently conducting toxicology studies, fermentation and formulation work in order to prepare for the new submission.

MBI-014 and 015

- Bioherbicide
- Crop Protection, Home and Garden, Turf
- Under Development

MBI-014 and MBI-015 (formerly referred to as MBI-010) are 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-014/015 is manufactured using different fermentation process to produce 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-014/015 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 glyphosate. MBI-014/015 have also demonstrated a novel mode of action, and some of their 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 been issued patents 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.

MBI-014 was submitted to the EPA in August 2018. The EPA subsequently requested additional toxicology studies, which have been completed and the dossier is being prepared for submission to EPA in 2020. During the time spent conducting the additional EPA requirements, we developed an improved, more concentrated, lower cost version, MBI-015. Field trials in 2019 showed that we can control pigweeds, specifically palmer amaranth, one of the worst weeds around the world, nearly as well as glufosinate, the commercial standard. As a different formulation, MBI-015 may require separate product registration from the MBI-014 dossier we are currently reviewing whether such registration is required. We plan to consult with the EPA in 2020 on the data requirements for submitting MBI-015, and additional crop safety studies are being planned.

Other Pipeline Candidates

We have also developed patented technology relating to a number of other Marrone product candidates, including MBI-601, a biofumigant based on novel and proprietary genus of fungus that has received EPA and California approvals, 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 in combination with Regalia and a pre-mixture combination of reduced risk fungicides with Regalia. We have a collaboration with another company to develop a pre-mixture of Regalia with a commercial fungicide and, also, to develop Venerate in a pre-mixture with a commercial insecticide.

We have also discovered several microorganisms with algaecidal activity, some of which have been 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 shows enhance nutrient uptake in plants, reduce stress and otherwise increase plant growth. In 2019 we developed two significant collaborations with these types of microorganisms – with Compass Minerals Plant Nutrition and Valagro. We have selected a subset of our microorganisms to develop plant nutrient products with Compass Minerals that can enhance the uptake of nutrients by the crop and that can enhance seaweed-based biostimulants with Valagro.

Sales, Marketing and Distribution

In the United States, we sell our Marrone, Jet and soon in the future the Pro Farm foliar, products through our own internal sales force, which consists of 15 employees focused on managing distributor relationships and creating grower demand for our products. In addition, a dedicated team of 8 employees provide technical service support to both our customers and sales representatives on the use of our products in IPM and crop production 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, Jet-Ag and Jet-Oxide, 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.

With respect to sales of Marrone products 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), Jocanima (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 sell our Pro Farm products through selected distributors in Europe, Asia and Latin America. For example, Pro Farm has an exclusive contract with Corteva, one of the largest seed companies, to sell seed treatment products in Europe. Pro Farm is also working with numerous companies to improve their biological offerings, such as PGG Wrightson in Uruguay, Agropartners in Bolivia, Agrofertil in Paraguay, EcoRural in Argentina and Ruchi Hi Rich in India. We expect our acquisition of Pro Farm to expand our global distribution network, especially in Latin America. We are hiring sales managers for our Pro Farm products in key territories to help achieve our growth goals and provide support to our seed and distribution customers. We believe we can leverage our existing sales, marketing and distribution network, finding synergies between operations for our Marrone and Pro Farm products, to bring in additional revenues, while enhancing our overall product portfolio.

We derived approximately 88% and 93% of our total revenues from Regalia, Grandevo and Venerate for the years ended December 31, 2019 and 2018, 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, 2019, our top two distributors accounted for 40% of our total revenues. Approximately 90% of our business has historically been from the U.S. markets. By 2021, however, we expect that mix to shift significantly due to both sales generated through our Pro Farm subsidiary, sales of our Pro Farm products and continued progress on registrations of our collective product lines in new countries.

While the biopesticide industry has been growing, customers in the crop production sectors are generally cautious in their adoption of new products and technologies and may perceive biological agricultural products as less attractive than conventional products. Growers often require on-farm demonstrations of pest management or plant health products, and based on their novel modes of action compared to chemical products, our customers 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 have rebuilt our sales and marketing teams, following major turnover in late 2017 and early 2018, 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, and unwavering belief in the potential and value of biologicals for crop production 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 build 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 biological pest management, plant nutrition 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 products 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 of association, a grower will then in the second year try one of our products on smaller plots of land and on one crop only to ensure successful application, a typical grower will then progress continued use of our products in future years across more acres, more crops and more products from our product portfolio. 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 our biological pest management, plant nutrition and plant health products, we target large commercial growers, who generally set industry standards through more widespread adoption of new pest management technologies they initially test on smaller 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.

Educate growers about the benefits of our bio-based pest management products. Education is critical to best use of biologicals, which often have different modes of action than chemical products. We will continue to perform on-farm 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 and their licensed pest control advisors about the benefits of our biological pest management, plant nutrition and plant health products. We have provided a free application for mobile phone users to assist in calculating tank mix quantities, as well as instructional videos, blogposts, 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, and retailers. We believe that educating industry influencers about the benefits of biologicals and our products increases the likelihood that they will recommend our products to our distributors and end users. In addition, food companies and retailers are driven by consumers to require more sustainability and transparency from their grower-suppliers. This consumer-pushed trend is driving awareness with both the grower and food channel of the benefits of biologicals to soil health, the new movements in regenerative agriculture and sustainable crop production programs in general.

Leverage the synergies of our sales teams and businesses domestically and internationally. Because of the concentration of large growers in the United States, we can access these customers through our own sales force. For our specialty crop products, we have distribution agreements with national and regional distributors and for seed treatment with Albaugh LLC. Our subsidiary Pro Farm has a seed treatment agreement with Corteva in Europe and with some distributors in Latin America. We believe we can leverage these existing relationships by expanding sales of our Pro Farm product lines through our U.S.-based sales team and distributors and likewise expand sales of our Marrone products through existing Pro Farm product 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. For the fast-growing medicinal plant and hemp market, we have set up several specialty distributors who can benefit from our products. We also are in discussions with consumer home and garden companies to distribute our products.

Manufacturing

Our manufacturing processes four our Marrone products 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 or to our manufacturing partners. 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 use third parties to manufacture Venerate and Majestene/Zelto as a result of regulatory requirements for the microorganism that underlies their technology. We are currently working on designs to adapt our fermenters to comply with these regulatory requirements, but it will require additional capital investment to do so. 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 facility at some point in the future but will require a separate facility from our other products. Haven has been produced using a third party, but we recently successfully validated the production at our Michigan plant and we have plans to bring the process in-house in the near future. 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.

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, but we have worked with them for ten years. 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, including one from outside China in the event additional inventory or diversified sourcing is necessary.

A majority of the production of our Pro Farm product lines, as well as associated raw materials, is conducted at a third party manufacturing facility in Russia in which we have a 12% ownership stake. A large scale paper and pulp manufacturing site in close proximity to this plant is the main supplier of the wood waste by-product material we use in production. For our Lumibio products we take source custom made bespoke micronutrient mixes formulations from a European third-party supplier and have multiple third-party postproduction facilities in Europe. Our Jet products are manufactured by a third party located in the United States.

Research and Development

We have leveraged an innovative and market-focused discovery process to generate a robust product line and pipeline. This has included isolating 18,000 microorganisms, testing more than 16,000 of them against multiple pest targets and testing a subset of them for plant health and nutrient uptake enhancement. We have then developed more than one product line based on the same active 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-014/015. 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.

At this time, we are prioritizing our research and development on supporting our existing products and focusing on two near term pipeline projects, an improved Majestene process and MBI-014/015. As we integrate Pro Farm, we also expect to direct our research and development activity to build an innovative seed treatment product line that combine our Pro Farm technology with our other technologies.

As of December 31, 2019, we had 45 full-time equivalent employees dedicated to research and development and patent related activities, 12 of whom hold Ph.D. degrees or doctorates, plus 8 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, formulation and analytical chemistry, biochemistry, fermentation, entomology, nematology, weed science, plant physiology, plant pathology. 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 in their respective regions. We have made, and will continue to make, substantial investments in research and development such as increasing the number and locations of field trials and toxicology and regulatory consultants for new products and international expansion, but our Davis research and development headcount has remained relatively flat since 2015. Our research and development expenses, including patent expenses, were $14.0 million and $10.7 million for the years ended December 31, 2019 and 2018, 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, 2019, we had 53 issued U.S. patents and 396 issued foreign patents 23 pending U.S. provisional and non-provisional patent applications, and 105 pending foreign patent applications relating to microorganisms and natural product compounds, uses and related technologies. As of December 31, 2019, we have received 8 copyright registrations. As of December 31, 2019, we had received 22 U.S. trademark registrations and had 15 trademark applications pending in the United States. As of December 31, 2019, we also had received 153 trademark registrations and had 34 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 Marrone products and certain of our leading product candidates are based on microbes we have identified using our proprietary discovery process, including Venerate, Majestene/Zelto and MBI-014/015, which are based on a *Burkholderia* bacterium, with respect to which we have 56 issued patents and 15 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 28 issued patents and 4 pending patent applications (both U.S. and foreign). Our Pro Farm products are based on technology developed by Pro Farm scientists for producing organic molecular complexes that facilitate nutrient absorption, and are protected by 2 issued U.S. patents, one issued Canadian patent, and 17 pending patent applications (both U.S. and foreign) comprising issued method of use patents and pending applications for method of manufacture.

We have also entered into in-license and research and development agreements with respect to the use and commercialization of Grandevo and Haven, as well as certain products under development. 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. We have filed separate patent applications with respect to both Regalia and Zequanox product lines and have been issued 6 U.S. patents with respect to Regalia and 6 for Zequanox. In addition, the in-licensed U.S. patent for Grandevo is expected to expire in or around 2024, but there are pending U.S. patent applications relating to Grandevo that could expire later than 2024, and we have also filed separate patent applications for Grandevo of which 9 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.

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.

Around the globe, the regulatory process for biostimulants and bionutrients (biofertilizers) is significantly accelerated compared to that for biopesticides. In the United States, if plant health products are not used to control pests or do not act as plant (growth) regulators, 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 and our Pro Farm products. Products 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. Europe and the United States have industry coalitions that have developed more formal definitions of "biostimulant" and made recommendations for possible streamlined regulatory frameworks. The 2018 Farm Bill for the first time proposed a federal definition of biostimulants. As mandated by U. S. Congress in the 2018 Farm Bill, in December 2019, the Secretary of Agriculture submitted a study to Congress recommending options for the official definition and regulation of biostimulants in the United States. Joint federal, state and industry discussions are now underway to review those options and to recommend a suitable path forward and policy framework for the regulation of biostimulants in the United States.

All of our biopesticide product lines are EPA-approved. However, 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 agricultural products, performance and value are critical competitive factors. To compete against manufacturers of conventional chemical pesticides, chemical fertilizers and genetically modified crops, we need to demonstrate the advantages of our products over these more established 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 Syngenta, Bayer, BASF, Corteva, UPL, FMC and Sumitomo Chemical. 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 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, Terramera and Vestaron.

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.

Due to the lower regulatory barriers than for crop protection products, the market for bionutrition and biostimulant products is very fragmented, with hundreds if not thousands of companies globally, including larger players like Valagro and UPL (after Arysta acquisition) and Acadian Seaplants, well-financed startups such as Indigo, Bioconsortia, New Leaf Symbiotics and Pivot Bio, and numerous smaller companies, many of which may lack robust science and quality control.

Employees

As of December 31, 2019, we had 133 full-time equivalent employees, of whom 12 hold Ph.D. degrees or doctorates. Approximately 45 employees are engaged in research and development and patent related activities, 31 in sales and marketing (including 8 sales and field development personnel who focus on technical support and demonstration and research field trials), 37 in operations, including manufacturing, supply chain and quality assurance, and 20 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, 2019 we had an accumulated deficit of $320.6 million and for the years ended December 31, 2019 and 2018, we had a net loss attributable to common stockholders of $37.2 million and $20.2 million, respectively. 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, 2019, we have derived substantially all of our revenues from sales of our Marrone products, particularly 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 our additional Marrone products, including Majestene/Zelto, Haven, and Stargus, our Jet and our Pro Farm products 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 biological agricultural 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 biological agricultural 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, 2019 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 of $6.3 million at December 31, 2019, together with expected revenues, proceeds from our warrant facility, net proceeds from 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 pipeline candidates, expand international presence and commercialization, general capital expenditures and satisfaction of debt obligations. 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, working capital associated with increased sales, 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 $22.0 million of principal and deferred interest payments remained outstanding as of February 29, 2020.

At this time, we intend to raise additional funds through draws pursuant to the warrant facility we have entered into with certain of our investors, which as a result of share issuances pursuant to those draws together with the issuance of new warrants pursuant to that facility, will dilute the ownership our shareholders not party to that facility. We may also seek additional funds from public or private equity offerings, debt financings, strategic collaborations involving up-front cash payments or other means. However, additional capital may not be available on terms acceptable to us, or at all. As a result of the late filing of our Quarterly Report on Form 10-Q for the period ended September 30, 2019, until one year after we became current in our filings, we are not eligible to sell securities using our registration statements on Form S-3, including any shelf registration statement, which will limit our ability to raise financing in capital markets transactions. In addition, until we have an effective registration statement on Form S-1, certain of our outstanding warrants, including those we may call under our warrant facility, may be exercised via cashless "net" exercise, and we may be limited in our ability to be financed through the exercise of outstanding warrants to the extent our stock continues to trade below the exercise price for such warrants. Further, recent uncertainty in the economy due to worldwide COVID-19 public health emergency may depress our stock price and severely reduce market liquidity overall. Any additional equity financing we do raise 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 biological agricultural 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 in December 2017. In 2019 we acquired a number of products, including our Jet products and our Pro Farm products, all of which will require considerable resources to successfully increase sales. However, while we have and plan to continue to invest considerable resources in the sale and 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. and globally in 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. Extended drought in some markets and excessive rain in other markets reduced demand for our products as fewer acres are planted, recent changes in weather patterns have resulted in a shortened bloom cycle in different markets in different years and resulted in fewer pesticide and plant health products being used, and certain of our strategic collaborations have not resulted in the significant increases in sales we expected both inside and outside of the Unites States.

Lower than expected sales growth may result in an increase in write-offs and inventory obsolescence if we are not 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, 2019, we employed 21 full-time equivalent sales and marketing personnel, 5 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 prior to the financing transactions we completed in the first half of 2018 and through 2019, due, we believe, to 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 the last half of 2018 and the first half of 2019. 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, Jet-Ag, Jet-Oxide, UBP-110 and other products we are developing. 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 biological agricultural products, which generally must be used differently than conventional chemical products. 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, biological agricultural products, including internally developed and commercialized biological products as well as biological 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, 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, 2019 and 2018, our top two distributors accounted for 40% and 52% 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 focused on two product candidates: MBI-014/015, 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-306, which is a significantly different new formulation of our existing nematicide product Majestene. 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, animals, beneficial insects 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 crop protection, plant health and plant nutrition products, including our Marrone, Jet, and Pro Farm products as well as other products we are developing, are extensively regulated by the EPA and other 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, MBI-601, MBI-005 and MBI-011. As we introduce new formulations of and applications for our products, we may 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, Grandevo, Venerate, Stargus and others 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 and 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. At the same time global warming has also led parts of the United States to experience abnormally high rainfall and flooding, delaying or preventing planting and causing less acreages to be planted in 2019. 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.

Biological crop protection 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 biological agricultural products is underdeveloped when compared to conventional products. Customers in the crop production sector are generally cautious in their adoption of new products and technologies. Growers often require on-farm demonstrations of a given crop protection 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. 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.

Customers have historically perceived biological agricultural products as more expensive and less effective than conventional products. To succeed, we will need to continue to change that perception. To the extent that the market for biological agricultural products does not further develop or customers elect to continue to purchase and rely on conventional chemical products, our market opportunity will be limited.

The high level of competition in the market for biological agricultural products may result in pricing pressure, reduced margins or the inability of our products to achieve market acceptance.

The markets for biological agricultural 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 biological agricultural products. Our competitors include major multinational agrichemical companies, some of which have developed bio-based products for our target markets, as well as specialized biological agricultural businesses such as AgraQuest (owned by Bayer), Certis USA (owned by Mitsui & Co), Novozymes and Valent Biosciences (subsidiary of Sumitomo Chemical). 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 crop protection, plant nutrition and plant health solutions. In addition, we could face competition in the future from new, well-financed start-up companies.

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. On December 1, 2019, Dr. Marrone announced her intention to retire as Chief Executive Officer and as an employee of the Company, which will be effective immediately prior to the date on which a new Chief Executive Officer is retained. Dr. Marrone will continue to serve on the Company's Board of Directors and continue to provide service to the Company under a consulting arrangement with a term of 3 years. The board of directors has begun the search process for a new Chief Executive Officer, but one has not yet been retained.

We have a lean level of staffing, and rely on qualified sales and marketing, research and development and management personnel to succeed. 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 a significant amount 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, and for all of our production of Venerate, Majestene/Zelto, Stargus and Haven, and from time to time, we expect to use third-party manufacturers for supplemental production capacity to meet excess seasonal demand and some packaging. Our reliance on third parties to manufacture our products presents significant risks to us, including the following:

- Pushed out or canceled delivery due to tariff restrictions or infectious disease quarantines;
- 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, support agriculture retailers and distributors operating shifting to "just-in-time" inventory approach 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 date 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, unusual and significant deterioration status of supplier resources due to the outbreak of the COVID-19 virus in early 2020, 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.

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.

We have acquired, and may in the future acquire, other companies, employee teams, products or technologies, which could divert our management's attention, result in additional dilution to our stockholders, and otherwise disrupt our operations and adversely affect our operating results.

We have acquired, and we may in the future acquire, other companies, employee teams, or technologies to further complement or expand our product portfolio, enhance our technical capabilities, obtain personnel, or otherwise offer growth opportunities. For example, in September 2019, we completed our acquisition of Pro Farm, which added proprietary nutrient and biostimulant technology and products for seed and foliar treatments to our product portfolio, and also in September 2019, we completed the purchase of substantially all rights and assets related to our Jet products. The pursuit of acquisitions may divert the attention of management and cause us to incur various expenses in identifying, investigating, and pursuing suitable acquisitions, whether or not they are consummated, and if an acquired business fails to meet our expectations, or the costs associated with the acquisition outweigh the benefits, our business, operating results, and financial position may suffer.

We may not be able effectively manage the integration of acquired personnel, operations, and technologies successfully, or effectively manage the combined operations following any acquisition, which may prevent us from achieving anticipated benefits from an acquisition. We also may not achieve the anticipated benefits from an acquisition, including the Pro Farm acquisition, due to a number of other factors, including:

- acquisition related costs, liabilities, or tax impacts, some of which may be unanticipated;
- ineffective or inadequate controls, procedures, or policies at the acquired company;
- multiple product lines or service offerings, as a result of our acquisitions, that are offered, priced, and supported differently;

- potential unknown liabilities or risks associated with the acquired businesses, including those arising from existing contractual obligations or litigation matters;
- adverse effects on our existing business relationships with business partners and customers as a result of the acquisition;
- potential write-offs of acquired assets and potential financial and credit risks associated with acquired customers;
- inability to maintain relationships with key customers, suppliers, and partners of the acquired business;
- difficulty in predicting and controlling the effect of integrating multiple acquisitions concurrently;
- lack of experience in new markets, products, or technologies;
- diversion of management's attention from other business concerns;
- use of resources that are needed in other parts of our business; and
- use of substantial portions of our available cash to consummate the acquisition.

A significant portion of the purchase price of companies or technologies we acquire may be allocated to acquired goodwill and other intangible assets, which must be assessed for impairment at least annually. In the future, if our acquisitions do not yield expected returns, we may be required to take charges to our operating results based on this impairment assessment process, which could adversely affect our operating results. Further, even if integration of acquired businesses is successful, we may be required to expend additional legal, accounting and other administrative costs with respect to managing subsidiaries in multiple international jurisdictions, including compliance with local laws and filing applicable tax returns.

We are subject to risks associated with our international sales and operations.

We expect sales to our international customers to account for an increasing portion of our sales in future fiscal years, including as a result of the Pro Farm acquisition and its formation as a subsidiary of the Company, through which we now sell directly to certain of our customers in Europe and South America. As a result of having global operations, the sudden disruption of sales caused by events outside of our control could impact our results of operations.

Our international operations are subject to inherent risks, and our future results could be adversely affected by a variety of factors, many of which are outside of our control, including:

- greater difficulty in collecting accounts receivable and longer collection periods;
- difficulties of managing manufacturing, infrastructure and legal compliance costs associated with producing products internationally;
- political, social and economic instability, including wars, terrorism, political unrest, boycotts, public health emergencies, curtailment of trade and other business restrictions;
- tariff and trade barriers and other regulatory requirements or contractual limitations on our ability to sell or develop our products in certain foreign markets;
- less effective protection of intellectual property than is afforded to us in the United States or other developed countries;
- potentially adverse tax consequences;
- effects of changes in currency exchange rates, particularly relative increases in the exchange rate of the U.S. dollar versus other currencies that could negatively affect our financial results and cash flows; and
- changes in governmental trade policies can lead to the imposition of new duties, tariffs or quotas affecting agricultural commodities, fertilizer or industrial products. These can alter trade flows, access to supplies or demand, and regional balances for our products.

Because of the importance of international sales, sourcing and manufacturing to our business, our financial condition and results of operations could be significantly harmed if any of the risks described above were to occur or if we are otherwise unsuccessful in managing our increasingly global business.

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, 2019, we had 53 issued U.S. patents and 396 issued foreign patents, 23 pending provisional and non-provisional U.S. patent applications and 105 pending foreign patent applications.

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, our manufacturing facility 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 an infectious disease, 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 COVID-19, avian flu, swine flu and SARS, and natural disasters. In addition, government policies affecting the economic climate in general and our business specifically are subject to change depending on which political party is in power after each election cycle in the regions which may impact our operations. 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, 2019, we had approximately $263.7 million of federal net operating loss carryforwards available to offset future taxable income. If unused, $216 million of these net operating loss carryforward are subject to expiration and begin to expire in varying amounts after 2026, the remainder may be carried forward indefinitely. As of December 31, 2019, we had approximately $216.5 million of state net carryforwards available to offset future taxable income which will expire after 2023. These net operating losses are subject to varying carryforward periods ranging from 10 years to an indefinite period. It is possible that we will not generate taxable income to use these loss carryforwards in cases where they are subject to expiration or where they are able to be carried forward indefinitely.

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."

Because U.S. federal net operating losses generated in the prior tax years beginning before December 31, 2017, 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 could 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 and were written off at that time. 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, our April 2018 equity offering, warrant reorganization or recent acquisitions. As of December 31, 2019, the Company was in the process of performing a Section 382 analysis. 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 dependent on information technology systems and infrastructure to operate our business. Despite our security measures, 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. While we have incurred no material cyber-attacks or security breaches to date, any material cyber-related incident, including unauthorized access, disclosure or other loss of information, could result in legal claims or proceedings, investigations by law enforcement or regulatory bodies, liability under laws that protect the confidentiality of personal information, regulatory penalties, could disrupt our operations, could compromise our ability to protect our intellectual property rights, could damage our reputation, which could adversely affect our business, financial condition, and operating results, and could negatively impact our stock price.

Our business is subject to risks arising from epidemic diseases, such as the recent outbreak of the COVID-19 illness.

The recent outbreak of the Coronavirus Disease 2019, or COVID-19, which has been declared by the World Health Organization to be a "public health emergency of international concern," has spread across the globe and is impacting worldwide economic activity. A public health epidemic, including COVID-19, poses the risk that we or our employees, suppliers, distributors and other partners may be prevented from conducting business activities for an indefinite period of time, including due to shutdowns that may be requested or mandated by governmental authorities. While it is not possible at this time to estimate the impact that COVID-19 could have on our business, the continued spread of COVID-19 and the measures taken by the governments of countries affected could disrupt the supply chain for, the manufacture or shipment of, and the demand for our products and adversely impact our business, financial condition or results of operations. The COVID-19 outbreak and mitigation measures may also have an adverse impact on global economic conditions, which could have an adverse effect on our business and financial condition, including by limiting our ability to obtain financing or to rely on our existing financing facilities. The extent to which the COVID-19 outbreak impacts our results will depend on future developments that are highly uncertain and cannot be predicted, including new information that may emerge concerning the severity of the virus and the actions to contain its impact.

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"). While we have regained compliance thus far, our stock has closed below $1.00 per share, the minimum bid price for continued listing on Nasdaq, for three consecutive days as of the market close on Thursday, March 12, 2020, and 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 February 29, 2020, 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 69.7 million shares, or 42.0% of our common stock, including 31.4% of our currently outstanding shares. In addition, affiliates of Waddell & Reed Financial, Inc. ("Waddell"), beneficially own 20% of our common stock and 17.4% of our currently outstanding shares, Ardsley Advisory Partners ("Ardsley") beneficially owns 11.9% of our common stock and 9.6% of our currently outstanding shares, and Van Herk Investments B.V. owns 7.2% of our common stock and 3.7% of our currently outstanding shares. These principal stockholders collectively beneficially owned or controlled, directly or indirectly an aggregate of 87.2 million shares or 62.1% 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, 2019. 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, such as the recent uncertainty in the global economy caused by the COVID-19 epidemic;
- 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 February 29, 2020, we had approximately 140.5 million shares of common stock outstanding, 75.0 million which were held by our directors and officers and their affiliates and an additional 56.7 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 February 29, 2020, we had 7.8 million shares of our common stock available to be awarded under our equity incentive plans, 2.4 million shares of our common stock issuable upon the settlement of outstanding restricted stock units, 11.7 million shares of our common stock issuable upon the exercise of outstanding options with a weighted average exercise price of $2.53 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 $1.34 per share. These shares may be sold in the public market upon issuance.

Additionally, pursuant to the Share Purchase Agreement, dated as of August 7, 2019, the Company issued 12,666,851 shares of Common Stock; those shares were subject to transfer restrictions. However, the transfer restriction expired for 2,696,502 shares of Common Stock on March 13, 2020 and the transfer restrictions for the remaining shares will expire on September 13, 2020. Upon the expiration of the transfer restrictions, these shares may be sold in the public market and large sales of those shares may negatively affect the market price of our common stock.

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. 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. While we believe we have appropriately remediated previous material weaknesses in our internal control over financial reporting, we can provide no assurances that other material weaknesses in our internal control over financial reporting, will not be identified in the future. Remediation of any material weaknesses requires 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 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 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.

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 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 extensive experience with implementing controls over our current 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

Not applicable.

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 was for a period of 60 months and commenced in August 2014. In November 2018, we exercised the first lease extension option, extending the lease term for an additional 60 months, as discussed in Note 4 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.

We own an 11,400 square-foot manufacturing facility in Bangor, Michigan for the manufacturing of our products.

We currently lease an office space in Finland for use by our Finland subsidiary as their headquarters. The original lease expired on August 31, 2018, and the lease is now on a month to month arrangement. The current monthly base rent is €5,000 and requires a three-month written notice prior to termination.

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 "Lawsuit"). Piper's complaint alleged one breach of contract claim, specifically, that the Company breached an engagement letter (the "Engagement Letter") with Piper by failure to pay a $2,000,000 transaction fee, which Piper alleged was due under the Engagement Letter as a result of the Company's consummation of its private placement and debt refinancing transactions in February 2018.

On October 8, 2019, the Company entered into a Settlement and Release Agreement with Piper to settle the Lawsuit without any admission or findings of liability (the "Settlement Agreement"). Pursuant to the Settlement Agreement, the Company has paid Piper an aggregate of one million dollars ($1,000,000). In addition, under the Settlement Agreement, Piper agreed to dismiss the Lawsuit against the Company with prejudice and the Parties agreed to mutual general releases of all claims relating to the Lawsuit other than their prospective obligations under the Settlement Agreement, the confidentiality obligations under the Engagement Letter and any potential indemnification obligations under the Engagement Letter unrelated to the Lawsuit.

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, 2019, there were 80 stockholders of record of our common stock, and the closing price of our common stock was $1.01 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, 2019:

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	14,225,974	$ 2.34	4,051,185
Equity compensation plans not approved by stockholders	—	—	—
Total	14,225,974	$ 2.34	4,051,185

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

ITEM 6. SELECTED FINANCIAL DATA

Not applicable.

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."

We strive to lead that sustainable agriculture movement through the discovery, development, production and promotion of effective, efficient and environmentally responsible biological products for pest management, plant nutrition and plant health. We target the major markets that use conventional chemical pesticides and fertilizers where our biological products are used as alternatives or mixed with, conventional chemical products. We also target new markets for which there are no available conventional chemical products, the use of conventional chemical products may not be desirable (including for organically certified crops) or permissible either because of health and environmental concerns or because the development of pest resistance has reduced the efficacy of conventional chemical pesticides.

We sell our products through distributors and other commercial partners to growers who use our bioprotection products to manage pests and plant diseases, our biostimulants to reduce crop stress and both our biostimulants and bionutrition products to increase yields and quality. We have developed and commercialized several patent-protected product lines based on various active ingredients, including our Regalia product line (based on the active ingredient knotweed), for controlling plant disease and increasing plant health, our Grandevo and Venerate product lines (based on two new species of bacteria, *Chromobacterium subtsugae* and *Burkholderia rinojensis*), each for insect and mite control, our Majestene product line and its turf and ornamentals counterpart brand Zelto (based on the same active ingredient bacterium in Venerate), each for nematode control, and our Stargus product line (based on a new strain of *Bacillus nakamurai)*, for downy mildew and white mold control and increased plant health. In addition, in 2019, we acquired the peroxyacetic acid-based plant health product lines Jet Ag and Jet Oxide from Jet Harvest Solutions, and we added bionutrition and biostimulant product lines UBP and Foramin to our portfolio through our acquisition of Pro Farm Technologies OY ("Pro Farm").

2019 Highlights

The following are the more significant financial results for the fiscal year ending December 31, 2019:

- Revenues grew to $29.4 million in 2019, a 38.4% increase compared with $21.2 million in 2018, as sales of the portfolio of products expanded with current customers, as well as new customers, across new crops and geographies, and in particular, as a result of sales of our Pro Farm products.
- Gross margins expanded to 54.9% in 2019, compared with 48.6% in 2018, reflecting a favorable mix effect from higher sales of the Venerate and Regalia product families.
- Full-year operating expenses were $44.1 million in 2019, compared to $29.8 million in operating expenses in 2018.
- Net loss increased by $17 million to a loss of $37.2 million, or $(0.32) per share, reflecting costs related to our investment in Pro Farm and warrant facility funding. Net income for the fiscal year ending December 31, 2018 included the benefit of one-time non-cash effect related to changes in the fair value of financial instruments and the extinguishment of debt of $1.8 million
- Raise of $16.0 million in connection with exercises under our warrant facility.

The following are the more significant business highlights for the fiscal year ending December 31, 2019:

- Our acquisition of Pro Farm, expanding our international reach and product portfolio, and the completion of the integration of Pro Farm's operations and reporting into our business;
- Our acquisition of the Jet product lines, expanding our product portfolio;
- The approval of Stargus biofungicide in Mexico by the Ministry of Health COFEPRIS to control downy mildews, late blight and a range of other plant-related diseases in zucchini, squash, chayote, melon, cucumber, watermelon and potato crops*;*
- The approval and subsequent launch of Stargus and Haven in Canada;
- The expansion of Grandevo and Venerate label to control Asian citrus psyllid in Mexico;
- The expansion of the Regalia Maxx label in Brazil;
- Regalia and Stargus biofungicides were approved by the U.S. Environmental Protection Agency for use on hemp plants and Regalia Maxx was approved for use on medicinal plants in Canada and approval of Venerate CG label for use in California;
- The continued expansion of our distribution network through new agreements with TerraLink to distribute Regalia Maxx in Western Canada;
- Execution of our collaborative research agreement with Compass Minerals Plant Nutrition; and
- The announcement of the upcoming retirement of our Chief Executive Officer, Pamela G. Marrone.

Business Strategy

The agricultural industry is increasingly dependent on effective and sustainable crop protection 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, external market research reported that the global market for biopesticides, biostimulants and bionutrition products is growing substantially faster than the overall markets for chemical products and fertilizers (plant nutrition). This demand is in part a result of conventional growers acknowledging that there are tangible benefits to adopting bio-based crop protection and plant health products into integrated pest management ("IPM") programs, as well as increasing consumer demand for sustainably produced and organic food. We seek to capitalize on these global trends by providing both conventional and organic growers with solutions to a broad range of crop protection and plant health 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.

Our research and development efforts in recent periods have been focused on supporting existing commercial products, including Regalia, Grandevo, Venerate Majestene/Zelto, Haven and Stargus with a focus on reducing cost of product revenues, further understanding the modes of action, manufacturing support and improving formulations. In addition, our internal efforts in development and commercialization are now focused on two promising product candidates, MBI-306 a next generation formulation of our current nematicide product, Majestene and two bioherbicides, MBI-014 and MBI-015 (formerly MBI-010), of which MBI-014 was submitted to the EPA in August 2018. Simultaneously, we are seeking collaborations with third parties to develop and commercialize more early stage candidates on which we have elected not to expend significant internal resources given our reduced budget. We believe this prioritization plan, together with our competitive strengths, including our leadership in the biologicals industry, commercially available products, robust pipeline of novel product candidates, proprietary discovery and development processes and industry experience, position us for growth.

We have also recently expanded our growth strategy to seek acquisitions of products and companies that broaden our biostimulant and bionutrition product offerings, both multibillion dollar segments that are also rapidly growing. In September 2019, we completed the acquisition of Pro Farm, which expanded the Company's portfolio of bio-based products for integrated crop protection and plant health to now include Foramin and LumiBio foliar biostimulants and seed treatments. Also in September 2019, we completed the purchase of substantially all rights and assets related to the Jet-Ag and Jet-Oxide (biofungicide and disinfectants) product lines from Austin Grant, Inc., a Florida corporation d/b/a Jet Harvest Solutions.

We acquired Pro Farm at an enterprise value of $31.8 million, and consideration for the acquisition consisted of a combination of $6.2 million of cash and approximately 12.7 million shares of our common stock, as well as the potential payment of up to a total of $7.5 million of additional shares of our common stock a portion of which is payable each year from 2021 through 2024 based on the achievement of agreed commercial milestones. Consideration for the Jet-Ag and Jet-Oxide acquisitions was approximately $2,534,000 in cash, of which $544,200 was paid upon closing and the remainder is to be paid in four installments over a 16-month window. The asset purchase agreement also contains a provision providing five earn-out payments yearly from 2020 through 2024 based on the Company's total future sales of the Jet-Ag and Jet-Oxide product lines purchased through a specified supplier. Acquisition costs for the Pro Farm acquisition totaled $3,084,000, and is one of the primary factors contributing to the increase in our operating expenses for the year ended December 31, 2019.

Financial Overview

Our total revenues were $29.4 million and $21.2 million for the years ended December 31, 2019 and 2018, 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 also included sales of Majestene, Stargus, Zequanox, Jet-Ag, Jet-Oxide and LumiBio Kelta. Historically, approximately 90% of our business has been primarily driven by the U.S. market. By 2021, however, we expect a larger portion of our business to be driven by international markets based on our Pro Farm acquisition and our continued focus on commercialization progress of our products in new countries. Going forward, we also believe our revenues will largely be impacted by weather, trade tariffs, natural disasters, infectious diseases, 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 crop protection 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,			
2019	30%	10%	9%
2018	35%	9%	17%

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, including as a result of our acquisition of Pro Farm.

Since 2011, we have also recognized revenues from our strategic collaboration and distribution agreements, which amounted to $0.4 million in each of the years ended December 31, 2019 and 2018, respectively.

Our cost of product revenues was $13.3 million and $10.9 million for the years ended December 31, 2019 and 2018, 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. 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 $14.0 million and $10.7 million for the years ended December 31, 2019 and 2018, 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 $30.1 million and $19.2 million for the years ended December 31, 2019 and 2018, respectively. For the period ending December 31, 2019, this also included amounts of $4.3 million related to our acquisition strategy and $1.9 million related to our previously reported litigation settlement. 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.

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 our acquisition strategy and research and development. We expect to incur additional losses related to our investment in these endeavors including 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, 2019, the aggregate amount of principal and capitalized interest under our debt agreements is approximately $23.0 million, with approximately $8.4 million of such principal accruing interest at a variable rate of 6.75% 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 line of credit facility an aggregate of $3.6 million of such principal amount accruing interest at 12.8% per annum and which was payable in January 2019.

In August 2019, we entered into a warrant amendment and plan of reorganization agreement, which we refer to as the Warrant Facility. Under the Warrant Facility, for certain holders of warrants issued in connection with the February 2018 Financing Transactions (the "February 2018 Warrants"), their warrant expiration date was extended from December 2020 to December 2021, and these warrant holders agreed, at any time the Company's stock trades above $1.00, upon request by the Company, to exercise up to 36,600,000 shares under their respective February 2018 Warrants, in consideration for the delivery of (x) the shares subject to the February 2018 Warrants so exercised and (y) the delivery of new warrants ("August 2019 Warrants") to purchase such additional number of shares of common stock equal to the amount of shares so exercised and delivered under February 2018 Warrants. During 2019, a total exercise of 16,000,000 shares of certain outstanding warrants at $1.00 per share occurred. Included in our net loss results, for the fiscal year ended December 31, 2019 is a non-cash charge of $1,564,000 related to the incremental fair value of the February 2018 Warrants prior to the August 2019 Warrant amendments due to a modification allowing us to call the warrants as needed to fund our operations, as well as a non-cash charge of $6,065,000 related to the fair value of the August 2019 Warrants issued.

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% of our total revenues for each of the years ended December 31, 2019 and 2018, respectively. Product revenues in the United States constituted 88% and 91% of our total revenues for the years ended December 31, 2019 and 2018, respectively.

The Company accounts for all revenues under Accounting Standards Codification ("ASC") 606, *Revenue from contracts with Customers ("ASC 606")* in which revenue recognition criteria for distributor sales are satisfied at the time title and risk of loss passes to the distributor. 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 and accordingly, revenue is deferred until products are resold to customers of the distributor (the "sell-through" method). In these cases the cost of goods sold associated with such deferral were also deferred and classified as deferred cost of product revenues in the consolidated balance sheets. On January 1, 2018, upon the adopted 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 as of January 1, 2018. 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 each of the years ended December 31, 2019 and 2018, license revenues constituted 2% of total revenues, respectively. As of December 31, 2019 and 2018, we have received an aggregate of $4.1 million in payments under our strategic collaboration and distribution agreements. In addition, there is $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 two of our commercially available product lines, Grandevo and 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 in-licensed U.S. patent for Grandevo is expected to expire in 2024. There are pending in-licensed patent application relating to Grandevo, which could expire later than 2024 if issued. The licensed patents for Haven began expiring in November 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 Grandevo 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 expand sales of Grandevo. 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.

We began full-scale manufacturing in our facility in 2014. We continue to use third party manufacturers for Venerate, Majestene, Haven, Stargus, 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, acquisition costs, public company expenses and other selling costs incurred related to business development and to acquire or build 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.

In order to drive our strategy and revenue growth, we expect selling, general, and administrative expenses of sales and marketing to increase in the future as we increase 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 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, 2019, we had an outstanding balance of $3.6 million in secured borrowings.

Income Tax Provision

Since our inception, we have been subject to income taxes principally in the United States. Due to the acquisition of Pro Farm and as we further expand our sales into foreign countries, we have become subject to taxation based on 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, 2019, 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 and certain foreign deferred tax assets.

As of December 31, 2019, we had net operating loss carryforwards for federal income tax reporting purposes of $263.7 million, which begin to expire after 2026, and California and other state net operating loss carryforwards of $165.9 million and $50.3 million, respectively, which will expire after 2023 through 2037. The federal net operating loss generated in 2019 and 2018 in the amount of $26.5 and $21.2 million, respectively, will never expire. Additionally, as of December 31, 2019, 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 $2.7 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.

Results of Operations

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

	YEARS ENDED DECEMBER 31,	
	2019	**2018**
Revenues:		
Product	98	98
License	2	2
Total revenues	100	100
Cost of product revenues	45	51
Gross profit	55	49
Operating Expenses:		
Research, development and patent	48	50
Selling, general and administrative	102	90
Total operating expenses	150	140
Loss from operations	(95)	(91)
Other income (expense):		
Interest expense	(5)	(10)
Interest expense to related parties	—	(2)
Change in estimated fair value of financial instruments	—	(24)
Gain on extinguishment of debt, net	—	(10)
Gain on extinguishment of debt, related party	—	43
Loss on modification of warrants	(5)	—
Loss on issuance of new warrants	(21)	—
Loss on change in fair value of contingent consideration in connection with the Pro Farm acquisition	(1)	—
Other income (expense), net	1	—
Total other expense, net	(31)	(3)
Net loss	(126)	(94)

Comparison of the Years Ended December 31, 2019 and 2018

Product Revenues

	YEAR ENDED DECEMBER 31,	
	2019	2018
	(Dollars in thousands)	
Product revenues	$ 28,912	$ 20,775
% of total revenues	98%	98%

Product revenues increased by $8.1 million, or 38.7%, in 2019 compared to 2018 due to an increase in overall sales across all of the Company's product offerings, driven most significantly by increased sales of the Regalia, Grandevo and Venerate product families. For the year ended December 31, 2019 our revenues results included approximately $1.4M of sales generated internationally by our subsidiary, Pro Farm.

License Revenues

	YEAR ENDED DECEMBER 31,	
	2019	2018
	(Dollars in thousands)	
License revenues	$ 461	$ 445
% of total revenues	2%	2%

License revenues related to certain strategic collaboration and distribution agreements remained flat compared to 2018 as expected. License revenues do not comprise a significant portion of our total revenues.

Cost of Product Revenues

	YEAR ENDED DECEMBER 31,	
	2019	2018
	(Dollars in thousands)	
Cost of product revenues	$ 13,260	$ 10,907
% of total revenues	45%	51%
Gross profit	16,113	10,313
% of total revenues	55%	49%

Cost of product revenues increased by $2.3 million, or 21%, in 2019 compared to 2018. Our gross margins increased to 55% in 2019 from 49% in 2018. Cost of products decreased as a percentage of revenues, and gross margins increased in 2019 compared to 2018, primarily due to a favorable mix of higher margin product offerings and continued improved manufacturing and third-party manufacturing efficiencies. For the year ended December 31, 2019, the gross margins attributable to the product revenues generated by our subsidiary, Pro Farm, had a positive impact to the Company's overall gross margins.

Research, Development and Patent Expenses

	YEAR ENDED DECEMBER 31,	
	2019	2018
	(Dollars in thousands)	
Research, development and patent	$ 14,026	$ 10,662
% of total revenues	48%	50%

Research, development and patent expenses increased by $3.4 million, or 32%, in 2019 compared to 2018 in line with management's overall focus on its product pipeline. The majority of the increase included approximately $1.0 million related to field trials, $0.8 million related to toxicology studies and $0.7 million related to employee cost.

Selling, General and Administrative Expenses

	YEAR ENDED DECEMBER 31,	
	2019	2018
	(Dollars in thousands)	
Selling, general administrative expenses	$ 30,072	$ 19,155
% of total revenues	102%	90%

Selling, general, and administrative expenses increased $10.9 million, or 57%, in 2019 compared to 2018. The increase is primarily related to acquisition related cost of $4.3 million, $1.9 million related to costs associated with the Company's previously disclosed settlement of a legal claim and $2.8 million related to salaries, wages, stock-based compensation and compensation bonuses.

Other Income (Expense), Net

	YEAR ENDED DECEMBER 31,	
	2019	2018
	(Dollars in thousands)	
Interest expense	$ (1,474)	$ (2,057)
Interest expense to related parties	—	(451)
Change in estimated fair value of derivative liability	—	(5,177)
Loss on extinguishment of debt, net	—	(2,196)
Gain on extinguishment of debt, related party	—	9,183
Loss on modification of warrants	(1,564)	—
Loss on issuance of new warrants	(6,065)	—
Change in fair value of contingent consideration	(342)	—
Other income (expense), net	255	(11)
	$ (9,190)	$ (709)

Other Income (expense) increased significantly for the year ended December 31, 2019 compared to 2018. The increase included $1.6 million related to the Company's modification of certain warrants which allowed the Company to request the exercise of the modified warrants and by $6.1 million in relation to the call of approximately 16,000,000 modified warrants. See Note 10 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, 2019, the Company also recognized a loss related to the change in fair value of the contingent consideration to be paid in the future in connection with the Pro Farm acquisition. These increases were offset by less interest expense as a result of the Company's February 2018 Financing Transaction. During the year ended December 31, 2018, the Company's other income and expense, net balance included the recognition of 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.

Seasonality

In recent years, we have increasingly had higher sales during the first half of the year than the second half. However, the level of seasonality in our business may change due to a number of factors, such as our expansion into new geographical territories (including as the result of the acquisition of Pro Farm), 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. 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, outbreaks of infectious diseases 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. 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, exercise of warrants, 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. 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. The shelf registration statement was expired as of December 31, 2019.

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. As of December 31, 2019, we had an outstanding balance of $3.6 million in secured borrowings. On January 7, 2020, we entered into a second amendment to the invoice purchase agreement, the terms of which included among other terms an increase to $20,000,000 of eligible customer invoices to be purchased and simultaneously entered into an addendum to allow the Company to request that LSQ advance a maximum of $3,000,000 of the Company's finished goods inventory.

In February 2018 we completed certain financing transactions which 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 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 which was converted. 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.

In August 2019, we entered into a warrant amendment and plan of reorganization agreement, which we refer to as the Warrant Facility, with certain holders of the warrants issued in connection with the February 2018 Financing Transactions (the "February 2018 Warrants"). The Warrant Facility extended the warrant expiration date from December 2020 to December 2021, and the warrant holders agreed, at any time the Company's stock trades above $1.00, upon request by the Company, to exercise up to 36.6 million of their respective February 2018 Warrants, in consideration for the delivery of (x) the shares subject to the February 2018 Warrants so exercised and (y) the delivery of new warrants (which we refer to as the August 2019 Warrants) to purchase such additional number of shares of common stock equal to the amount of shares so exercised and delivered under February 2018 Warrants. During 2019, we called the exercise of 16 million of these outstanding warrants at $1.00 per share. We recognized a non-cash charge of $1.6 million related to the incremental fair value of the February 2018 Warrants due to the modification allowing us to call the warrants as needed to fund our operations, as well as a non-cash charge of $6.1 million related to the fair value of the August 2019 Warrants issued.

As of December 31, 2019, our cash and cash equivalents totaled $6.3 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. We are out of compliance with certain covenant requirements under that agreement, Five Star Bank waived their right to deem recurring losses, liquidity, going concern, and financial condition as material adverse changes through May 30, 2021. 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 May 30, 2021.

Our historical operating results as of December 31, 2019 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 of $6.3 million as of December 31, 2019, expected revenues, the net proceeds from expected future debt or equity financings, including our call of warrants to be exercised, 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, 2019, 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%	$ 2,836	Due December 31, 2022 [5]
Promissory Note [2]	7.25%	8,620	Monthly/June 2036
Promissory Notes [3]	8.00%	6,099	Due December 31, 2022[5]
Secured Borrowing [4]	12.78%	3,657	Varies[6]/June 2019
Loan Facility	1.00%	81	Proportionately each September 2022, 2023, 2024, 2025
Loan Facility	2.60%	207	February 2020

See Note 9 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 each of the following debt arrangements:

(1) "—October 2012 and April 2013 Secured Promissory Notes."
(2) "—June 2014 Secured Promissory Note."
(3) "—August 2015 Senior Secured Promissory Notes."
(4) "—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.

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 9, 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, 2019, 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,	
	2019	2018
Net cash used in operating activities	$ (21,339)	$ (19,425)
Net cash used in investing activities	(6,793)	(580)
Net cash provided in financing activities	16,163	36,953
Net increase (decrease) in cash, cash equivalents, and restricted cash	$ (11,969)	$ 16,948

Cash Flows from Operating Activities

Net cash used in operating activities of $21.3 million during the twelve months ended December 31, 2019 primarily resulted from our net loss of $37.2 million, which included $2.3 million of depreciation and amortization expense, $3.7 million of share-based compensation expense, $0.3 million of non-cash interest expense, $0.3 million of change in the fair value of the contingent consideration in connection with the acquisition of Pro Farm, and $1.6 million on loss on modification of warrants, $6.1 million loss on exercise of 16.0 million shares underlying warrants, and $0.8 million in amortization of right of use assets. In addition, net cash used in operating activities resulted from an increase of $1.2 million in accounts payables, $3.2 million increase in accrued liabilities mainly for the contingent considerations payable in the future in connection with the Jet-Ag and Pro Farm acquisitions, $0.6 million related to lease liabilities for the adoption of ASC 842 and $0.6 related to inventory, off-set by an increase of $2.6 million in accounts receivables due to overall revenue growth, $0.7 million in deferred revenue and $0.3 million in prepaids.

Net cash used in operating activities of $19.4 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, $1.0 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 a decrease of $1.6 million related to accrued interest due to related parties.

Cash Flows from Investing Activities

Net cash used in investing activities were $6.8 million and $0.6 million during the year ended December 31, 2019 and 2018, respectively. Cash flow from investing activities included $5.8 million, net related to the acquisition of Pro Farm and $0.6 million related to the acquisition of product lines Jet-Ag and Jet-Oxide with the remainder a result from purchases of property, plant and equipment to support our operations.

Other than amounts used for the purchase of property, plant and equipment to support our operations, no other amounts were used in investing activities for the year ended December 31, 2019.

Cash Flows from Financing Activities

Net cash provided in financing activities of $16.2 million during the twelve months ended December 31, 2019 consisted primarily of $16.0 million in proceeds from the exercise of warrants and $29.5 million in proceeds from the issuance of debt, offset by reductions and repayment of debt of $29.5 million.

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.

Inflation

We believe that inflation has not had a material impact on our results of operations during the years ended December 31, 2019 and 2018.

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.

Acquisitions

Accounting Standards Codification ("ASC") 805, *Business Combinations ("ASC 805"),* governs business combinations when an entity obtains control of a business by acquiring its net asset, or some or all of its equity interest. During the year ended December 31, 2019 we applied ASC 805 in the determination of our acquisition of Jet-Ag and Jet-Oxide product lines and of Pro Farm. ASC 805 requires among other things, defining a business, and upon that determination, recognizing assets acquired and liabilities assumed at fair value as of the acquisition date, determination and recognition of goodwill and that the results of operations of the acquired business be included in the consolidated statements of operations from the respective date of the acquisition.

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

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. Product revenues consist of revenues generated from sales of our products to distributors and direct customers, net of rebates and cash discounts.

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.

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.

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

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.

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 and August 2019 Warrant Amendment and Reorganization was accounted for in equity. In connection with the February 2018 Financing Transactions, the Company estimated the fair value of the warrants issued using the Black Scholes Option Pricing Model. The Company's fair value of the outstanding warrant post amendment was estimated utilizing a Monte Carlo univariate option pricing model. Upon the various exercise of the Company's call option, the Company estimated the fair value of the new warrants issued using the Black Scholes 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

To the Shareholders and Board of Directors of
Marrone Bio Innovations, Inc.

Opinion on the Financial Statements

We have audited the accompanying consolidated balance sheets of Marrone Bio Innovations, Inc. (the "Company") as of December 31, 2019 and 2018, the related consolidated statements of operations, stockholders' equity and cash flows for each of the two years in the period ended December 31, 2019, 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, 2019 and 2018, and the results of its operations and its cash flows for each of the two years in the period ended December 31, 2019, 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, 2019, 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 16, 2020, 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 leases in 2019 due to the adoption of Accounting Standards Update No. 2016-02, *Leases (Topic 842), as amended,* effective January 1, 2019, using the modified retrospective approach.

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 audits. 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 audits in accordance with the standards of the PCAOB. Those standards require that we plan and perform the audits to obtain reasonable assurance about whether the financial statements are free of material misstatement, whether due to error or fraud. Our audits 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 audits 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 audits provide 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 16, 2020

To the Shareholders 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, 2019, 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, 2019, 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 sheets as of December 31, 2019 and 2018 and the related consolidated statements of operations, stockholders' equity, and cash flows and the related notes for each of the two years in the period ended December 31, 2019 of the Company, and our report dated March 16, 2020 expressed an unqualified opinion, which included explanatory paragraphs for going concern and change in accounting principles, on those financial statements.

Explanatory Paragraph – Excluded Subsidiaries

As described in "Management Annual Report on Internal Control over Financial Reporting", management has excluded its wholly-owned subsidiaries, Pro Farm Technologies OY (Finland), Pro Farm International OY (Finland), Pro Farm OU (Estonia), Pro Farm Inc. (Delaware), Glinatur SA (Uruguay) and partially-owned subsidiary Pro Farm Technogies Comercio De Insumos Agricolas do Brasil ltda (Brazil – 99% controlling interest) (collectively "Pro Farm"), from its assessment of internal control over financial reporting as of December 31, 2019 because these entities were acquired by the Company in purchase business combinations during 2019. We have also excluded Pro Farm from our audit of internal control over financial reporting. These subsidiaries' combined total assets and total revenues represent approximately 2% and 5%, respectively, of the related consolidated financial statement amounts as of and for the year ended December 31, 2019**.**

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 16, 2020

MARRONE BIO INNOVATIONS, INC.
Consolidated Balance Sheets
(In Thousands, Except Par Value)

	DECEMBER 31,	
	2019	**2018**
Assets		
Current assets:		
Cash and cash equivalents	$ 6,252	$ 18,221
Accounts receivable	5,925	2,720
Inventories	8,149	8,224
Prepaid expenses and other current assets	1,390	971
Total current assets	21,716	30,136
Property, plant and equipment, net	13,260	14,512
Right of use assets, net	4,567	-
Intangible assets, net	23,842	-
Goodwill	6,764	-
Restricted cash	1,560	1,560
Other assets	1,008	359
Total assets	$ 72,717	$ 46,567
Liabilities and stockholders' equity		
Current liabilities:		
Accounts payable	$ 3,379	$ 1,692
Accrued liabilities	12,467	6,871
Deferred revenue, current portion	427	438
Lease liability, current portion	913	-
Debt, current portion, net	3,899	2,318
Total current liabilities	21,085	11,319
Deferred revenue, less current portion	1,986	2,399
Lease liability, less current portion	3,970	-
Debt, less current portion, net	11,847	11,819
Debt due to related parties	7,300	7,300
Other liabilities	2,971	794
Total liabilities	49,159	33,631
Commitments and contingencies *(Note 13)*		
Stockholders' equity:		
Preferred stock: $0.00001 par value; 20,000 shares authorized and no shares issued or outstanding at December 31, 2019 and December 31, 2018	—	—
Common stock: $0.00001 par value; 250,000 shares authorized, 139,526 and 110,691 shares issued and outstanding as of December 31, 2019 and December 31, 2018, respectively	1	1
Additional paid in capital	344,206	296,409
Accumulated deficit	(320,649)	(283,474)
Total stockholders' equity	23,558	12,936
Total liabilities and stockholders' equity	$ 72,717	$ 46,567

See accompanying notes.

MARRONE BIO INNOVATIONS, INC.
Consolidated Statements of Operations
(In Thousands, Except Per Share Data)

	YEARS ENDED DECEMBER 31,	
	2019	**2018**
Revenues:		
Product	$ 28,912	$ 20,775
License	461	445
Total revenues	29,373	21,220
Cost of product revenues	13,260	10,907
Gross profit	16,113	10,313
Operating Expenses:		
Research, development and patent	14,026	10,662
Selling, general and administrative	30,072	19,155
Total operating expenses	44,098	29,817
Loss from operations	(27,985)	(19,504)
Other income (expense):		
Interest expense	(1,474)	(2,057)
Interest expense, related parties	—	(451)
Change in fair value of financial instruments	—	(5,177)
Loss on extinguishment of debt, net	—	(2,196)
Gain on extinguishment of debt, related party	—	9,183
Loss on modification of warrants	(1,564)	—
Loss on issuance of new warrants	(6,065)	—
Change in fair value of contingent consideration	(342)	—
Other income (expense), net	255	(11)
Total other expense, net	(9,190)	(709)
Net loss	$ (37,175)	$ (20,213)
Basic and diluted net loss per common share:	$ (0.32)	$ (0.20)
Weighted-average shares outstanding used in computing basic and diluted net loss per common share:	117,982	101,248

See accompanying notes.

MARRONE BIO INNOVATIONS, INC.
Consolidated Statements Stockholders' Equity
(In Thousands)

	COMMON STOCK		ADDITIONAL PAID IN	ACCUMULATED	TOTAL STOCKHOLDERS'
	SHARES	AMOUNT	CAPITAL	DEFICIT	EQUITY (DEFICIT)
Balance at January 1, 2018	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	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
Net loss	—	—	—	(37,175)	(37,175)
Net settlement of options	47	—	55	—	55
Share-based compensation	—	—	3,686	—	3,686
Employee stock purchase plan	115	—	128	—	128
Settlement of restricted stock units	7	—	—	—	—
Modification of existing warrants	—	—	1,564	—	1,564
Issuance of common stock in connection with call to exercise warrants	16,000	—	16,000	—	16,000
Issuance of new warrants in connection with call to exercise warrants	—	—	6,065	—	6,065
Issuance of common stock in connection with Pro Farm acquisition.	12,666	—	20,299	—	20,299
Balance at December 31, 2019	139,526	$ 1	$ 344,206	$ (320,649)	$ 23,558

See accompanying notes.

MARRONE BIO INNOVATIONS, INC.
Consolidated Statements of Cash Flows
(In Thousands)

	YEARS ENDED DECEMBER 31,	
	2019	**2018**
Cash flows from operating activities		
Net loss	$ (37,175)	$ (20,213)
Adjustments to reconcile net loss to net cash used in operating activities:		
Depreciation and amortization	2,349	1,890
Gain on disposal of equipment	(21)	—
Right of use assets amortization	805	—
Share-based compensation	3,686	1,850
Non-cash interest expense	277	994
Change in fair value of financial instruments	—	5,177
Loss on extinguishment of debt, net	—	2,196
Gain on extinguishment of debt, related party, net	—	(9,183)
Loss on modification of warrants	1,564	—
Loss on issuance of new warrants	6,065	—
Change in fair value of contingent consideration	342	—
Net changes in operating assets and liabilities:		
Accounts receivable	(2,622)	1,065
Inventories	599	1,603
Prepaid Expenses and other assets	(327)	34
Accounts payable	1,204	(2,028)
Accrued and other liabilities	3,223	(857)
Accrued interest due to related parties	—	(1,614)
Lease Liability	(627)	—
Deferred revenue	(681)	(339)
Net cash used in operating activities	(21,339)	(19,425)
Cash flows from investing activities		
Asset acquisition	(669)	—
Business combination, net of cash acquired	(5,849)	—
Purchases of property, plant and equipment	(296)	(580)
Proceeds from sale of equipment	21	—
Net cash used in investing activities	(6,793)	(580)
Cash flows from financing activities		
Proceeds from issuance of common stock, net of offering costs	—	34,486
Proceeds from issuance of debt	141	2,000
Proceeds from secured borrowings	29,376	21,844
Repayment in secured borrowings	(27,822)	(21,046)
Repayment of debt	(1,715)	(254)
Financing costs	—	(201)
Exercise of stock options	55	40
Proceeds from employee stock purchase plan	128	—
Net settlement of options	—	(14)
Exercise of warrants	16,000	98
Net cash provided by financing activities	16,163	36,953
Net (decrease) increase in cash and cash equivalents and restricted cash	(11,969)	16,948
Cash and cash equivalents and restricted cash, beginning of period	19,781	2,833
Cash and cash equivalents and restricted cash, end of period	$ 7,812	$ 19,781
Supplemental disclosure of cash flow information		
Cash paid for interest	$ 1,175	$ 2,772
Supplemental disclosure of non-cash investing and financing activities		
Property, plant and equipment included in accounts payable and accrued liabilities	$ —	$ 51
Fair Value of non-cash consideration issued in acquisition transactions	23,917	
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
Embedded derivative liability associated with bridge loan	$ —	$ 573
Conversion of accrued interest, related party, into debt, related party	$ —	$ 324

See accompanying notes.

1. Summary of Business, Basis of Presentation

Marrone Bio Innovations, Inc. (the "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. In September 2019 the Company closed its acquisition of Pro Farm Technologies OY, a Finnish limited company, which consisted of Pro Farm Technologies OY and its five subsidiaries Pro Farm International Oy (Finland), Pro Farm OU (Estonia), Pro Farm Technogies Comercio de Insumos Agricolas do Brasil ltda. (Brazil – 99% controlling interest), Pro Farm Inc. (Delaware), and Glinatur SA (Uruguay) (collectively "Pro Farm"). As a result of the acquisition, Pro Farm became a wholly-owned subsidiary of the Company. The consolidated financial statements include the accounts of the Company and its wholly-owned subsidiaries. All significant intercompany balances and transactions have been eliminated in consolidation.

The accompanying consolidated financial statements and notes thereto have been prepared in accordance with the rules and regulations of the Securities and Exchange Commission ("SEC") for Form 10-K and include all of the information and disclosures required by accounting principles generally accepted in the United States of America ("GAAP") for financial reporting. Certain amounts in the prior periods' financial statements and related footnote disclosures have been reclassified to conform to the current presentation with no impact on previously reported net income or stockholders' equity.

The Company makes biological crop protection, plant health and nutrition products. The Company targets the major markets that use conventional chemical products, including certain agricultural markets where its biological products are used as alternatives for, or mixed with, conventional chemical products. The Company also targets new markets for which (i) there are no available conventional chemical products or (ii) the use of conventional chemical products 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 products. The Company delivers EPA-approved and registered biological crop protection products and other biological 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 under the assumption that there is substantial doubt about its ability to continue as a going concern, for 12 months after the issuance of these consolidated financial statements. This assessment 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 substantial doubt about its ability to continue as a going concern.

The Company has a limited number of commercialized products and operating history. As of December 31, 2019, the Company had an accumulated deficit of $320,649,000, has incurred significant losses since inception, and expects to continue to incur losses for the foreseeable future. The Company funds operations primarily with the proceeds from the sale of its products and payments under strategic collaboration and distribution agreements, promissory notes and term loans, net proceeds from the private placements of convertible notes, as well as with the proceeds from other equity instruments. The Company will need to generate significant revenue growth to achieve and maintain profitability. As of December 31, 2019, the Company had a working capital surplus of $631,000, including cash and cash equivalents of $6,252,000. In addition, as of December 31, 2019, the Company had debt and debt due to related parties of $15,746,000 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, 2019, the Company had a total of $1,560,000 of restricted cash relating to these debt agreements (See Notes 9 for further discussion).

The Company's historical operating results, including prior periods of negative use of operating cash flows which 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 of $4,767,000 at March 13, 2020, together with expected revenues, expected future debt or equity financings and cost management 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 cash 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 May 30, 2021, 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.

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 May 30, 2021. 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, 2019.

In August 2019, the Company entered into a warrant amendment and plan of reorganization agreement (the Warrant Reorganization Agreement) with certain holders of the warrants issued in connection with the February 2018 Financing Transactions (the "February 2018 Warrants"). Pursuant to the Warrant Reorganization Agreement, the Company has agreed to extend the expiration date under the February 2018 Warrants held by such holders from December 2020 to December 2021, and the holders have agreed, at any time the Company's stock trades above $1.00 and upon request by the Company, to exercise up to 36,600,000 shares under their respective February 2018 Warrants, in consideration for the delivery of (x) the shares subject to the February 2018 Warrants so exercised and (y) the delivery of new warrants ("August 2019 Warrants") to purchase such additional number of shares of common stock equal to the amount of shares so exercised and delivered under February 2018 Warrants. As of the date of the issuance of these consolidated financial statements, the Company has called the exercise of all February 2018 Warrants (See Note 10) of which 22,000,000 have been exercised with the remainder to be exercised on an as needed basis.

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 biological agricultural product 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.

Additionally, the Company could spend its available financial resources less or more rapidly than currently expected. 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.

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 actions discussed above cannot be considered to mitigate 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.

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 acquisition activities in determining the fair values of acquired assets, liabilities and goodwill, revenue recognition, including assumptions and estimates used in determining the timing and amount of revenue to recognize for those transactions with variable considerations, warrants and share-based compensation, right-of-use assets and corresponding lease liability, inventory valuation, and fair value of financial instruments, have the greatest potential impact on the consolidated financial statements. Therefore, the Company considers these estimates to be its significant estimates.

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, 2019 and 2018, 12% and 11%, 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, 2019 and 2018, accounting for 88% and 90%, 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		
DECEMBER 31,	A	B	C
2019	30%	10%	9%
2018	35%	9%	17%

Customers to which 10% or more of the Company's outstanding accounts receivable are attributable as of either December 31, 2019 or 2018 consist of the following:

	CUSTOMER	
DECEMBER 31,	A	B
2019	44%	9%
2018	52%	24%

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.

The Company continues to rely on third parties to formulate Grandevo and Zequanox into spray-dried powders, for all of its production of Venerate, Majestene/Zelto, Stargus and Haven, and from time to time, third-party manufacturers for supplemental production capacity to meet excess seasonal demand and for packaging. The Company's products have been produced in quantities, and on timelines, sufficient to meet commercial demand and for the Company to satisfy its delivery schedules. However, the Company's dependence upon others for the production of a portion of its products, or for a portion of the manufacturing process, particularly for drying and for all of its production of Venerate, may adversely affect its ability to satisfy demand and meet delivery obligations, as well as to develop and commercialize new products, on a timely and competitive basis. The Company has not entered into any long-term manufacturing or supply agreements for any of its products, and it may need to enter into additional agreements for the commercial development, manufacturing and sale of its products. There can be no assurance that it can do so on favorable terms, if at all.

Pro Farm products are currently partially sourced by suppliers from one manufacturing plant in Russia, in which the Company owns a 12% interest. The Company plans for enough inventory on hand to fill its revenue forecasts for 12 months at any given time, but an unexpected disruption in supply could have an adverse effect on the supply and revenues related to the subsidiary. Although the Company has identified additional manufacturers who are capable suppling the products, there can be no assurance that the Company will continue to be able to obtain products at a competitive price.

Acquisitions

The Company contemplates business combinations and acquisition opportunities that align with the Company's overall strategy. Based on the facts and circumstances of the transaction, acquisitions are accounted for under Accounting Standards Codification ("ASC") 805, *Business Combinations ("ASC 805"),* which requires, among other things that assets acquired and liabilities assumed be recognized at fair value as of the acquisition date and that the results of operations of the acquired business be included in the consolidated statements of operations from the respective date of the acquisition based on the significance of the transaction to the Company's own consolidated financial statements.

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. and global 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 including for amounts held at U.S. 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, 2019	DECEMBER 31, 2018
Cash and cash equivalents	$ 6,252	$ 18,221
Restricted cash, less current portion	1,560	1,560
Total cash, cash equivalents and restricted cash	$ 7,812	$ 19,781

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 9 for further discussion.

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, 2019 and 2018, no receivables balances were written off. As of December 31, 2019 and 2018, 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, 2019, the Company recorded, as a component of cost of product revenues, adjustments to inventory reserves of $248,000 due to quantities on hand that may not be used or sold prior to expiration, and an adjustment of $969,000 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, 2018, the Company recorded, as a component of cost of product revenues, adjustments to inventory reserves of $579,000 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.

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

	DECEMBER 31, 2019	DECEMBER 31, 2018
Raw materials	$ 1,610	$ 1,844
Work in progress	783	1,580
Finished goods	5,756	4,800
	$ 8,149	$ 8,224

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

Maintenance, repairs and minor renewals are expensed as incurred. Expenditures that substantially increase an asset's useful life are capitalized. The Company did not recognize any amounts related to impairment for the year ended December 31, 2019 and 2018.

Intangible Assets

Intangible assets are acquired individually or as part of a group at fair value. Intangible assets with definitive lives are amortized over the useful life of the intangible asset, which is the period over which the asset is expected to contribute directly or indirectly to the entity's future cash flows.

ASSET CATEGORY	ESTIMATED USEFUL LIFE
Customer Relationship	15 years
Developed Technology	10 years
Tradenames	10-15 years
Non-compete	6 years
In Process Research and Development	11 years

The Company evaluates intangible assets for impairment at least annually and more often whenever events or changes in circumstances indicate that the carrying value may not be recoverable. Whenever any such impairment exists, an impairment loss will be recognized for the amount by which the carrying value exceeds the fair value. The Company's intangible assets include customer relationships, patents, trademarks, and in process research and development acquired in 2019 in connection with its asset acquisition of the Jet-Ag and Jet-Oxide product lines and the Company's acquisition of Pro Farm. The Company has not recorded impairment of intangible assets as of December 31, 2019.

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 not recoverable, the impairment loss is measured as the amount by which the carrying value of the asset or asset group exceeds its estimated fair value.

Goodwill

Goodwill represents the excess of purchase price over the underlying net assets of businesses acquired and such excess resulted in the significant increase of goodwill from 2018 to 2019. Goodwill is reviewed for impairment on an annual basis as of the first day of the Company's fiscal fourth quarter or more frequently if events or changes in circumstances indicate that the carrying amount of goodwill may be impaired. Due to the short time lapse between the date of acquisitions of Pro Farm and the Jet-Ag and Jet-Oxide product lines and the balance sheet date, no formal assessment of impairment has been completed for the year ended December 31, 2019.

Fair Value

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.

As of December 31, 2019, the contingent consideration in connection with the Company's acquisition of Pro Farm was recorded at its fair value. The following table provides a reconciliation of the activity for the contingent consideration 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):

	CONTINGENT CONSIDERATION LIABILITY
Fair value at September 13, 2019	$ 1,395
Change in estimated fair value recorded of contingent consideration	342
Fair value at December 31, 2019	$ 1,737

The change in fair value for the reporting period was driven by the result of the unobservable fair value model, a Monte Carlo simulation in a risk-neutral framework assuming Geometric Browning Motion. The most significant input to the model was the estimated results of the Pro Farm subsidiary for the periods specified in the share purchase agreement of 2020 – 2023. The following represents other inputs used in determining the fair value of the contingent consideration liability:

	SEPTEMBER 13, 2019	DECEMBER 31, 2019
Discount rate	16.4%	15.2%
Volatility	38.2%	33.6%
Credit spread	11.1%	10.8%
Risk-free rate	1.75%	1.66%

Discount Rate. Discount rate is based on an adjusted weighted cost of capital contribution considering an estimated operational leverage ratio and a risk-free rate, each determined by publicly traded peer group median except the risk-free rate.

Estimated Volatility Factor. Volatility factor is based on the adjusted weighted cost of capital, operating asset volatility, operating leverage ratio and risk-free interest rate, each determined by publicly traded peer group median except the risk-free rate.

Credit Spread. Credit spread cased on the Company's financial ratio in comparison with those of publicly traded peer group.

Interest Rate. Interest rate based on US Constant Maturity Treasury rates for the same period as the period of performance of 2020 to 2023.

The change in the fair value estimate is recognized in the Company's consolidated statement of operations in Other Income (expense) under caption Change in fair value of contingent consideration. The contingent consideration will be determined at each reporting period and will be settled with the issuance of the Company's common shares.

The Company had no financial liabilities measured at fair value as of December 31, 2018, however during 2018 the Company estimated the fair value of the derivative liability using an Option Pricing Model 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 18). The fair value was subjective and was affected by certain significant inputs to the valuation model, which are disclosed in the table below. The fair value of the derivative liability was 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 during 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
Price	$ 0.50	$ 1.00
Stock Price volatility	60%	60%
Risk-free rate	1.46%	1.43%
Probability weighted term in years	0.18	0.23 – 0.25

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.

Deferred Revenue

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, 2019	DECEMBER 31, 2018
Product revenues	$ 299	$ 457
Financing costs[(1)]	609	604
License revenues	1,505	1,776
	2,413	2,837
Less current portion	(427)	(438)
	$ 1,986	$ 2,399

(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. 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.

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. Product revenues consist of revenues generated from sales of the Company's products to distributors and direct customers, net of rebates and cash discounts.

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, 2019 and 2018, the Company had deferred product revenue in the amount of $299,000 and $457,000, respectively, 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. Through December 31, 2019, the Company has received an aggregate of $4.1 million in payments under these strategic collaboration and distribution agreements of which no amounts and $0.2 million, respectively, was recognized as of December 31, 2019 and 2018. 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. For each year ended December 31, 2019 and 2018 the Company recognized $0.2 million, respectively 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, 2019 and 2018, research and development expenses totaled $12,924,000 and $9,681,000, respectively, and patent expenses totaled $1,102,000 and $981,000, 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, 2019 and 2018 were $1,180,000 and $837,000, respectively.

Advertising

The Company expenses advertising costs as incurred and has included these expenses as a component of Selling, General and Administrative costs. Advertising costs for the years ended December 31, 2019 and 2019 were $708,000 and $1,022,000, 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, 2019 and 2018, the Company calculated the fair value of stock options granted based on the following assumptions:

	DECEMBER 31, 2019	DECEMBER 31, 2018
Expected life (years)	5.33-6.08	2.51-6.08
Estimated volatility factor	51%-54%	53%-58%
Risk-free interest rate	1.41%-2.44%	2.42%-2.98%
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. As the Company's common stock had limited trading history, the Company calculated the estimated volatility factor based on both the volatility of its common stock and the volatility of the common stock of comparable agricultural biotechnology companies, giving the volatility of its common stock additional weight.

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. 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.

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 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, 2019 and 2018, all deferred tax assets, except the deferred tax liability generated during the year related to foreign entities, 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, 2019, the Company concluded that there were no additional uncertain tax positions required to be recognized in its consolidated financial statements. In connection with the Company's acquisition of Pro Farm, the Company acquired approximately $22,000 in uncertain tax position.

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 year ended December 31, 2019. In connection with the Company's acquisition of Pro Farm, amounts of interest and penalties were not significant or material.

Foreign Currency

The functional currency of the Company's subsidiary Pro Farm is the U.S. dollar. Assets and liabilities have been translated to the U.S. dollar reporting currency using the exchange rates in effect on the consolidated balance sheet dates. Equity accounts are translated at historical rates, except for the change in retained earnings during the year which is the result of the income statement translation process. Revenue and expense accounts are translated using the weighted average exchange rate during the period. The cumulative translation adjustments associated with the net assets of foreign subsidiaries and the Company's normal operations are recorded in "Other income (expense)" in the consolidated statement of operations in the amounts of $0.1 million and $0.05 million for the periods ended December 31, 2019 and 2018, respectively.

Comprehensive Loss

Comprehensive loss represents the net loss for the period adjusted for the results of certain changes to stockholders' equity 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 consolidation of the Company's subsidiaries and receipt of payment from customers and payment to vendors.

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 February 2016, the Financial Accounting Standards Board ("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.

The Company adopted ASU 2016-02 on January 1, 2019 using the modified-retrospective method. This adoption primarily affected the Company's consolidated balance sheet based on the recording of Right-of-use assets and Lease liability, current and non-current for its operating leases. The adoption of ASU 2016-02, did not change the Company's historical classification of these leases or the straight-line recognition of related expenses.

See Note 4 for the effects of the adoption of ASU 2016-02 on the Company's consolidated financial statements as of January 1, 2019 and for the year ended December 31, 2019. The adoption of this standard had a material impact on the Company's consolidated financial statements and is expected to continue to have a material impact for the foreseeable future.

In January 2017, the FASB issued Accounting Standards Updated No. 2017-01, Business Combinations (Topic 805): Clarifying the Definition of a Business which adds guidance to assist registrants in the determination of whether an acquisition (or disposal) represents assets or a business – inputs, processes, and outputs. The update provides a screen to determine when an asset is not a business. If substantially all of the fair value of the assets acquired (or disposed) is concentrated in a single asset or a group of similar identifiable assets, the acquired assets do not represent a business. If this test is not met, the update provides further guidance to evaluate if the acquisition represents a business.

The Company prospectively adopted the guidance in the third quarter of fiscal 2019. The adoption primarily impacted the Company's consolidated balance sheet based on the accounting treatment for the Jet-Ag Acquisition (as defined below) which could have otherwise been treated as a business combination had the acquired asset not met the screen test outlined in the ASU. The Company did not perform further analysis related to the treatment of the Jet-Ag Acquisition upon the results of the screen test. See Note 3 for the effects of the adoption of ASU 2017-01 on the Company's consolidated financial statements as of July 1, 2019 and for year ended December 31, 2019. The adoption of this standard did not have a material impact on the Company's consolidated financial statements and may have a material impact for the foreseeable future based on the actual occurrence of any business combination related activities.

Recently Issued Accounting Pronouncements

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 ("SEC") 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), in April 2019, the FASB issued Accounting Standards Update No. 2019-04, Codification Improvements to Topic 326, Financial Instruments—Credit Losses, Topic 815, Derivatives and Hedging, and Topic 825, Financial Instruments ("ASU 2019-04"), in May 2019, the FASB issued Accounting Standards Update No. 2019-05, Financial Instruments—Credit Losses (Topic 326) ("ASU 2019-05"), in November 2019, the FASB issued Accounting Standards Update No. 2019-10, Financial Instruments—Credit Losses, (Topic 326), Derivatives and Hedging (Topic 815), and Leases (Topic 842): Effective Date ("ASU 2019-10") and Accounting Standards Update No. 2019-11, Financial Instruments—Credit Losses ("ASU 2019-11"), and in February 2020, the FASB issued Accounting Standards Update No. 2020-02, Financial Instruments—Credit Losses, (Topic 326) and Leases (Topic 842) ("ASU 2020-02"). ASU 2020-02, delayed the effective date for certain entities including entities meeting the SEC's definition of a Smaller Reporting Company. The Company is currently evaluating ASU 2016-13 all related ASUs to determine the impact to its consolidated financial statements and related disclosures and anticipates delaying the adoption of ASU 2016-13 as provided for until January 1, 2021.

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.

In December 2019, the FASB issued ASU No. 2019-12, "Income Taxes (Topic 740): Simplifying the Accounting for Income Tax" (ASU No. 2019-12), which removed certain exceptions and updated certain provisions related to the accounting for income tax. The provisions of ASU No. 2019-12 are effective for annual reporting periods beginning after December 15, 2020 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 been issued or made available for issuance. This ASU shall be applied on a retrospectively or modified retrospective basis. The Company has not yet determined the impact of implementing this new standard on the consolidated financial statements.

3. Acquisitions

Jet-Ag and Jet-Oxide

On September 10, 2019, the Company completed the purchase of substantially all rights and assets related to the Jet-Ag and Jet-Oxide product lines from Austin Grant, Inc., a Florida corporation d/b/a Jet Harvest Solutions, for approximately $2,534,000 in cash, of which $544,200 was paid upon closing and the remainder is to be paid in four installments over an 16-month window (the "Jet-Ag Acquisition"). The Jet-Ag Acquisition is accounted for as an asset acquisition consistent with ASC 2017-01, which requires that substantially all of the fair value of the gross assets acquired is concentrated in a single asset or a group of similar assets. The asset purchase agreement also contains a provision providing five yearly earn out payments from 2020 through 2024 based on the Company's total future sales of Jet-Ag and Jet-Oxide purchased through a specified supplier. The fair value of the contingent consideration was estimated at $190,000 on the close date of the transaction, which the Company has included in its total cost to be allocated to the acquired assets. The Company intends to assess its contingent consideration estimate periodically upon the settlement of the revenue contingency at each reporting period. Acquisition costs of $168,000 were also included in the total consideration for the Jet-Ag Acquisition to be allocated among the acquired assets. The allocation of the total consideration was based on each of the acquired asset's relative fair values as follows (in thousands):

	ALLOCATION OF COST OF ASSET ACQUISITION
Cash paid, inclusive of future payments	$ 2,534
Fair value of contingent consideration	190
Other cost to acquire assets	168
Total acquisition related consideration	$ 2,892
Intangible assets acquired:	
Customer relationships	$ 2,333
Tradename	466
Non-compete	93
Total assets acquired	$ 2,892

The fair value of the acquired customer list, trade name, non-compete were estimated using either an excess earning method, relief-from-royalty or with and without the asset being in place, based on management's forecasted cash inflows and outflows. Each of the intangible assets are being amortized within the expense reflected in "Selling, general and administrative" expenses in the consolidated statement of operations.

Pro Farm Technologies OY

On September 13, 2019, the Company completed its acquisition of 100% of the outstanding shares of Pro Farm Technologies OY, a Finnish limited company ("Pro Farm") for consideration of approximately $27,543,000 (the "Pro Farm Acquisition"), net of cash acquired. Total consideration consisted of cash payments of $2,843,000 to beneficial owners and $3,178,000 in debt repayments made on behalf of Pro Farm, issuance of a total of 12,666,000 of the Company's common stock, at the closing market price of $1.59, for an aggregate fair value of $20,299,000, inclusive of 100,000 restricted stock units at a fair value of $159,000 awarded to a key employee and the fair value of up to $7,466,000 of contingent consideration subject to the achievement of certain distributor, revenue, earnings before interest, taxes, depreciation and amortization, and debt and equity milestones from the date of the closing through December 31, 2024, fair valued at $1,395,000. The contingent consideration will be determined at the end of each reporting period and settled through the issuance of the Company's common shares. The Pro Farm acquisition meets the definition of a business in accordance with ASC 805. The goodwill recorded as a result of the acquisition represents the strategic benefits of growing the Company's future revenues and product portfolio and the expected revenue growth from increased market penetration. The goodwill is not deductible for income tax purposes.

Certain estimated fair values are not yet finalized and are subject to change, which could be significant. The Company expects to finalize its purchase accounting by the end of the second quarter of fiscal year 2020 when it has completed its assessment of certain consideration adjustments and completed the assessment of deferred taxes. Amounts for acquired current assets and liabilities, deferred tax liabilities, intangibles and goodwill also remain subject to change. The preliminary estimated fair values of the assets acquired, and liabilities assumed are as follows (in thousands):

	PRELIMINARY ALLOCATION AT DECEMBER 31, 2019
Accounts receivable	$ 583
Inventory	523
Other current assets	211
Investments in subsidiary	537
Intangible assets:	
Developed technology	16,362
Tradename	2,659
In process research and development	2,713
Goodwill	6,764
Total assets acquired	30,352
Accounts payable	432
Accrued liabilities	779
Debt	1,612
Minority interest	(14)
Net assets acquired	$ 27,543
Cash paid, net of cash acquired	5,849
Fair Value of stock consideration	20,299
Fair value of contingent consideration	1,395
Total purchase price	$ 27,543

Tangible assets and liabilities acquired were recorded at their preliminary fair values on the date of close based on management's preliminary assessment. Included in the tangible assets acquired is an investment a 12% interest in a Russian manufacturing plant and which been accounted for under Accounting Standard Codification *325 – Investments Other, Cost Method Investments.* The purchase price allocated to developed technology, in process technology and trade name were estimated using either an excess earning method or relief-from-royalty to calculate the fair value of the assets purchased, based on management's forecasted cash inflows and outflows. All intangible assets are being amortized with the expense reflected in "Selling, general and administrative" expenses in the consolidated statement of operations.

Acquisition costs are recorded in "Selling, general and administrative" expenses as incurred. As of December 31, 2019 the Company has incurred expenses of $3,084,000 in connection with the Pro Farm Acquisition. The Pro Farm Acquisition was financed partially through the warrant holders' purchase of 10,000,000 shares of the Company's common stock in connection with the Company's exercise of its warrant call option under the Warrant Reorganization Agreement (see Note 10).

The consolidated statement of operation include $1,433,000 of product revenues and $1,520,000 of operating expenses from Pro Farm for the period from September 14, 2019 through December 31, 2019. The Company's consolidated results as of December 31, 2019 include amounts related to a 1% non-controlling interest in Pro Farm's Brazilian subsidiary, deemed to be immaterial to the consolidated financial statements. The following unaudited pro forma results of operations assume the Pro Farm acquisition had occurred on January 1, 2018 (in thousands):

	PRO FORMA FOR THE YEAR ENDED DECEMBER 31, 2019	PRO FORMA FOR THE YEAR ENDED DECEMBER 31, 2018
Product revenues	$ 30,362	$ 21,383
Cost of product revenues	13,630	11,211
Gross profit	16,732	10,172
Operating expenses	43,956	33,367
Loss from operations	$ (27,224)	$ (23,195)
Basic and Diluted net loss per common share	$ (0.30)	$ (0.20)

Significant pro forma adjustments incorporated into the pro forma results above include elimination of nonrecurring acquisition-related costs incurred prior to the close of the Pro Farm Acquisition, amortization of acquired intangible assets. These pro forma results are based on estimates and assumptions, which the Company believes are reasonable. They are prepared for comparative purposes only and do not necessarily reflect the results that would have been realized had the Pro Farm Acquisition occurred at the beginning of the periods ended December 31, 2019 and 2018, and are not necessarily indicative of the Company's consolidated results of operations in future periods.

4. Right of Use Assets and Lease Liabilities

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 was for a period of 60 months and commenced in August 2014. In November 2018, the Company exercised the first lease extension option, extending the lease term for an additional 60 months. The monthly base rent is $44,000 per month for the first 12 months with a 3% increase each year thereafter. Concurrent with the April 2014 lease agreement, 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 was 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 exercised the first lease extension option, extending the lease term for an additional 60 months.

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 lease was not renewed and was on a month to month arrangement through November 2019.

On January 1, 2019, the Company adopted ASU No. 2016-02, "Leases (Topic 842)" (ASU 2016-02) using the modified retrospective transition method allowing it to apply the new standard at the adoption date and to recognize a cumulative-effect adjustment to the opening balance of retained earnings on the date of adoption. Under this transition method, the prior comparative period continues to be reported under the accounting standards in effect for that period.

The Company elected to use the package of practical expedients permitted which allows (i) an entity not to reassess whether any expired or existing contracts are or contain leases; (ii) an entity need not reassess the lease classification for any expired or existing leases; and (iii) an entity need not reassess any initial direct costs for any existing leases. The Company made an accounting policy election to adopt the short-term lease exception which allows the Company to not recognize on the balance sheet those leases with terms of 12 months or less resulting in short-term lease payments being recognized in the condensed consolidated statements of income on a straight-line basis over the lease term. All of the Company's leases were previously classified as operating and are similarly classified as operating lease under the new standard.

Adoption of the new standard resulted in recognition of both right-of-use assets and lease liabilities of approximately $5,324,000 and $5,510,000 as of January 1, 2019, respectively, inclusive of any deferred rent as of December 31, 2018. As the right-of-use assets and lease liabilities were substantially the same at adoption, the Company did not record a cumulative effect adjustment to the opening balance of retained earnings.

The Company's operating leases have remaining terms ranging from less than one year to five years. The leases are for office space and various office equipment. The Company determines if an arrangement includes a lease at the inception of the agreement and the right-of-use asset and lease liability is determined at the lease commencement date and is based on the present value of estimated lease payments. The Company's lease agreements contain both fixed and variable lease payments, none of which are based on a rate or an index. Fixed lease payments are included in the determination of the right-of-use asset and lease liability. Variable lease payments that are not based on a rate or index are expensed when incurred. The present value of estimated lease payments is determined utilizing the rate implicit in the lease agreement if that rate can be determined. If the implicit rate cannot be determined, the present value of estimated lease payments is determined utilizing the Company's incremental borrowing rate. The incremental borrowing rate is determined at the lease commencement date and is estimated utilizing similar or collateralized borrowing instruments adjusted for the terms of leasing arrangement as necessary. Some of the leases include an option to renew that can extend the lease term. For those leases which are reasonably certain to be renewed, the Company included the renewal period in the lease term. The Company's lease agreements do not contain any material residual value guarantees or material restrictive covenants. As of December 31, 2019, the weighted average incremental borrowing rate and the weighted average remaining lease term for the operating leases held by the Company were 7.02% and 4.7 years, respectively.

The components of lease expense were as follows (in thousands):

	YEAR ENDED DECEMBER 31, 2019
Operating lease cost	$ 1,154
Short-term lease cost	88
Sublease income	(93)
Total operating lease costs:	$ 1,149

Other information (in thousands)	YEAR ENDED DECEMBER 30, 2019
Cash paid for amounts included in the measurement of lease liabilities	$ 1,393
Right-of-use assets obtained in exchange for operating lease liabilities	$ 5,324

Maturities of lease liabilities for each future calendar year as of December 31, 2019 are as follows (in thousands):

	OPERATING LEASES
2020	$ 1,179
2021	1,202
2022	1,238
2023	1,275
2024 and beyond	864
Total lease payments	5,758
Less: imputed interest	875
Total lease obligation	4,883
Less lease obligation, current portion	913
Lease obligation, non-current portion	$ 3,970

5. Property, Plant and Equipment

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

	DECEMBER 31, 2019	DECEMBER 31, 2018
Land	$ 1	$ 1
Buildings	6,562	6,528
Computer equipment and software	564	528
Furniture, fixtures and office equipment	379	347
Machinery and equipment	15,768	15,701
Leasehold improvements	2,410	2,373
Construction in progress	155	95
	25,839	25,573
Less accumulated depreciation and amortization	(12,579)	(11,061)
	$ 13,260	$ 14,512

The Company recognized depreciation and amortization expense during the years ended December 31, 2019 and 2018 of $1,565,000 and $1,890,000, respectively. The total depreciation and amortization for disposed assets during the year ended December 31, 2019 was $48,000.

6. Intangible Assets

The Company's intangible assets acquired through its asset purchase of Jet-Ag and Jet-Oxide product lines and Pro Farm during the year ended December 31, 2019, consist of the following (in thousands):

	DECEMBER 31, 2019
Customer Relationships	$ 2,333
Developed Technology	16,362
Tradenames	3,125
Non-compete	93
In Process Research and Development	2,713
	24,626
Less accumulated amortization	(784)
	$ 23,842

The Company recognized amortization expense during the year ended December 31, 2019 of $784,000. The Company expects to recognize approximately $3,106,000 in each of the future periods from 2020 through 2024 with the remainder to recognized in periods thereafter. The weighted average life of the intangible assets is 10.8 years.

7. 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 options and 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, 2019	DECEMBER 31, 2018
Stock options outstanding	11,821	7,136
Warrants to purchase common stock	52,647	52,647
Restricted stock units outstanding	2,405	1,146
Common shares to be issued in lieu of agent fees	498	498
Employee stock purchase plan	8	—
Maximum contingent consideration shares to be issued	5,972	—
	73,351	61,427

8. Accrued Liabilities

Accrued liabilities consist of the following (in thousands):

	DECEMBER 31, 2019	DECEMBER 31, 2018
Accrued compensation	$ 2,730	$ 2,570
Accrued warranty costs	327	320
Accrued customer incentives	5,102	2,170
Accrued liabilities, acquisition related	1,722	-
Accrued liabilities, other	2,586	1,811
	$ 12,467	$ 6,871

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, 2018	$ 320
Warranties issued (released) during the period	138
Settlements made during the period	(131)
Balance at December 31, 2019	$ 327

9. Debt

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

	DECEMBER 31, 2019	DECEMBER 31, 2018
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	$ 3,425	$ 3,425
Secured promissory note ("June 2014 Secured Promissory Note") bearing interest at prime plus 2% (7.25% as of September 30, 2019) 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, 2019 and December 31, 2018 of $185 and $205	8,404	8,639
Secured revolving borrowing ("LSQ Financing") bearing interest at (12.80% annually) payable through the lenders direct collection of certain accounts receivable through March 2020, collateralized by substantially all of the Company's personal property.	3,629	2,073
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.	7,300	7,300
Research loan facility ("2018 Research Facility") bearing interest at 1.00% per annum, interest payments are due annually on the anniversary date of the facility with principal payable in 25% increments on the anniversary date of the facility beginning on the fourth anniversary of the loan (September 2022), net of imputed interest as of December 31, 2019 of $8.	81	—
Financial institution facility ("2018 Bank Facility") bearing interest at Euribor plus 2.40% (2.60% as of December 31, 2019) per annum, interest payable monthly and principal payable at maturity (February 29, 2020), 60% guaranteed by Export Credit Agency of Finland for a fee of 2.49%	207	—
Debt, including debt due to related parties	$ 23,046	$ 21,437
Less debt due to related parties, non-current	(7,300)	(7,300)
Less current portion	(3,899)	(2,318)
Debt, non-current	$ 11,847	$ 11,819

As of December 31, 2019, aggregate contractual future principal payments on the Company's debt, including debt due to related parties, are due as follows (in thousands):

PERIOD ENDING DECEMBER 31,	DEBT	DEBT TO RELATED PARTY
2020	$ 4,125	$ -
2021	311	-
2022	2,805	5,000
2023	379	
2024	403	-
Thereafter	6,940	-
Total future principal payments	14,963	5,000
Interest payments included in debt balance [1]	976	2,300
	$ 15,939	$ 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 9 and 18.

The fair value of the Company's outstanding debt obligations, which excludes debt due to related parties, as of December 31, 2019 and 2018 was $15,746,000 and $14,137,000, 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 18) 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 into 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, 2019 and 2018 (in thousands):

	DECEMBER 31, 2019		
	INTEREST		
	EXPENSE	RELATED PARTY, NET	NON-CASH
June 2014 Secured Promissory Note	$ 674	$ —	$ 20
LSQ Financing	429	—	—
ASC 606 Financing Component[2]	256	—	257
Other	115	—	—
	$ 1,474	$ —	$ 277

	DECEMBER 31, 2018		
	INTEREST		
	EXPENSE	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

(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 6.75% as of December 31, 2019. 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 $72,482 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 total amount of finance related cost related to this debt initially was $304,000, currently treated as a debt discount and is being amortized over the life of the loan.

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, 2019, 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 May 30, 2021.

The following table reflects the activity under this note:

Principal balance, net at December 31, 2018	$	8,639
Principal payments		(908)
Interest		653
Debt discount amortization		20
Principal balance, net at December 31, 2019	$	8,404

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.

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. Thereafter the terms of the arrangement remained in effect until the Company and the creditor executed an amendment.

On January 7, 2020, the Company entered into a Second Amendment to the Company's Invoice Purchase Agreement with LSQ. The amendment, among other things, (i) increases the amount in which LSQ may elect to purchase up to $20,000,000 of eligible customer invoices from the Company from $7,000,000; (ii) increases the advance rate to 90% from 85% and 70% from 60%, respectively, of the face value of domestic and international receivables being sold; (iii) decreases the invoice purchase fee rate from 0.40% to 0.25%; (iv) increases the funds usage fee from 0.020% to 0.025%; (v) extends the 0% aging and collection fee percentage charged at the time when the purchased invoice is collected from 90 days to 120 days, and increases the fee percentage charged thereafter from 0.35% to 0.75%; and (vi) decreases the early termination fee from 0.75% to 0.50%.

In addition to the Amendment, the Company simultaneously entered into an Amended Inventory Financing Addendum (the "Addendum") with LSQ. The Addendum allows the Company to request an advance up to the lesser of (i) 100% of the Company's unpaid finished goods inventory; (ii) 65% of the appraised value of the Company's inventory performed on or on behalf of LSQ; or (iii) $3,000,000. Funds advance under the Addendum are subject to a monthly inventory management fee of 0.5% on the average monthly inventory funds available and a daily interest rate of 0.025%.

There was $3,629,000 and $2,073,000, respectively, in outstanding balance under the LSQ Financing as of December 31, 2019 and 2018. 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. As of December 31, 2019 and 2018, the Company had $5,082,000 and $2,693,000, respectively included in accounts receivable that were transferred under this arrangement.

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.

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 18).

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	$	-

September 2018 Research Facility

On September 4, 2018, the Company's subsidiary Pro Farm entered into a research loan facility under the Finnish Government Innovation Funding initiative with the Innovation Centre Business Finland, in the amount of $326,000 (€282,000). Pro Farm subsequently drew down $94,000 (€80,000) on September 21, 2018 in connection with research and development costs. The note bears interest at 3% below the reference rate for Finnish Government Aid, with a minimum of 1% interest annually. The current effective interest rate as of December 31, 2019 is 1.00%. The loan facility requires repayment in increments of 25% on each of the anniversary date of the loan after the third anniversary of the loan execution date as such the balance of the loan has been classified as long term. The terms of the loan facility allow for partial debt forgiveness if so determined by the State Council for the Financing of Research, Development and Innovation at the lender's discretion. As of December 31, 2019, the outstanding principal balance net of imputed interest was $81,000 (€72,000).

September 2018 Bank Facility

On September 10, 2018, the Company's subsidiary Pro Farm entered into a bank facility with Nordea Bank AB, under which the Company may borrow up to $266,000 (€230,000). The note bears interest at the Euribor three-month rates plus 2.4% which as of September 30, 2019 was increased to 2.60%. The bank facility includes a usage commitment fee of 0.95% and required repayment on its maturity date of February 28, 2019. On February 20, 2018, the bank facility was extended until August 31, 2019, and on August 30, 2019, the bank facility was again extended until February 29, 2020, The bank facility is 60% guaranteed by Export Credit Agency of Finland. In connection with the guarantee the Company pays a fee of 2.49% to the guarantor. As of December 31, 2019, the amount outstanding on the bank facility was $207,000 (€184,664).

On February 29, 2020, the September 2018 Bank Facility became due and the Company through its subsidiary Pro Farm extended the terms of the bank facility with Nordea Bank AB to May 31, 2020 with all terms remaining the same.

10. Warrants

On August 6, 2019, the Company entered into a warrant amendment and plan of reorganization agreement ("Warrant Reorganization Agreement") with certain holders of the warrants issued in connection with the February 2018 Financing Transactions (the "February 2018 Warrants"). Pursuant to the Warrant Reorganization Agreement, the Company has agreed to extend the expiration date under the February 2018 Warrants held by such holders from December 2020 to December 2021, and the holders have agreed, at any time the Company's stock trades above $1.00 and upon request by the Company, to exercise up to 36,600,000 shares under their respective February 2018 Warrants, in consideration for the delivery of (x) the shares subject to the February 2018 Warrants so exercised and (y) the delivery of new warrants ("August 2019 Warrants") to purchase such additional number of shares of common stock equal to the amount of shares so exercised and delivered under February 2018 Warrants. Accordingly, up to a maximum of 36,600,000 new shares may be issued pursuant to the August 2019 Warrants, to the extent the Company exercises its rights to require exercise of the February 2018 Warrants.

The Warrant Reorganization Agreement was treated as a modification of an equity-classified instrument, which did not result in a change in the classification of the instrument pre- and post-modification. Analogizing to Accounting Standards Codification ("ASC") 718 – *Compensation – Stock Compensation*, the Company accounted for the modification similarly to modification of stock option awards, which requires the Company to assess the fair value of the instrument pre- and post-modification. As a result of the modification of the February 2018 Warrants, the Company incurred a non-cash charge of $1,564,000, consistent with the increase in the fair value of the warrants which were not immediately called under the terms of the Warrant Reorganization Agreement.

The Company's fair value of the warrant post modification was estimated utilizing a Monte Carlo univariate option pricing model based on the following assumptions which have been determined consistent with the Company's historical methodology for such assumptions:

	AUGUST 6, 2019
Expected life (years)	3.4
Estimated volatility factor	53.1%
Risk-free interest rate	1.52%
Expected dividend yield	—

Expected Life. Expected life represents the period that the warrants are expected to be outstanding. The Company estimates the contractual period, the period between the date of the modification and the expiration date of the warrant, which is an appropriate estimate of the expected term.

Estimated Volatility Factor. As the Company's common stock has a limited period of normalized trading history, the Company calculated the estimated volatility factor based on the Company's trading history and calculated volatility of the common stock of comparable agricultural biotechnology companies. The Company's estimation of the volatility factor gives weighting 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.

The August 2019 Warrants have a term expiring on January 1, 2023, an exercise price of $1.75 per share, and are first exercisable 180 days after issuance. The August 2019 Warrants are classified as equity instruments, exercisable in cash, provided that they may be exercised via net exercise if the Company does not have a registration statement registering the shares underlying the August 2019 Warrants effective as of June 30, 2020. On August 7, 2019, the Company requested under the Warrant Reorganization Agreement, the exercise of 10,000,000 ("Exercise 1") shares under the February 2018 Warrants, resulting in the Company issuing 10,000,000 common shares and August 2019 Warrants to purchase 10,000,000 shares. The issuance of the August 2019 Warrants resulted in the Company incurring non-cash charge of $4,751,000 in connection with the fair value of new warrants. The Company's fair value of the new warrants issued was estimated utilizing a Black Scholes option pricing model. Due to the insignificant time lapse between the warrant call and the date of the warrant modification, the same assumptions as outlined above were utilized to fair value the new warrants issued in connection with the warrant exercise in August 2019.

On December 18, 2019 and through December 30, 2019, a total of 6,000,000 shares under February 2018 Warrants were exercised following the Company's call, resulting in the Company issuing 6,000,000 common shares and the August 2019 Warrants to purchase 6,000,000 shares ("Exercise 2"). The issuance of the August 2019 Warrants resulted in the Company incurring non-cash charge of $1,314,000 in connection with the fair value of new warrants.

The following table outlines assumptions utilized for the December 2019 warrant issuances:

	DECEMBER 2019
Expected life (years)	3.01-3.04
Estimated volatility factor	52.9-53.1 %
Risk-free interest rate	1.58-1.66 %
Expected dividend yield	—

Expected Life. Expected life represents the period that the warrants are expected to be outstanding. The Company estimates the contractual period, the period between the date of the modification and the expiration date of the warrant, which is an appropriate estimate of the expected term.

Estimated Volatility Factor. As the Company's common stock has a limited period of normalized trading history, the Company calculated the estimated volatility factor based on the Company's trading history and calculated volatility of the common stock of comparable agricultural biotechnology companies. The Company's estimation of the volatility factor gives weighting 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.

As of the date of the issuance of these consolidated financial statements, an additional 6,000,000 shares under the February 2018 Warrants have been exercised following the Company's call, resulting in the issuance of 6,000,000 common shares and August 2019 Warrants to purchase 6,000,000 shares.

The following table summarizes information about the Company's common stock warrants outstanding as of December 31, 2019 (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	6,750	$ 1.00
In connection with February 2018 Financing Transaction (February 2018 Warrants 2)	February 2018	December 2020	5,065	$ 1.25
In connection with August 2019 Modification of February 2018 Warrants (Warrant Amendment and Plan of Reorganization Agreement)	August 2019	December 2021	20,600	$ 1.00
In connection with Exercise 1 & 2 of Call Option under the Warrant Amendment and Plan of Reorganization Agreement (August 2019 Warrants)	Various dates starting in August 2019	January 2023	16,000	$ 1.75
			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.

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 of these consolidated financial statements for the valuation of these warrants and their impact to these consolidated financial statements.

A total of 16,000,000 shares had been issued upon exercise of warrants during the year ended December 31, 2019. The weighted average remaining contractual life and exercise price for warrants outstanding as of December 31, 2019 is 2.23 years and $1.33, respectively. The intrinsic value of the warrants on December 31, 2019 was $274,000.

On March 3, 2020, an additional 6,000,000 shares under February 2018 Warrants were exercised following the Company's call under the Warrant Reorganization Agreement, resulting in the Company issuing 6,000,000 common shares and August 2019 Warrants to purchase 6,000,000 shares.

11. 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.

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.

As of December 31, 2019, 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	4,051
Stock options outstanding	11,821
Restricted stock units outstanding	2,405
Warrants called not yet exercised	20,600
Warrants to purchase common stock	52,647
Common shares to be issued in lieu of agent fees	498
Shares available for future purchase under ESPP	885
Maximum contingent consideration shares to be issued	5,972
Contingent shares to be issued in connection with future retirement of CEO.	1,250
Balance at December 31, 2019	100,129

On March 3, 2020, an additional 6,000,000 shares under February 2018 Warrants were exercised following the Company's call under the Warrant Reorganization Agreement, resulting in the Company issuing 6,000,000 common shares and August 2019 Warrants to purchase 6,000,000 shares.

12. Stock Option Plans

On May 31, 2019, the Company's stockholders approved an Employee Stock Purchase Plan (the "ESPP") whereby employees may purchase Company stock through payroll deductions over each six-month period beginning on June 1 and December 1 (the "Offer Period"). The total maximum number of shares available for purchase under the ESPP is 1,000,000. The purchase price of the shares will be 85% of the lower of the fair market value of the shares at the beginning or at the end of the Offer Period. The ESPP is a tax qualified plan under Section 423 of the Internal Revenue Code. All employees, including officers, are eligible to participate in the ESPP. A participant may withdraw all uninvested payment balances credited to their account at any time. An employee whose stock ownership in the Company exceeds 5% of the Company's outstanding common stock is not eligible to participate in the ESPP. The ESPP is compensatory and the 15% discount will be expensed over the Offer Period. The Company has accounted for the ESPP in accordance with ASC 718, Compensation – Stock Based Compensation. As of December 31, 2019 the Company recorded stock-based compensation expense of approximately $34,000.

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, 2019 and 2018, 0 and 35,000 options, respectively had been exercised that was subject to repurchase.

As of December 31, 2019, options to purchase 97,000 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 all were vested. During the year ended December 31, 2019, 28,000 and 3,000 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, 2019, options to purchase 281,000 shares of the Company's common stock at a weighted-average exercise price of $7.51 per share were outstanding under the 2011 Plan, of which all were vested. During the year ended December 31, 2019, 0 and 4,000 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, 2019, options to purchase 11,443,000 shares of the Company's common stock at a weighted-average exercise price of $2.41 per share were outstanding under the 2013 Plan, of which 4,318,000 were vested. During the year ended December 31, 2019, 19,000 and 868,000 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, 2019, the Company granted 5,607,000 options with Standard Vesting Terms.

The following table summarizes the activity under the Company's stock option plans for the year ended December 31, 2019 (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, 2019	7,136	$ 3.31	8.1	$ 469
Options granted	5,607	$ 1.43		
Options exercised	(47)	$ 1.18		
Options cancelled	(875)	$ 1.92		
Balances at December 31, 2019	11,821	$ 2.53	8.2	$ 65
Vested and expected to vest at December 31, 2019	10,022	$ 2.71	8.0	$ 62
Exercisable at December 31, 2019	4,696	$ 4.04	6.7	$ 55

The total intrinsic value of options exercised during the years ended December 31, 2019 and 2018 was $13,000 and $53,000, respectively.

The estimated fair value of options vested during the years ended December 31, 2019 and 2018 was $65,000 and $469,000, respectively. The weighted-average estimated fair value of options granted during the years ended December 31, 2019 and 2018 was $1.43 per share and $0.97 per share, respectively.

During the years ended December 31, 2019 and 2018, the Company recorded share-based compensation expense related to stock options of $1,742,000 and $1,040,000, respectively. During the years ended December 31, 2019 and 2018, 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 14).

As of December 31, 2019, 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 $3,963,000. This expense will be recognized on a straight-line basis over a weighted-average remaining term of 2.96 years.

On December 2, 2019, Dr. Pamela Marrone announced her intention to retire from her position as the Company's Chief Executive Officer ("CEO") and an employee of the Company. In connection with her retirement, Dr. Marrone entered into an employment separation agreement with the Company on December 1, 2019 (the "Separation Agreement"). The Separation Agreement provides that Dr. Marrone's retirement as an employee and officer of the Company will become effective immediately prior to the date on which a new CEO is retained, after which Dr. Marrone will continue to serve on the Company's board of directors as a non-executive member. As a result of the above compensation arrangement, under ASC 718, the Company treated the accelerated vesting terms for the options as a modification under Accounting Standards Codification ("ASC") 718 – *Compensation – Stock Compensation*, which requires the Company to assess the fair value of the instrument pre- and post-modification and recognize any incremental expense on the modification date dependent on the Company's assessment of the initial probability of the option award vesting under the pre-modification terms. As such, the Company recognized an incremental stock-based compensation expense of $312,000 as of December 31, 2019. The remaining expense to be recognized in future periods is $355,000.

Restricted Stock

During the year ended December 31, 2019, 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, 2019 varied from immediate to 36 months. During the year ended December 31, 2019, 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, 2019, there were 2,405,000 restricted stock units outstanding under the 2013 Plan. The following table reflects the activity of restricted stock units for the year ended December 31, 2019 (in thousands, except weighted average grant date fair value):

	SHARES OUTSTANDING	WEIGHTED AVERAGE GRANT DATE FAIR VALUE
Outstanding at December 31, 2018	1,146	$ 1.40
Granted	1,266	1.44
Exercised	(7)	1.36
Forfeited	-	-
Outstanding at December 31, 2019	2,405	$ 1.40

The following table summarizes the activity of non-vested restricted stock units for the year ended December 31, 2019 (in thousands, except weighted average grant date fair value):

	SHARES OUTSTANDING	WEIGHTED AVERAGE GRANT DATE FAIR VALUE
Nonvested at December 31, 2018	404	$ 1.40
Granted	1,266	1.44
Vested	(959)	1.42
Forfeited	-	-
Nonvested at December 31, 2019	711	$ 1.45

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, 2019 and 2018, the Company recognized $1,597,000 and $810,000, 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, 2019 was $482,000, which is expected to be recognized over a weighted average period of .33 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.

The following table summarizes shares available for grant under the Company's stock incentive plans for the year ended December 31, 2019 (in thousands):

	SHARES AVAILABLE FOR GRANT
Balances at December 31, 2018	6,175
Shares authorized	3,874
Options granted	(5,607)
Options cancelled	875
Restricted stock units granted	(1,266)
Restricted stock units cancelled	-
Balances at December 31, 2019	4,051

13. Commitments and Contingencies

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 "Lawsuit"). Piper's complaint alleged one breach of contract claim, specifically, that the Company breached an engagement letter (the "Engagement Letter") with Piper by failure to pay a $2,000,000 transaction fee, which Piper alleged was due under the Engagement Letter as a result of the Company's consummation of its private placement and debt refinancing transactions in February 2018.

On October 8, 2019, the Company entered into a Settlement and Release Agreement with Piper to settle the Lawsuit without any admission or findings of liability (the "Settlement Agreement") in an aggregate of $1,000,000. Under the Settlement Agreement, Piper agreed to dismiss the Lawsuit against the Company with prejudice and the parties agreed to mutual general releases of all claims relating to the Lawsuit other than their prospective obligations under the Settlement Agreement, the confidentiality obligations under the Engagement Letter and any potential indemnification obligations under the Engagement Letter unrelated to the Lawsuit. The settlement amount has been paid as of December 31, 2019 and included in the Company's selling, general and administrative within the Company's consolidated statement of operations.

Other Matters

On December 2, 2019, Dr. Pamela Marrone announced her intention to retire from her position as the Company's Chief Executive Officer ("CEO") and an employee of the Company. In connection with her retirement, Dr. Marrone entered into the Separation Agreement on December 1, 2019 (the "Separation Agreement"). The Separation Agreement provides that Dr. Marrone's retirement as an employee and officer of the Company will become effective immediately prior to the date on which a new CEO is retained, after which Dr. Marrone will continue to serve on the Company's board of directors as a non-executive member. In addition to being entitled to any unpaid salary through her retirement date and continued COBRA coverage, in consideration of her execution of certain releases, Dr. Marrone will be entitled under the Separation Agreement to her 2019 annual bonus without regard to the termination of her employment, calculated based on achievement of 100% of her individual goals, and with all other terms (including the component of her award based on achievement of Company goals) determined in accordance with the Company's annual bonus plan as applied to other active senior executives of the Company, and all of her outstanding unvested stock options will become fully vested.

In connection and in conjunction with Dr. Marrone's retirement also entered into a consulting services agreement with the Company on December 1, 2019 (the "Consulting Agreement"). Pursuant to the Consulting Agreement, Dr. Marrone will serve as a consultant to the Company for a period of three years following the date of her retirement to advocate for the Company and its mission as the Company's founder, and to provide transition services and other support, with the terms of such services and related deliverables to be mutually agreed between Dr. Marrone and the Company's new CEO. As consideration for her service as a consultant, Dr. Marrone will receive a consulting fee of $19,583.33 per month ("Monthly Consulting Fee"), as well as a one-time award of 1,250,000 restricted stock units (the "Consulting RSUs") under the Company's 2013 Stock Incentive Plan, to be awarded as soon as practicable after her retirement date. The Consulting RSUs will vest in equal installments on each of the first three anniversaries of Dr. Marrone's retirement date, subject to her continuous service as a consultant through the applicable vesting dates. Under the terms of the Consulting Agreement, the Company may terminate Dr. Marrone's service as a consultant in connection with a change in control, and Dr. Marrone may terminate the Consulting Agreement due to the Company's breach or default, in which case Dr. Marrone will be entitled to full acceleration of the Consulting RSUs and receive a lump sum payment equal to the sum of the then remaining Monthly Consulting Fees payable under the Consulting Agreement. The Company may also terminate the Consulting Agreement due to Dr. Marrone's breach or default or for certain other grounds, in which case the Company shall not be obligated to make further payments under the Consulting Agreement and Dr. Marrone's compensatory equity awards will cease to vest or terminate, as applicable.

14. Income Taxes

As of December 31, 2019, the Company had net operating loss carryforwards prior to 2019 for federal income tax reporting purposes of $237,182,000, which begin to expire in 2026, and California and various other state net operating loss carryforwards of $146,354,000 and $48,071,000, respectively, which will expire from 2023 through 2038. The federal net operating loss generated in 2019 and 2018 in the amount of $26,493,000 and $21,216,000, respectively will never expire. In addition, as of December 31, 2019, the Company had federal research and development tax credit carryforwards of $2,910,000, which begin to expire in 2026, and state research and development tax credit carryforwards of $2,871,000, 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 which it is in the process of completing. 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, 2019, deferred tax assets of $84,077,000, arising primarily as a result of the Company's net operating loss carryforwards, tax credits and certain costs capitalized for tax purposes, the majority of which is fully offset by a valuation allowance. The valuation allowance increased $7,201,000 for the year ended December 31, 2019 and decreased by $6,455,000 during the year ended December 31, 2018.

At December 31, 2019, the Income (loss) before provision for income taxes, includes the following components (in thousands):

	DECEMBER 31,	
	2019	**2018**
Domestic	$ (36,692)	$ (20,213)
Foreign	(483)	-
Income (loss) before income taxes	$ (37,175)	$ (20,213)

At December 31, 2018, there were no comparative amounts.

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

	DECEMBER 31,	
	2019	**2018**
DEFERRED TAX ASSETS:		
Federal & State NOL carryforward	$ 74,109	$ 64,319
Research and development tax credits	4,223	3,609
Other, net	5,745	3,058
Net deferred tax assets	84,077	70,986
Less valuation allowance	(78,187)	(70,986)
Net deferred tax assets	$ 5,890	$ -
DEFERRED TAX LIABILITIES:		
Other Intangibles	5,890	-
Net deferred tax assets	$ -	**$ -**

For the years ended December 31, 2019 and 2018, the Company did not recognized a provision. The provision for income taxes is different than the amount computed using the applicable statutory federal income tax rate as summarized below:

	DECEMBER 31,	
	2019	2018
Federal tax benefit at statutory rate	21%	21%
State tax benefit, net of federal benefit	9	5
Foreign rate differential	1	—
Interest Expense	—	(1)
Share-based compensation expense	(1)	(1)
Other	—	2
Debt- related	—	2
Change in accounting method	—	4
Financing cost, warrants	(4)	—
Adjustment due to change in valuation allowance	(26)	(32)
Provision for income taxes	—%	—%

On September 13, 2019, as discussed in Note 3, the Company completed its acquisition of Pro Farm. This was accounted for as a non-taxable acquisition. For purposes of the Company's income tax provision, the acquisition required the Company to consider income tax changes under the Tax Cuts and Jobs Act it was not previously subject to, including Global Intangible Low-Taxed Income ("GILTI") and Subpart F. Due to the timing of the acquisition's consummation, the impact of these amounts on the Company's income tax provision and consolidated financial statements as of December 31, 2019 were not material. The Company has elected to treat GILTI as a period cost and accordingly has not recorded any deferred assets or liabilities related to the calculation of future GILTI income. The most significant impact to the Company's tax provision as a result of the Pro Farm acquisition was the recognition of intangible assets which impacted the Company's temporary differences for depreciation and amortization. Refer to the table above for the inclusion of the foreign entity on the Company's overall federal income tax rate and deferred tax liabilities.

On September 10, 2019, as discussed in Note 3, the Company completed its acquisition of the Jet-Ag and Jet-Oxide product lines. These were treated as asset acquisitions. For purposes of the Company's income tax, the acquisition resulted in the recognition of intangible assets which impacted the Company's temporary differences for depreciation and amortization which did not have a material impact on the Company's provision and consolidated financial statements as of December 31, 2019.

On January 1, 2019, as discussed in Note 4, the Company adopted ASC 842 and all the related amendments. For purposes of the Company's income tax, the adoption did not have a material impact on the consolidated financial statements as of December 31, 2019.

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 had no tax implications as the Company is on the full inclusion method for tax purposes.

As of December 31, 2019, the Company had unrecognized tax benefits of $1,431,000. 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,	
	2019	2018
Balance at January 1	$ 1,348	$ 1,201
Gross increase to tax positions in prior years	14	147
Gross increases to tax positions in the current year	69	—
Balance at December 31	$ 1,431	$ 1,348

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 2006 through 2019 due to unutilized net operating loss carryforwards and research and development tax credit carryforwards.

15. 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, 2019 and 2018 of $364,000 and $335,000, respectively.

16. Related Party Transactions

Warrant Exercise

During the year ended December 31, 2019, the Company requested under the Warrant Reorganization Agreement, the exercise of 16,000,000 shares underlying the February 2018 Warrants, resulting in the Company issuing 16,000,000 common shares and August 2019 Warrants for 16,000,000 shares. Of the warrants exercised, two of the warrant holders, Ospraie Ag Science LLC ("Ospraie") and Ardsley Advisory Partners ("Ardsley"), are beneficial owners of 31.6% and 9.1%, respectively, of the Company's total outstanding common stock as of December 31, 2019. The total number of warrants exercised at the request of the Company by Ospraie and Ardsley were for 13,406,184 shares and 2,331,521 shares, respectively.

Ospraie Loan to Pro Farm

In connection with the Company's closing of the Pro Farm Acquisition, the terms of the Share Purchase Agreement included as a condition to closing the repayment of certain indebtedness of Pro Farm. One of the indebtedness obligations to be repaid was a convertible loan in a principal amount of $1,000,000, held by Dwight Anderson, an affiliate of Ospraie, the Company's largest shareholder. The Company paid in total $1,434,000 which is inclusive of the principal, interest and other charges under the terms of the debt arrangement.

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

17. 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 9 for further discussion.

18. Subsequent Event

On January 7, 2020, the Company entered into a Second Amendment to the Company's Invoice Purchase Agreement with LSQ. The amendment, among other things, (i) increases the amount in which LSQ may elect to purchase up to $20,000,000 of eligible customer invoices from the Company from $7,000,000; (ii) increases the advance rate to 90% from 85% and 70% from 60%, respectively, of the face value of domestic and international receivables being sold; (iii) decreases the invoice purchase fee rate from 0.40% to 0.25%; (iv) increases the funds usage fee from 0.020% to 0.025%; (v) extends the 0% aging and collection fee percentage charged at the time when the purchased invoice is collected from 90 days to 120 days, and increases the fee percentage charged thereafter from 0.35% to 0.75%; and (vi) decreases the early termination fee from 0.75% to 0.50%.

In addition to the Amendment, the Company simultaneously entered into an Amended Inventory Financing Addendum (the "Addendum") with LSQ. The Addendum allows the Company to request an advance up to the lesser of (i) 100% of the Company's unpaid finished goods inventory; (ii) 65% of the appraised value of the Company's inventory performed on or on behalf of LSQ; or (iii) $3,000,000. Funds advance under the Addendum are subject to a monthly inventory management fee of 0.5% on the average monthly inventory funds available and a daily interest rate of 0.025%.

On February 29, 2020, the September 2018 Bank Facility became due and the Company through its subsidiary Pro Farm extended the terms of the bank facility with Nordea Bank AB to May 31, 2020 with all terms remaining the same.

On March 3, 2020, an additional 6,000,000 shares under February 2018 Warrants were exercised following the Company's call under the Warrant Reorganization Agreement, resulting in the Company issuing 6,000,000 common shares and August 2019 Warrants to purchase 6,000,000 shares. The Company is still in the process of evaluating the accounting impact related to the exercise and the fair value of the warrants issued.

On March 5, 2020, George H. Kerckhove, a member of the Board of Directors (the "Board") of Marrone Bio Innovations, Inc. (the "Company") and Chair of the Audit Committee of the Board, notified the Board of his intention to retire from service with the Company for personal reasons. Mr. Kerckhove tendered his resignation as a member of the Board and each of its committees effective April 1, 2020. Mr. Kerckhove's retirement and resignation from the Board is not the result of any disagreement with the Company. In connection with Mr. Kerckhove's upcoming retirement, the Board appointed Zachary S. Wochok, to become Chair of the Audit Committee effective April 1, 2020. The Board has determined that Mr. Wochok is an "audit committee financial expert," as defined under the applicable SEC rules.

The Company has evaluated its subsequent events from December 31, 2019 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.

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, 2019.

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, 2019. 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").

On September 13, 2019, we acquired Pro Farm Technologies OY (see Note 3 to the accompanying consolidated financial statements for additional information. As permitted for newly acquired businesses by interpretive guidance issued by the staff of the SEC, management has excluded Pro Farm from its assessment of internal controls over financial reporting as of December 31, 2019. We have reported the operating results of Pro Farm in our consolidated statement of operations and cash flows from the acquisition date through December 31, 2019. Total assets and revenues of Pro Farm, excluded from our assessment of internal controls over financial reporting, were 2% and 5%, respectively as of December 31, 2019. As part of our post-closing integration activities, we are engaged in the process of assessing and integrating the acquired business into our existing operations and evaluating the internal controls over financial reporting of the acquired business.

Based on this assessment, management has concluded that our internal control over financial reporting was effective as of December 31, 2019.

The effectiveness of our internal controls over financial reporting as of December 31, 2019, 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

There have been no 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, 2019 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

Not applicable.

PART III

ITEM 10. DIRECTORS, EXECUTIVE OFFICERS AND CORPORATE GOVERNANCE

Board of Directors

Pursuant to our certificate of incorporation, our board of directors is divided into three classes with staggered three-year terms. The following table sets forth, as of the date of this Report, information concerning our board:

Name	Age	Class[(1)]	Position
Pamela G. Marrone, Ph.D.	63	I	Chief Executive Officer
Robert A. Woods (Chair of the Board)	76	I	Chair of the Compensation Committee and Audit Committee Member
Yogesh Mago	38	I	Chair of the Nominating and Corporate Governance Committee and Audit Committee Member
Keith McGovern	54	II	Compensation Committee Member and Nominating and Corporate Governance Committee Member
Stuart Woolf	60	II	Compensation Committee Member and Nominating and Corporate Governance Committee Member
George H. Kerckhove[(2)]	82	III	Chair of the Audit Committee and Nominating and Corporate Governance Committee Member
Zachary S. Wochok, Ph.D.[(2)]	77	III	Audit Committee Member and Compensation Committee Member

(1) The terms of Class I directors will expire at the 2020 annual meeting. The terms of Class II directors will expire at the 2021 annual meeting. The terms of Class III directors will expire at the 2022 annual meeting.

(2) On March 5, 2020, Mr. Kerckhove notified the Board of his intention to retire from service with the Company for personal reasons, effective April 1, 2020. In connection with Mr. Kerckhove's upcoming retirement, the Board has appointed Dr. Wochok to serve as Chair of the Audit Committee, effective April 1, 2020.

Pamela G. Marrone, Ph.D. is our founder and has served as our Chief Executive Officer and a member of our board of directors since our inception in 2006, as well as serving as our President from inception through January 2015 and from September 2015 to August 2017. Prior to founding the Company, in 1995 Dr. Marrone founded AgraQuest, Inc. (acquired by Bayer), where she served as chief executive officer until May 2004 and as President or Chairman from such time until March 2006, and where she led teams that discovered and commercialized several bio-based pest management products. She served as founding president and business unit head for Entotech, Inc., a biopesticide subsidiary of Denmark-based Novo Nordisk A/S (acquired by Abbott Laboratories), from 1990 to 1995, and held various positions at the Monsanto Company from 1983 until 1990, where she led the Insect Biology Group, which was involved in pioneering projects in transgenic crops, natural products and microbial pesticides. Dr. Marrone is an author of over a dozen invited publications, an inventor on more than 300 patents and is in demand as a speaker and has served on the boards and advisory councils of numerous professional and academic organizations. In 2016, Dr. Marrone was elected to the Cornell University Board of Trustees. In February 2019, she was awarded the Lifetime Achievement Award for contributions in biopesticides by BioAg World. In January 2019, she was awarded the "Sustie" award by the Ecological Farming Association for her decades-long leadership in sustainable agriculture. In 2013, Dr. Marrone was named the Sacramento region's "Executive of the Year" by the Sacramento Business Journal and "Cleantech Innovator of the Year" by the Sacramento Area Regional Technology Alliance and Best Manager with Strategic Vision by Agrow in 2014. Dr. Marrone earned a B.S. in Entomology from Cornell University and a Ph.D. in Entomology from North Carolina State University. We believe Dr. Marrone's qualifications to sit on our board of directors include the fact that, as our founder, Dr. Marrone is uniquely familiar with the business, structure, culture and history of our company and that she also brings to the board of directors considerable expertise based on her management and technical and commercialization experience in the biopesticide industry.

Robert A. Woods has served on our board of directors and as Chairman of the board of directors since February 2018. He has more than fifty years of experience in agribusiness and agriculture products. Mr. Woods formerly served as the Chairman and Chief Executive Officer of Targeted Growth Inc., a biotechnology firm focused on improving yield in agronomic crops. Prior to that, he served as Chief Executive Officer of Athena Biotechnologies, Inc., Chairman of Syngenta Corporation US, Group President for Zeneca Ag Products and CEO of Garst Seed Company. He has recently retired from the board of the Gowan Company having served in various capacities for 14 years. In April of 2019, Mr. Woods joined the board of Ag Plenus, an Israeli company in Agricultural technology discovery. From 2007 to 2016, Mr. Woods was a consultant and board member with Vertellus Specialties Inc. Since February 2018, Mr. Woods has served as a consultant with Ospraie Management LLC. Mr. Woods has a Bachelors' degree in Agriculture and Horticulture from the University of Manitoba in Winnipeg, Manitoba. We believe Mr. Woods's qualifications to sit on our board of directors include his extensive experience in agribusiness and agriculture products, and his experiences serving on the board of other companies in the biotechnology industry.

Yogesh Mago has served on our board of directors since February 2018. He has been a senior advisor for Ospraie Ag Science, LLC since October 2016 and has over 15 years of experience in investing across a variety of industries globally, including agriculture, travel, consumer, transportation, industrials and real estate. Mr. Mago is the president and co-founder of Operation Water Inc., a nonprofit organization that aims to deliver sustainable access to clean water in impoverished countries through the development of scalable infrastructure projects. In addition, he is on the Advisory Board of Girl Rising, the nonprofit organization behind the worldwide social action campaign for girls' education and empowerment. Mr. Mago has a Bachelor's degree in Finance and International Business from New York University. We believe Mr. Mago's qualifications to sit on our board of directors include his extensive experience in financial, strategic and other corporate transactions and his perspective working with companies in the agriculture industry.

Keith McGovern has over 30 years of experience in the agriculture industry, specializing in leading commercial potato farming and potato processing operations. He is President of R.D. Offutt Farms, a division of R.D. Offutt Company, one of the largest farming and food processing concerns in the United States. Mr. McGovern joined R.D. Offutt Company in August 1988. Mr. McGovern serves on the Management Committee of Lamb-Weston/RDO Frozen, a joint venture frozen potato product processing plant. He also serves on the Board of Alliance for Potato Research and Education, on the Management Committee for Columbia River Technologies, a whey processor in partnership with Tillamook and Fonterra, and the Management Committee for Simplot RDO, a frozen vegetable plant in Pasco, Washington. Mr. McGovern is a graduate of Embry Riddle Aeronautical University with a degree in Aeronautical Science, and is still an active pilot. We believe Mr. McGovern's qualifications to sit on our board of directors include his considerable experience the agricultural development industry and his work with major organizations that are leaders in food sustainability and growth.

Stuart Woolf has served as President and CEO of Woolf Farming & Processing since 2002. He also serves as the Managing Partner for Harris Woolf California Almonds, a processor and handler of raw almonds, and Los Gatos Tomato Products, which manufactures bulk tomato paste for industrial users. Mr. Woolf has served as Chairman of the California League of Food Processors, the Almond Board of California, and of the University of California President's Commission of Agriculture and Natural Resources. Mr. Woolf currently serves on the board of Ruiz Food Products and Western Growers Association. Mr. Woolf received a bachelor's degree in Liberal Arts from the University of California at Berkeley and an MBA at Boston College. We believe Mr. Woolf's qualifications to sit on our board include his considerable experience in the agriculture industry and his roles serving on the boards of organizations that promote food sustainability and development.

George H. Kerckhove has served on our board of directors since July 2014. He served on the board of directors for Gundersen Medical Foundation from 2010 to 2016 and previously served on the board of directors for Merix Corporation, where he chaired the audit committee. He worked with the American Standard Companies from 1988 through 2000, where he served as VP and chief financial officer, executive VP and global sector manager of various countries and president and general manager of the European Division. Prior to that, he served in a variety of positions from 1962 through 1987 with The Trane Company, from product manager in several product departments, VP and general manager, Process Equipment Division, and executive VP and general manager of both the US and International Commercial Equipment Divisions. Mr. Kerckhove received Bachelor of Science degrees in Agricultural Engineering and Mechanical Engineering, a Master of Science Degree in Mechanical Engineering, and an MBA, all from the University of Wisconsin in Madison. We believe Mr. Kerckhove's qualifications to sit on our board of directors include his education in agricultural engineering and his extensive experience in finance, accounting and management in global publicly traded companies.

Zachary S. Wochok, Ph.D. has served on our board of directors since May 2016. He served as president and founder of The Wochok Group, LLC, a management consulting firm, since October 2011. For over 25 years, Dr. Wochok has held executive positions in the agribusiness, biotechnology and food industries, including service as Chairman of PGP International, Inc., a food ingredients company, from April 2011 to October 2011 and as its chief executive officer from February 1996 to March 2011, as the Chairman and Chief Executive Officer of NURTURE, Inc., as president and chief operating officer of Calgene, Inc., which was then publicly traded, and as the chief executive officer of Plant Genetics, Inc., during which time the company completed an initial public offering and later merged with Calgene, Inc., creating the largest plant biotechnology company in the United States at the time. Dr. Wochok has served as a director and President of Grazix Animal Health, Inc. from July 2015 to July 2019; as Director of Live Leaf, Inc. from April 2017 to July 2019; on the board of Nucelis, Inc., a fermentation based specialty chemical company, from March 2012 to December 2014; as advisor to the board of directors of Cibus Global, Ltd. from January 2015 to July 2017; as agricultural technology business advisor to Alexandria Real Estate Equities, Inc. from January 2015 to February 2017; and on the Advisory Board of AgTech Accelerator from May 2016 to May 2017. He has also served as business development manager in the new ventures department at Monsanto and a lead scientist for Weyerhaeuser Company. Dr. Wochok began his career as a professor of biology at the University of Alabama, following an NIH funded post-doctoral position at Yale University. Dr. Wochok received a B.A. in Biology from LaSalle University, an M.S. in Biology from Villanova University and a Ph.D. in Cell Biology and Plant Physiology from the University of Connecticut. We believe Dr. Wochok's qualifications to sit on our board of directors include his education in biology and plant physiology and extensive experience serving public and private companies in the agriculture and biotechnology industries as an advisor, senior executive or director.

Board of Directors and Leadership Structure

Our board of directors currently consists of seven members.

In accordance with our amended and restated certificate of incorporation and amended and restated bylaws, our board of directors has been divided into three classes with staggered three-year terms. At each annual general meeting of stockholders, the successors to directors whose terms then expire will be elected to serve from the time of election and qualification until the third annual meeting of stockholders following election. Our current directors have been divided among the three classes as follows:

- The Class I directors are Pamela G. Marrone, Ph.D., Robert A. Woods and Yogesh Mago, and their terms will expire at the annual general meeting of stockholders to be held in 2020.
- The Class II director is Keith McGovern and Stuart Woolf, and their terms will expire at the annual general meeting of stockholders to be held in 2021.
- The Class III directors are George H. Kerckhove and Zachary S. Wochok, Ph.D., and their terms will expire at the annual general meeting of stockholders to be held in 2022.

The board of directors currently separates the role of Chairman and Chief Executive Officer, with Dr. Marrone serving as Chief Executive Officer and Mr. Woods serving as Chairman. The board of directors believes that separating these two roles promotes balance between the independent authority of the board of directors to oversee our business and the Chief Executive Officer and our management team, which manages the business on a day-to-day basis. The current separation of the Chairman and Chief Executive Officer roles allows the Chief Executive Officer to focus her time and energies on operating and managing the Company and leverages the experience and perspectives of the Chairman.

We believe the board of directors maintains effective independent oversight through a number of governance practices, including our strong committee system, open and direct communication with management, input on meeting agendas and regular executive sessions.

In addition, the board of directors has established the following procedures for selecting the presiding director during the executive sessions of the board of directors. The presiding director will be (i) the Chairman of the board of directors or (ii) another director appointed by the independent directors. Following his appointment in fiscal year 2018, our Chairman, Robert A. Woods, presided at executive sessions of our Board of Directors.

Director Independence

Nasdaq rules generally require that a majority of the members of a listed company's board of directors be independent. In addition, the listing rules generally require that, subject to specified exceptions, each member of a listed company's audit, compensation, and governance committees be independent. Audit committee members must also satisfy the independence criteria set forth in Rule 10A-3 under Exchange Act, and compensation committee members must also satisfy the independence criteria set forth in Rule 10C-1 under the Exchange Act. In order to be considered independent for purposes of Rule 10A-3 and Rule 10C-1, a committee member may not, other than in his or her capacity as a member of the board of directors or any board committee: accept, directly or indirectly, any consulting, advisory, or other compensatory fee from the listed company or any of its subsidiaries; or be an affiliated person of the listed company or any of its subsidiaries.

Our board of directors has undertaken a review of its composition, the composition of its committees and the independence of each director and considered whether any director has a material relationship with us that could compromise his or her ability to exercise independent judgment in carrying out his or her responsibilities. Our board of directors has also reviewed whether the directors that comprise our audit committee and compensation committee satisfy the independence standards for those committees established by the applicable SEC rules and Nasdaq rules. In making this determination, our board of directors has considered the relationships that each of these non-employee directors has with our company and all other facts and circumstances our board of directors deem relevant in determining their independence, including the beneficial ownership of our capital stock held by each non-employee director.

The board of directors has determined that each of George H. Kerckhove, Yogesh Mago, Keith McGovern, Stuart Woolf, Zachary S. Wochok and Robert A. Woods is an independent director within the meaning of Nasdaq Listing Rule 5605(a)(2), that each of Mr. Kerckhove, Mr. Mago, Dr. Wochok and Mr. Woods further meet the criteria for independence for audit committee members set forth in Rule 10A-3(b)(1) under the Exchange Act and Nasdaq Listing Rule 5605(c)(2), and that each of Mr. McGovern, Dr. Wochok, Mr. Woods and Mr. Woolf further meet the criteria for independence for compensation committee members set forth in set forth in Rule 10C-1(b)(1) under the Exchange Act.

In making its independence determination regarding Mr. Woods and Mr. Mago, the board of directors considered, among other things, that Mr. Woods and Mr. Mago are each consultants to Ospraie Management LLC ("Ospraie Management"), an affiliate of Ospraie Ag Science LLC ("Ospraie"), a significant stockholder and warrant holder (for more information, see "Transactions with Related Persons – Certain Related-Person Transactions"). We also considered that pursuant to their consulting agreements with Ospraie Management, Mr. Woods and Mr. Mago are each paid monthly consulting fees by Ospraie and have each been granted an indirect interest in the equity securities of our Company held by Ospraie and its affiliates. Neither Mr. Woods nor Mr. Mago actively engage in the management of Ospraie or Ospraie Management or have voting control or investment power over the securities owned by Ospraie.

Role of the Board of Directors in Risk Oversight

The board of directors is actively involved in the oversight of our risk management process. The board of directors does not have a standing risk management committee, but administers this oversight function directly through the board of directors as a whole, as well as through its standing committees that address risks inherent in their respective areas of oversight. In particular, our audit committee has the responsibility to consider and discuss our major financial risk exposures and the steps our management has taken to monitor and control these exposures, our compensation committee assesses and monitors whether any of our compensation policies and programs has the potential to encourage excessive risk-taking and our board of directors is responsible for monitoring and assessing strategic risk exposure and other risks not covered by our committees.

The full board of directors, or the appropriate committee, receives reports on risks facing our company from our Chief Executive Officer or other members of management to enable it to understand our risk identification, risk management and risk mitigation strategies. We believe that the leadership structure of our board of directors supports effective risk management because it allows the independent directors on our committees to exercise oversight over management.

Committees of the Board of Directors

In fiscal year 2019, our board of directors had three standing committees: an audit committee, a compensation committee and a nominating and corporate governance committee. The composition and responsibilities of each of our committees are below.

Audit Committee

Our audit committee members are Mr. Kerckhove, Mr. Mago, Dr. Wochok and Mr. Woods, each of whom is a non-employee member of our board of directors. Mr. Kerckhove is our audit committee chair. On March 5, 2020, Mr. Kerckhove notified our board of directors of his intention to retire from service with the Company for personal reasons, effective April 1, 2020. In connection with Mr. Kerckhove's upcoming retirement, our board of directors has appointed Dr. Wochok to serve as Chair of the Audit Committee, effective April 1, 2020. Our board of directors has determined that Mr. Kerckhove and Dr. Wochok are audit committee financial experts, as defined under the applicable SEC rules, and that each of Mr. Kerckhove, Mr. Mago, Dr. Wochok and Mr. Woods is independent within the meaning of Nasdaq Listing Rule 5605(a)(2) and Rule 10A-3(b)(1) under the Exchange Act and further satisfy the additional independence requirements for service on the audit committee under Nasdaq Listing Rule 5605(c)(2).

Our audit committee oversees our corporate accounting and financial reporting process. Among other matters, the audit committee evaluates the independent registered public accounting firm's qualifications, independence and performance; determines the engagement of the independent registered public accounting firm; reviews and approves the scope of the annual audit and the audit fee; discusses with management and the independent registered public accounting firm the results of the annual audit and the review of our quarterly consolidated financial statements; approves the retention of the independent registered public accounting firm to perform any proposed permissible non-audit services; monitors the rotation of partners of the independent registered public accounting firm on our engagement team as required by law; reviews our critical accounting policies and estimates; and annually reviews the audit committee charter and the committee's performance. The audit committee operates under a written charter adopted by the board of directors that satisfies the applicable standards of Nasdaq.

Compensation Committee

Our compensation committee members are Mr. McGovern, Dr. Wochok, Mr. Woods and Mr. Woolf, each of whom is a non-employee member of our board of directors. In accordance with the securities purchase agreement we entered into with Ospraie and other parties named therein on December 15, 2017 (the "Purchase Agreement") (for more information, see "Transactions with Related Persons – Certain Related-Person Transactions – Purchase Agreement and Debt Refinancing"), Mr. Woods has been designated our compensation committee chair. Our board of directors has determined that each of Mr. McGovern, Dr. Wochok, Mr. Woods and Mr. Woolf is independent within the meaning of Nasdaq Listing Rule 5605(a)(2) and the criteria for independence set forth in Rule 10C-1(b)(1) under the Exchange Act. The board of directors also determined that each of Mr. McGovern, Dr. Wochok and Mr. Woolf is a non-employee director under Rule 16b-3 of the Exchange Act, but that Mr. Woods may be deemed to be an employee director under that rule as a result of his consulting relationship with Ospraie Management.

Our compensation committee reviews and recommends programs, arrangements and policies relating to the compensation and benefits of our officers and employees. The compensation committee reviews and approves corporate goals and objectives relevant to the compensation of our chief executive officer and other executive officers, evaluates the performance of these officers in light of those goals and objectives and sets the compensation of these officers based on such evaluations. The compensation committee approves the issuance of certain stock options and other awards under our stock plans, provided that the compensation committee recommends awards for approval by the board of directors with respect to our executive officers, directors and any other persons subject to Section 16 of the Exchange Act. The compensation committee reviews and evaluates, at least annually, the performance of the compensation committee and its members. The compensation committee operates under a written charter adopted by the board of directors that satisfies the applicable standards of Nasdaq. The compensation committee may form and delegate authority under its charter to subcommittees or other persons when appropriate.

Nominating and Corporate Governance Committee

Our nominating and corporate governance committee members are Mr. Kerckhove, Mr. Mago, Mr. McGovern and Mr. Woolf, each of whom is a non-employee member of our board of directors. In accordance with the Purchase Agreement, Mr. Mago has been designated our nominating and corporate governance committee chair. Our board of directors has determined that each of Mr. Kerckhove, Mr. Mago, Mr. McGovern and Mr. Woolf is independent within the meaning of Nasdaq Listing Rule 5605(a)(2).

Our nominating and corporate governance committee is responsible for making recommendations regarding candidates for directorships and the size and the composition of our board of directors. Candidates for directorships are generally identified and considered on the basis of experience, areas of expertise and other factors relative to the overall composition of our board of directors. The nominating and corporate governance committee will also consider candidates for directorship recommended by stockholders that are submitted in compliance with its charter. In addition to making recommendations for director candidates, the nominating and corporate governance committee is responsible for overseeing our corporate governance principles and making recommendations concerning governance matters. The nominating and corporate governance committee operates under a written charter adopted by the board of directors that satisfies the applicable standards of Nasdaq.

Corporate Governance

Corporate Governance Guidelines

Our board of directors has adopted written Corporate Governance Guidelines to assure that the board of directors will have the necessary authority and practices in place to review and evaluate our business operations as needed and to make decisions that are independent of our management. The guidelines are also intended to align the interests of directors and management with those of our stockholders. The Corporate Governance Guidelines set forth the practices the board of directors intends to follow with respect to board composition and selection, board meetings and involvement of senior management, Chief Executive Officer performance evaluations and succession planning, and board committees and compensation. The nominating and corporate governance committee assists the board of directors in implementing and adhering to the Corporate Governance Guidelines. Our Corporate Governance Guidelines are available on the investor relations section of our website at *investors.marronebio.com* under the heading "*Corporate Governance*." The corporate governance guidelines are reviewed at least annually by our nominating and corporate governance committee, and changes are recommended to our board of directors with respect to changes as warranted.

Code of Business Conduct and Ethics

We have adopted the Marrone Bio Innovations Code of Business Conduct and Ethics that applies to all officers, directors and employees. Our Code of Business Conduct and Ethics is available on the investor relations section of our website (at investors.marronebio.com) under the heading "Corporate Governance." If we make any substantive amendments to our Code of Business Conduct and Ethics or grant any waiver from a provision of the Code of Business Conduct and Ethics to any executive officer or director, we will promptly disclose the nature of the amendment or waiver on the investor relations section of our website at investors.marronebio.com under the heading "Corporate Governance." We intend to satisfy the disclosure requirement under Item 5.05 of Form 8-K regarding amendment to, or waiver from, a provision of our Code of Business Conduct and Ethics by posting such information on our website at the address and location specified above.

Corporate Governance Materials

Our Corporate Governance Guidelines, Code of Business Conduct and Ethics, charters for each committee of the board of directors and other corporate governance documents, are posted on the investor relations section of our website at *investors.marronebio.com* under the heading "*Corporate Governance*." In addition, stockholders may obtain a print copy of our Corporate Governance Guidelines, Code of Business Conduct and Ethics as well as the charters of our audit committee, compensation committee and nominating and corporate governance committee by writing to our Corporate Secretary at 1540 Drew Ave., Davis, California 95618.

Compensation Committee Interlocks and Insider Participation

None of our executive officers currently serve, or in the past year have served, as a member of the board of directors or compensation committee of any other entity that has one or more executive officers serving on our board of directors.

Executive Officers

Our executive officers as of December 31, 2019, their positions and respective ages on that date are:

Name	Age	Position
Pamela G. Marrone, Ph.D.	63	Chief Executive Officer
James B. Boyd	67	President and Chief Financial Officer
Kevin Hammill	53	Chief Commercial Officer
Linda V. Moore	73	Executive Vice President, General Counsel, Secretary and Chief Compliance Officer
Tim Johnson, Ph.D.	63	Vice President of Field Development and Technical Services
Keith J. Pitts	56	Senior Vice President, Regulatory and Government Affairs and Chief Sustainability Officer
Amit Vasavada, Ph.D	65	Senior Vice President, Research and Development and Chief Technology Officer

Our executive officers serve at the discretion of the board of directors, subject to rights, if any, under contracts of employment. See the section entitled "Employment Agreements" below. Biographical information for Dr. Marrone is provided in the section entitled "Board of Directors" above.

James B. Boyd was appointed as Chief Financial Officer effective February 2014 and President effective August 2017. Mr. Boyd previously served as chief financial officer of Quantenna Communications and Link-A-Media Devices, both venture capital backed companies, from 2012 to 2013 and from 2010 to 2012, respectively. From 2007 to 2010, he served as chief financial officer and senior vice president of Silicon Storage Technology and from 2000 to 2007, Mr. Boyd served as chief financial officer and senior vice president of ESS Technology, both Nasdaq listed companies. Mr. Boyd earned a B.A. and an M.B.A. in Finance from the University of Wisconsin and a J.D. from Golden Gate University School of Law.

Kevin Hammill was appointed as Chief Commercial Officer effective May 2019. Mr. Hammill previously served as chief operating officer of Pivot Bio, a crop nutrition company, from January 2016 to April 2018. Prior to Pivot Bio, from 2004 to January 2016, Mr. Hammill served in various roles at Valent USA (a division of Sumitomo Chemical), including as vice president of Agriculture Business Operations and Strategy and as the senior director for U.S. Marketing. In addition to these positions, Mr. Hammill served as a member on the board of directors of Valent USA from January 2015 to January 2016. From 1992 to 2004, Mr. Hammill held multiple positions at BASF, a major chemical company, and American Cynamid (acquired by BASF in 2000). Mr. Hammill earned his Bachelor of Science degree in Agriculture and a Master's degree in Agriculture Business from the University of Guelph in Ontario, Canada.

Linda V. Moore was appointed as General Counsel, Secretary and Chief Compliance Officer effective March 2014 and Executive Vice President effective November 6, 2017. Ms. Moore co-founded The Moore Group, where she served as principal from 2005 to 2007, during which time she also served as chief operating officer and general counsel of Mobius Photonics, as well as from 2009 to 2014. From 2007 to 2009, Ms. Moore served as executive vice president, general counsel, chief compliance officer and secretary of Merix Corporation. Ms. Moore has served as an Executive Mentor to Astia (formerly Women's Technology Cluster) and as a member of the Advisory Board for Remedy Interactive and Opportunity Works. She has also taught at the University of Detroit Mercy and Santa Clara University as an adjunct professor. Ms. Moore earned a J.D. at Michigan State University School of Law.

Tim Johnson, Ph.D. was appointed as Vice President of Field Development and Technical Services in August 2015. Dr. Johnson previously served as our Global Product Development Director, Product Development Manager and Eastern U.S. Product Development Manager from June 2011 to August 2015, May 2009 to June 2011 and November 2008 to May 2009, respectively. From June 2002 to November 2008, Dr. Johnson served as manager of commercial development for Plato Industries, Ltd. Dr. Johnson earned a B.S. in Entomology and Pest Management from Iowa State University, an M.S. in Entomology from Iowa State University and a Ph.D. in Entomology from Purdue University.

Keith J. Pitts was appointed as Vice President of Regulatory and Government Affairs in July 2008 and Senior Vice President and Chief Sustainability Officer effective August 8, 2016. Previously, from January 2001 to June 2007, Mr. Pitts served as Director of Public Policy at the Pew Initiative on Food and Biotechnology, a non-partisan research and policy organization based in Washington, D.C. From 1986 to 2001, Mr. Pitts worked in senior legislative, administrative, regulatory and public policy roles in both the U.S. Department of Agriculture and the House Committee on Agriculture. Mr. Pitts earned a B.A. in Chemistry from the University of North Carolina.

Amit Vasavada, Ph.D. was appointed as Vice President of Research and Development in March 2014 and Senior Vice President and Chief Technology Officer effective March 16, 2017. From 2009 to 2014, Dr. Vasavada served as a program manager at General Atomics. Since 2006, Dr. Vasavada has served on the scientific advisory board of Vaxiion Therapeutics and from 2008 to 2014 served as scientific advisor to NewCos, an applied microbiology and algae-based technology development company. Dr. Vasavada earned a B.S. in microbiology from Gujarat University, an M.S. in microbiology from University of Louisiana and a Ph.D. in applied microbiology from University of California, Davis.

Certain Relationships

There are no family relationships between any of our directors or our executive officers.

ITEM 11. EXECUTIVE COMPENSATION

Executive Compensation Tables

We refer to our Chief Executive Officer and our two other most highly compensated executive officers discussed below as our "named executive officers." Our named executive officers for fiscal year 2019 were as follows:

- Pamela G. Marrone, Ph.D., Chief Executive Officer
- James B. Boyd, President and Chief Financial Officer
- Keith Hammill, Chief Commercial Officer

Summary Compensation Table

The following table presents information regarding compensation earned by or awards to our named executive officers during fiscal years 2019, 2018 and 2017.

NAME AND PRINCIPAL POSITION	YEAR	SALARY ($)	BONUS ($)	OPTION & RSU AWARDS ($)[1]	NON-EQUITY INCENTIVE PLAN COMPENSATION ($)[2]	ALL OTHER COMPENSATION ($)[3]	TOTAL ($)
Pamela G. Marrone, Ph.D.	2019	369,558	—	404,449(4)	—(5)	10,609	784,616
Chief Executive	2018	335,577	—	504,896(6)	80,261	21,049	941,783
Officer	2017	300,000	—	—	79,373	11,014	390,387
James B. Boyd	2019	317,942	—	284,669(4)	—(5)	39,097	641,708
President and	2018	297,173	—	135,240(6)	55,932	45,068	533,413
Chief Financial Officer	2017	263,462	—	154,500	67,027	20,447	505,436
Kevin Hammill	2019	329,908		284,669(4)	—(5)	22,786	637,363
Chief Commercial Officer	2018	203,569	—	382,480(6)	43,614	13,916	643,579

(1) This column reflects the aggregate grant date fair value of option awards and restricted stock units granted to our named executive officers estimated pursuant to FASB ASC 718, Compensation—Share based compensation (ASC 718). Valuation assumptions are described in Note 12 of the Notes to Consolidated Financial Statements included in Part II—Item 8—"Financial Statements and Supplementary Data" of this Report.

(2) This column includes cash amounts paid under our non-equity incentive award program, except as indicated.

(3) This column includes our 401(k) retirement savings plan matching, payment of life insurance premiums, long-term disability, housing allowances, gym reimbursements, and other insurance-related reimbursements unless separately noted.

(4) The amount for Dr. Marrone includes an option award of 500,000 shares with an exercise price of $1.44, which has not been exercised. The amount for Mr. Boyd includes an option award of 300,000 shares with an exercise price of $1.44, which has not been exercised. The amount for Mr. Hammill represents an option award of 300,000 shares, with an exercise price of $1.44, which has not been exercised.

(5) The amount of non-equity incentive plan compensation earned by our named executive officers, if any, is not yet calculable. We expect these amounts to be determined by our Board of Directors or the Compensation Committee of our Board of Directors on or prior to April 30, 2020.

(6) The amount for Dr. Marrone includes an option award of 560,000 shares with an exercise price of $1.65, which has not been exercised. The amount for Mr. Boyd includes an option award of 150,000 shares with an exercise price of $1.65, which has not been exercised. The amount for Mr. Hammill represents an option award of 400,000 shares, with an exercise price of $1.73, which has not been exercised.

Incentive Awards

We structure our incentive compensation awards to reward named executive officers for the successful performance of our company as a whole and of each participating named executive officer as an individual. For fiscal year 2019, our compensation committee established a bonus plan available to all of our executive officers and other key employees. The bonus plan provides for a target award of up to 45% of base salary for Dr. Marrone, 40% of base salary for Mr. Boyd and 40% of base salary for Mr. Hammill, with 70% of the target award based upon the achievement of company-wide goals and 30% of the target award based upon the achievement of individual goals. The progress of the goals is tracked by our compensation committee, and the determination of goal achievement (full or partial) is made by our compensation committee and approved by our board of directors.

Each company-wide goal received a weighting, such that each named executive officer would receive a portion of the target incentive compensation award for each goal achieved. The company-wide goals are based on achievement of our financial forecasts, plans and objectives for fiscal year 2019 as well as advancement of selected components of our product pipeline.

Messrs. Boyd and Hammill will be generally evaluated with respect to individual goals on the basis of the overall performance of our company, including the success of financing transactions and related matters, achievement of financial goals, developing strategic collaborations, product development and organizational development. As discussed below, pursuant to the employment separation agreement entered into by the Company and Dr. Marrone on December 1, 2019 (the "Separation Agreement"), Dr. Marrone will be entitled to her annual bonus for fiscal year 2019 without regard to the termination of her employment, calculated based on achievement of 100% of her individual goals, and with all other terms (including the component of her award based on achievement of Company goals) determined in accordance with the Company's bonus plan as applied to the other named executive officers,

In the coming weeks, our compensation committee will evaluate our company-wide performance and that of each named executive officer against the 2019 corporate goals to determine what percentage of the corporate and individual goals have been achieved overall. Based on this evaluation, the compensation committee may determine that incentive compensation awards have been earned by Messrs. Boyd and Hammill. The performance evaluation process and the determination of bonuses to be paid to Messrs. Boyd and Hammill, and will determine the final award earned by Dr. Marrone.

Outstanding Equity Awards at the End of Fiscal Year 2019

The following table provides information regarding unexercised stock options and restricted stock units held by each of our named executive officers as of the end of fiscal year 2019.

		OPTION AWARDS				STOCK AWARDS	
NAME	GRANT DATE	SECURITIES UNDERLYING UNEXCERCISED OPTIONS EXCERCISABLE (#)	SECURITIES UNDERLYING UNEXCERCISED OPTIONS UNEXCERCISEABLE (#)	OPTION EXERCISE PRICE ($)	OPTION EXPIRATION DATE	NUMBER OF SHARES OR UNITS OF STOCK THAT HAVE NOT YET VESTED (#)	MARKET VALUE OF SHARES OR UNITS OF STOCK THAT HAVE NOT YET VESTED ($)
Pamela Marrone, Ph.D.	1/24/2011	31,863(1)	—	1.19	1/23/2021	—	—
	12/15/2011	13,807(2)	—	1.41	12/14/2021	—	—
	2/20/2012	13,390(3)	—	3.11	2/19/2022	—	—
	10/29/2012	63,725(4)	—	12.08	10/28/2022	—	—
	8/1/2013	1,911(5)	—	12.00	8/1/2023	—	—
	9/27/2013	84,000(6)	—	18.01	9/27/2023	—	—
	11/6/2013	482(7)	—	16.77	11/6/2023	—	—
	8/11/2016	208,333(10)	41,667	0.80	8/11/2026	—	—
	5/30/2018	221,692(14)	338,308	1.65	5/30/2028	—	—
	7/16/2019	52,085(15)	447,915	1.44	7/16/2029	—	—
James B. Boyd	2/26/2014	190,000(8)	—	14.03	2/26/2024	—	—
	3/1/2016	150,000(9)	—	1.23	3/1/2026	—	—
	11/16/2016	154,200(11)	45,800	2.34	11/16/2026	—	—
	8/15/2017	—	—	—	—	33,352(12)	33,686
	5/30/2018	59,382(14)	90,618	1.65	5/30/2028	—	—
	7/16/2019	31,255(15)	268,745	1.44	7/16/2029	—	—
Kevin Hammill	5/7/2018	158,352(13)	241,648	1.73	5/7/2028	—	—
	7/16/2019	31,255(15)	268,745	1.44	7/16/2029	—	—

(1) The options vested with respect to one-quarter of the total shares subject to the option on the first anniversary of the vesting commencement date of January 1, 2011, and with respect to 1/48th of the total shares subject to the options monthly thereafter for 36 months, such that all the shares were fully vested upon the fourth anniversary of the options' vesting commencement date.

(2) The options vest with respect to 1/60th of the total shares subject to the options one month after the vesting commencement date of November 1, 2011, and with respect to 1/60th of the total shares subject to the options monthly thereafter for 59 months, such that all the shares will be fully vested upon the fifth anniversary of the options' vesting commencement date.

(3) The options vested with respect to 100% of the total shares subject to the options on the vesting commencement date of February 20, 2012.

(4) The options vest with respect to one-quarter of the total shares subject to the options on October 18, 2013, and with respect to 1/48th of the total shares subject to the options monthly thereafter for 36 months, such that all the shares were fully vested upon the fourth anniversary of the options' vesting commencement date.

(5) The options vest with respect to one-quarter of the total shares subject to the options on August 1, 2014, and with respect to 1/48th of the total shares subject to the options monthly thereafter for 36 months, such that all the shares will be fully vested upon the fourth anniversary of the options' vesting commencement date.

(6) The options vest with respect to one-quarter of the total shares subject to the options on September 27, 2014, and with respect to 1/48th of the total shares subject to the options monthly thereafter for 36 months, such that all the shares will be fully vested upon the fourth anniversary of the options' vesting commencement date.

(7) The options vested with respect to one-quarter of the total shares subject to the option on November 6, 2014, and with respect to 1/48th of the total shares subject to the option monthly thereafter for 36 months, such that all the shares were fully vested upon the fourth anniversary of the option's vesting commencement date.

(8) The option vests with respect to one-quarter of the total shares subject to the option on February 26, 2015, and with respect to 1/48th of the total shares subject to the option monthly thereafter for 36 months, such that all the shares will be fully vested upon the fourth anniversary of the option's vesting commencement date.

(9) The option vests with respect to one-third of the total shares subject to the option on March 1, 2017, and with respect to 1/36th of the total shares subject to the option monthly thereafter for 24 months, such that all the shares will be fully vested upon the third anniversary of the option's vesting commencement date.

(10) The option vests with respect to one-quarter of the total shares subject to the option on August 11, 2017, and with respect to 1/48th of the total shares subject to the option monthly thereafter for 36 months, such that all the shares will be fully vested upon the fourth anniversary of the option's vesting commencement date.

(11) The option vests with respect to one-quarter of the total shares subject to the option on November 16, 2017, and with respect to 1/48th of the total shares subject to the option monthly thereafter for 36 months, such that all the shares will be fully vested upon the fourth anniversary of the option's vesting commencement date.

(12) The restricted stock units vest with respect to 1/36 of the total shares subject to the grant monthly for 36 months. Vested shares will be delivered to the reporting person upon the earlier of the reporting person's separation of service with the Company or immediately prior to a change in control event.

(13) The option vests with respect to one-quarter of the total shares subject to the option on May 3, 2019, and with respect to 1/48th of the total shares subject to the option monthly thereafter for 36 months, such that all the shares will be fully vested upon the fourth anniversary of the option's vesting commencement date.

(14) The option vests with respect to one-quarter of the total shares subject to the option on May 30, 2019, and with respect to 1/48th of the total shares subject to the option monthly thereafter for 36 months, such that all the shares will be fully vested upon the fourth anniversary of the option's vesting commencement date.

(15) The option vests with respect to one-quarter of the total shares subject to the option on July 16, 2020, and with respect to 1/48th of the total shares subject to the option monthly thereafter for 36 months, such that all the shares will be fully vested upon the fourth anniversary of the option's vesting commencement date.

Option Exercises and Stock Vested

The following table shows information regarding the options exercised during 2019 by our named executive officers, and vesting during 2019 of restricted stock units ("RSUs") previously granted to the named executive officers.

	OPTION AWARDS		STOCK AWARDS	
NAME	NUMBER OF SHARES ACQUIRED ON EXERCISE (#)	VALUE REALIZED ON EXERCISE ($)	NUMBER OF SHARES ACQUIRED ON VESTING (#)[1]	VALUE REALIZED ON VESTING ($)[2]
Pamela G. Marrone, Ph.D.	23,871	6,144.40	22,058	29,998.88
James B. Boyd	—	—	44,117	59,999.12
Kevin Hammill	—	—	44,117	59,999.12

(1) Represents shares subject to RSUs that vested in 2019. Vested shares will be delivered to the named executive officer upon the earlier of her or his separation of service with the Company or immediately prior to a change in control event.

(2) The dollar amounts shown in this column are determined by multiplying the number of shares that vested by the per share closing price of our common stock on the vesting date.

Employment Agreements

We have entered into an employment offer letter with each of Dr. Marrone, Mr. Boyd and Mr. Hammill, as described below. We have also entered into employee proprietary information and inventions assignment agreements with each of our named executive officers, under which each of them has agreed not to disclose our confidential information or induce us to use proprietary information or trade secrets of others at any time.

Pamela G. Marrone, Ph.D. Effective as of June 29, 2006, we entered into an offer letter with Pamela G. Marrone, Ph.D., our Chief Executive Officer ("CEO"). Under the offer letter, Dr. Marrone was entitled to an annual base salary, which had been $300,000 since our initial public offering in 2013, but was increased by our board of directors to $350,000 effective May 3, 2018. Dr. Marrone is eligible for our benefit programs on the same terms as our other executives, including eligibility under our bonus program. In addition, in accordance with the terms of the offer letter, our board of directors granted Dr. Marrone a restricted stock award of 97,424 shares, which completely vested on June 29, 2010, and an option to purchase 53,378 shares of our common stock on May 1, 2007, which completely vested on May 1, 2011.

The letter agreement provides that either party may terminate the employment arrangement for any reason or no reason, but four weeks' notice is requested if the agreement is terminated by Dr. Marrone. In addition, the agreement provides that if we actively or constructively terminate Dr. Marrone's employment without cause (whether or not in connection with a change of control), Dr. Marrone will be eligible to receive:

- an amount equal to twelve months of her then-current annual base salary payable in the form of salary continuation; and
- medical and dental coverage, plus disability and life insurance premiums, for a period of twelve months following her termination.

On December 2, 2019, the Company reported that Dr. Pamela Marrone has announced her intention to retire from her position as CEO and an employee of the Company. In connection with her retirement, Dr. Marrone entered into the Separation Agreement with the Company on December 1, 2019.

The Separation Agreement provides that Dr. Marrone's retirement as an employee and officer of the Company will become effective immediately prior to the date on which a new CEO is retained, after which Dr. Marrone will continue to serve on the Company's board of directors as a non-executive member. In addition to being entitled to any unpaid salary through her retirement date and continued COBRA coverage, in consideration of her execution of certain releases, Dr. Marrone will be entitled under the Separation Agreement to her 2019 annual bonus without regard to the termination of her employment, calculated based on achievement of 100% of her individual goals, and with all other terms (including the component of her award based on achievement of Company goals) determined in accordance with the Company's annual bonus plan as applied to other active senior executives of the Company, and all of her outstanding unvested stock options will become fully vested.

Dr. Marrone also entered into a consulting services agreement with the Company on December 1, 2019 (the "Consulting Agreement"). Pursuant to the Consulting Agreement, Dr. Marrone will serve as a consultant to the Company for a period of three years following the date of her retirement to advocate for the Company and its mission as the Company's founder, and to provide transition services and other support, with the terms of such services and related deliverables to be mutually agreed between Dr. Marrone and the Company's new CEO. As consideration for her service as a consultant, Dr. Marrone will receive a consulting fee of $19,583.33 per month ("Monthly Consulting Fee"), as well as a one-time award of 1,250,000 RSUs ("Consulting RSUs") under the Company's 2013 Plan (as defined below), to be awarded as soon as practicable after her retirement date. The Consulting RSUs will vest in equal installments on each of the first three anniversaries of Dr. Marrone's retirement date, subject to her continuous service as a consultant through the applicable vesting dates. Under the terms of the Consulting Agreement, the Company may terminate Dr. Marrone's service as a consultant in connection with a change in control, and Dr. Marrone may terminate the Consulting Agreement due to the Company's breach or default, in which case Dr. Marrone will be entitled to full acceleration of the Consulting RSUs and receive a lump sum payment equal to the sum of the then remaining Monthly Consulting Fees payable under the Consulting Agreement. The Company may also terminate the Consulting Agreement due to Dr. Marrone's breach or default or for certain other grounds, in which case the Company shall not be obligated to make further payments under the Consulting Agreement and Dr. Marrone's compensatory equity awards will cease to vest or terminate, as applicable.

James B. Boyd Effective as of February 26, 2014, we entered into an offer letter with James B. Boyd, our President and Chief Financial Officer. Under the offer letter, Mr. Boyd was entitled to an annual base salary of $240,000, which was increased to $285,000 effective as of August 15, 2017 and further increased to $300,000 effective as of May 3, 2018. Mr. Boyd is eligible for our benefit programs, vacation benefits, medical benefits and 401(k) plan participation. In addition, in satisfaction of obligations to Mr. Boyd in the offer letter with respect to option awards, our board of directors granted Mr. Boyd an option to purchase 190,000 shares of our common stock on February 13, 2014, which vests, subject to continued employment on each vesting date, with respect to one-quarter of the total shares subject to the option on the first anniversary of the option's vesting commencement date of February 26, 2014 and with respect to 1/48th of the total shares subject to the option monthly thereafter for 36 months, such that all shares subject to the option will be fully vested on the fourth anniversary of such option's vesting commencement date.

The offer letter also provided for a $10,000 signing bonus upon Mr. Boyd's acceptance, relocation expenses of $20,000 and three months temporary housing. The letter agreement provides that either party may terminate the employment arrangement for any reason or no reason, but four weeks' notice is requested if Mr. Boyd terminates his employment. In addition, the agreement provides that if we actively or constructively terminate Mr. Boyd's employment without cause (whether or not in connection with a change of control), Mr. Boyd will be eligible to receive:

- an amount equal to six months of his then-current annual base salary payable in the form of salary continuation; and
- medical and dental coverage, plus disability and life insurance premiums, for a period of six months following his termination.

Effective March 3, 2015, Mr. Boyd's terms of employment were revised pursuant to a letter agreement to increase his base salary to $250,000 and to provide for certain payments in the event of a termination in connection with a change in control. Such change in control provisions were superseded by the change in control agreement discussed below.

Effective August 15, 2017, we promoted Mr. Boyd to President and Chief Financial Officer. In connection with the promotion, we entered into a letter agreement with Mr. Boyd, also effective August 15, 2017, pursuant to which Mr. Boyd's base salary was increased from $250,000 to $285,000, provided that Mr. Boyd has agreed to defer his salary increase until the satisfaction of certain contingencies described in the letter agreement. In addition, Mr. Boyd was granted 150,000 RSUs, which will vest in equal monthly increments over a period of three years from the grant date. Furthermore, Mr. Boyd remains eligible for our bonus plan, under which Mr. Boyd's bonus can be up to 40% of his base salary.

Kevin Hammill Effective as of May 7, 2018, we entered into an offer letter with Kevin Hammill, our Chief Commercial Officer. Under the offer letter, Mr. Hammill is entitled to annual base salary of $320,000, and is eligible for our benefit programs, vacation benefits, medical benefits and 401(k) plan participation. In addition, in satisfaction of obligations to Mr. Hammill in the offer letter with respect to option awards, our board of directors granted Mr. Hammill an option to purchase 400,000 shares of our common stock on May 7, 2018, which vests, subject to continued employment on each vesting date, with respect to one-quarter of the total shares subject to the option on the first anniversary of the option's vesting commencement date of May 7, 2019 and with respect to 1/48th of the total shares subject to the option monthly thereafter for 36 months, such that all shares subject to the option will be fully vested on the fourth anniversary of such option's vesting commencement date.

The letter agreement provides that either party may terminate the employment arrangement for any reason or no reason, but two weeks' notice is requested if Mr. Hammill terminates his employment. In addition, the agreement provides that if we actively or constructively terminate Mr. Hammill's employment without cause (whether or not in connection with a change of control), Mr. Hammill will be eligible to receive:

- an amount equal to six months of his then-current annual base salary payable in the form of salary continuation; and
- medical and dental coverage, plus disability and life insurance premiums, for a period of six months following his termination.

Mr. Hammill is also eligible for our bonus plan, under which Mr. Hammill's bonus can be up to 40% of his salary.

Change in Control Agreements

Effective as of June 17, 2016, we entered into a change in control agreement with each of Dr. Marrone and Mr. Boyd, each an Agreement and together, the Agreements. The Agreements provide each of Dr. Marrone and Mr. Boyd, respectively, with the right to receive certain benefits if, in connection with a Change in Control (as defined in each Agreement), such executive terminates his or her employment with the Company for good reason or the Company terminates his or her employment without cause. Each Agreement provides that in such an event: (i) the executive will receive a single lump sum severance payment equal to twelve months of the executive's annual salary; (ii) all outstanding and unvested equity compensation awards held by the executive will vest; (iii) the executive will receive a lump sum bonus payment in an amount equal to 16.7% of the executive's then-current base salary, prorated based on the percentage of the current year completed prior to termination; and (iv) the Company will pay for health continuation coverage premiums for the executive and his or her family members for twelve months following the date of termination.

The benefits provided for in the Agreements as described above are subject to the executive's delivery of a release of claims reasonably acceptable to the Company. Under the Agreements, each executive is also subject to non-solicitation and non-disparagement obligations during employment with the Company and for one and two years, respectively, following termination.

The Agreements supersede and replace the provisions of each executive's employment offer letter as to any matters expressly covered by the applicable Agreement, as well Mr. Boyd's letter agreement effective March 3, 2015, discussed above. However, each executive's employment offer letter shall continue to apply to any matters not expressly covered by the applicable Agreement. The Agreement with Dr. Marrone survives the execution of her Separation Agreement, but will terminate upon her retirement as CEO.

Compensation Risk Management

We have considered the risks associated with our compensation policies and practices for all employees, and we believe we have designed our compensation policies and practices in a manner that does not create incentives that could lead to excessive risk taking that would have a material adverse effect on our Company.

Employee Benefit and Stock Plans

Marrone Bio Innovations, Inc. Stock Option Plan

We established the Marrone Bio Innovations, Inc. Stock Option Plan, which we refer to as the 2006 Plan, effective as of July 26, 2006. We ceased granting options under our 2006 Plan after, and the 2006 Plan terminated upon, the adoption of our 2011 Plan on July 19, 2011. Our 2006 Plan provided for the grant of incentive stock options, within the meaning of Section 422 of the Internal Revenue Code of 1986, as amended, or the Code, to our employees and any parent and subsidiary corporations' employees, and for the grant of non-qualified stock options to our employees, outside directors and consultants and our parent and subsidiary corporations' employees and consultants.

Administration: Our board of directors administered our 2006 Plan. The administrator's powers include the power to: determine the fair market value of our common stock; select the individuals to whom options may be granted; determine the number of shares of stock covered by each option; approve forms of award agreement; determine the terms and conditions of options granted to employees and consultants (e.g., the exercise price, the times when options may be exercised (which may be based on performance criteria), any vesting acceleration or waiver of forfeiture restrictions, and any restriction or limitation regarding any option or the underlying shares of stock); reduce the exercise price of any option granted to employees and consultants to the then current fair market value of our common stock if such fair market value has declined since the date of grant; prescribe, amend and rescind rules and regulations relating to our 2006 Plan; modify or amend each option; institute an option exchange program; and make all other determinations deemed necessary or advisable for administering our 2006 Plan.

Transferability of Options: Our 2006 Plan allows for the transfer of options only (i) by will; and (ii) by the laws of descent and distribution. Only the recipient of an option may exercise such option during his or her lifetime.

Certain Adjustments: In the event of certain changes in our capitalization our board of directors will make adjustments to one or more of (i) the number of shares that are covered by outstanding options; (ii) the exercise price of outstanding options, and (iii) the numerical share limits contained in our 2006 Plan. In the event of our complete liquidation or dissolution, recipients must be notified at least ten (10) days prior to the proposed transaction and may exercise all vested and unvested options until ten (10) days prior to such transaction; all outstanding options will terminate immediately prior to the consummation of such transaction.

Corporate Transactions: Our 2006 Plan provides that in the event of a corporate transaction, as defined in our 2006 Plan, each outstanding option will become immediately vested. In the event of a corporate transaction involving a merger or sale of assets, options will be exercisable for a period of fifteen (15) days from the date that notice of the transaction is provided; the option will then terminate upon the expiration of that period.

2011 Stock Plan

We established our 2011 Stock Plan, which we refer to as the 2011 Plan, effective as of July 19, 2011. Our 2011 Plan provided for the grant of incentive stock options, within the meaning of Section 422 of the Code, to our employees and any parent and subsidiary corporations' employees, and for the grant of non-qualified stock options and stock purchase rights to our employees, directors and consultants and any parent and subsidiary corporations' employees, directors and consultants. We ceased granting options under our 2011 Plan after, and the 2011 Plan terminated upon, the adoption of our 2013 Plan on August 1, 2013.

Administration: Our board of directors administered our 2011 Plan. The administrator's powers include the power to: determine the persons to whom, and the times at which, awards shall be granted and the number of shares of our common stock subject to each award; determine the fair market value of our common stock; determine the terms, conditions and restrictions applicable to each award (e.g. the exercise price, the method of payment, the method for satisfaction of any tax withholding obligation, the timing, terms and conditions of the exercisability and vesting of the award, the time of the expiration of the award, and the effect of the recipient's termination of service); approve forms of award agreement; amend, modify, extend, cancel or renew any award or waive any restrictions or conditions applicable to any award; accelerate, continue, extend or defer the exercisability of any award; prescribe, amend or rescind rules guidelines and policies relating to the 2011 Plan; and make all other determinations and take such other actions with respect to the 2011 Plan or any award as it deems advisable and that is consistent with applicable law, regulations and rules.

Stock Options: Our 2011 Plan allowed for the grant of incentive stock options that qualify under Section 422 of the Code only to our employees and employees of any parent or subsidiary of ours. Non-qualified stock options could be granted to our employees, directors, and consultants and those of any parent or subsidiary of ours. The exercise price of all options granted under our 2011 Plan was required to be at least equal to the fair market value of our common stock on the date of grant. The term of an option may not exceed ten (10) years, except that with respect to any employee who owns more than ten percent (10%) of the voting power of all classes of our outstanding stock or the outstanding stock of any parent or subsidiary corporation as of the grant date (i) the term of an incentive stock option must not exceed five (5) years; and (ii) the exercise price of an incentive stock option must equal at least one hundred ten percent (110%) of the fair market value of our common stock on the grant date.

After the continuous service of an employee, director or consultant terminates, he or she may exercise his or her option, to the extent vested, for the period of time specified in the award agreement. If his or her continuous service terminates for cause, however, the option shall immediately terminate. An option may not be exercised later than the expiration of its term.

Stock Purchase Rights: Our 2011 Plan allowed for the grant of stock purchase rights. Stock purchase rights are rights to purchase our common stock for at least one hundred percent (100%) of the fair market value of our common stock and which are exercisable for thirty (30) days from the date of grant. The purchase price of a stock purchase right may be paid in cash or in the form of services rendered. The board of directors may subject a stock purchase right to vesting conditions.

Transferability of Awards: Our 2011 Plan allowed for the transfer of awards only (i) by will; (ii) by the laws of descent and distribution and (iii) for non-qualified stock options, to the extent authorized by the board of directors. Only the recipient of an award may exercise such award during his or her lifetime except that non-qualified stock options may be transferred to certain trusts and certain family members.

Certain Adjustments: In the event of certain changes in our capitalization, to prevent diminution or enlargement of the benefits or potential benefits available under the 2011 Plan, the board of directors will make adjustments to one or more of (i) the number and class of shares subject to the 2011 Plan and that are covered by outstanding awards; (ii) the exercise price of outstanding awards and (iii) the incentive stock option share limit contained in the 2011 Plan.

Changes in Control: Our 2011 Plan provides that in the event of a change in control, as defined in the 2011 Plan, the board of directors, in its discretion may provide that (i) the vesting and exercisability of any outstanding awards shall accelerate; or (ii) that each outstanding award (including, at the board of directors' discretion, unvested awards) shall be cashed out; payment due with respect to unvested awards would then be payable in accordance with the existing vesting schedule. Further, the successor corporation may assume or substitute an equivalent award for each outstanding award; if the successor corporation does not do so, awards held by recipients who have not terminated employment with us will vest in full as of the change in control.

2013 Stock Incentive Plan

In August 2013, our board of directors adopted the 2013 Stock Incentive Plan, as subsequently amended in May 2018 (which we refer to as our 2013 Plan). The 2013 Plan serves as the successor to our 2011 Plan. Our 2013 Plan provides for the grant of incentive stock options, within the meaning of Section 422 of the Code, to our employees and any parent and subsidiary corporations' employees, and for the grant of non-qualified stock options, stock appreciation rights, restricted stock, restricted stock units and dividend equivalent rights to our employees, directors and consultants and our parent and subsidiary corporations' employees, directors and consultants.

Shares: Upon the ratification of its amendment by our shareholders in May 2018, the 2013 Plan authorized a total of 14,452,472 shares of our common stock for issuance. In addition, the number of shares authorized for issuance pursuant to the 2013 Plan will be increased by any additional shares that would otherwise return to the 2011 Plan after the date of adoption of the 2013 Plan as a result of the forfeiture, termination or expiration of awards previously granted under the 2011 Plan. Further, our 2013 Plan provides for annual increases in the number of shares available for issuance thereunder equal to the least 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. Based on and subject to the foregoing, as of January 1, 2019, including such annual increase, 18,446,640 shares of our common stock, plus any additional shares which are subject to options granted under our 2011 Plan but are forfeited or otherwise terminate or expire subsequent to January 1, 2019, were authorized for issuance pursuant to the 2013 Plan. In addition, as of January 1, 2019, under the 2013 Plan, 8,282,242 shares of common stock were issuable upon the exercise of outstanding options and settlement of RSUs granted and 10,051,837 additional shares of common stock were reserved for issuance pursuant to future grants.

Administration: Our board of directors or a committee of our board of directors administers our 2013 Plan. In the case of awards intended to qualify as "performance based compensation" within the meaning of Section 162(m) of the Code, the committee consists of two (2) or more "outside directors" within the meaning of Section 162(m) of the Code. The administrator has the power to determine and interpret the terms and conditions of the awards, including the employees, directors and consultants who will receive awards, the exercise price, the number of shares subject to each such award, the vesting schedule and exercisability of the awards, the restrictions on transferability of awards and the form of consideration payable upon exercise. The administrator also has the authority to institute an exchange program whereby the exercise prices of outstanding awards may be reduced or outstanding awards may be surrendered or cancelled in exchange for other awards of the same type (which may have higher or lower exercise prices) or awards of a different type.

Stock Options: Our 2013 Plan allows for the grant of incentive stock options that qualify under Section 422 of the Code only to our employees and employees of any parent or subsidiary of ours. Non-qualified stock options may be granted to our employees, directors and consultants and those of any parent or subsidiary of ours.

The exercise price of all options granted under our 2013 Plan must at least be equal to the fair market value of our common stock on the date of grant. The term of an incentive stock option may not exceed ten (10) years, except that with respect to any employee who owns more than ten percent (10%) of the voting power of all classes of our outstanding stock or any parent or subsidiary corporation as of the grant date, the term must not exceed five (5) years and the exercise price must equal at least one hundred ten percent (110%) of the fair market value on the grant date.

After the continuous service of an employee, director or consultant terminates, he or she may exercise his or her option, to the extent vested, for the period of time specified in the option agreement. However, an option may not be exercised later than the expiration of its term.

Stock Appreciation Rights: Our 2013 Plan allows for the grant of stock appreciation rights. Stock appreciation rights allow the recipient to receive the appreciation in the fair market value of our common stock between the date of grant and the exercise date. The administrator will determine the terms of stock appreciation rights, including when such rights become exercisable and whether to pay the increased appreciation in cash or with shares of our common stock, or a combination thereof, except that the base appreciation amount for the cash or shares to be issued pursuant to the exercise of a stock appreciation right will be no less than one hundred percent (100%) of the fair market value per share on the date of grant. After the continuous service of an employee, director or consultant terminates, he or she may exercise his or her stock appreciation right, to the extent vested, only to the extent provided in the stock appreciation right agreement.

Restricted Stock Awards: Our 2013 Plan allows for the grant of restricted stock. Restricted stock awards are shares of our common stock that vest in accordance with terms and conditions established by the administrator. The administrator will determine the number of shares of restricted stock granted to any employee, director or consultant. The administrator may impose whatever conditions on vesting it determines to be appropriate. For example, the administrator may set restrictions based on the achievement of specific performance goals. Shares of restricted stock that do not vest are subject to our right of repurchase or forfeiture.

Restricted Stock Units: Our 2013 Plan allows for the grant of restricted stock units. Restricted stock units are awards that will result in payment to a recipient at the end of a specified period only if the vesting criteria established by the administrator are achieved or the award otherwise vests. The administrator may impose whatever conditions to vesting, restrictions and conditions to payment it determines to be appropriate. The administrator may set restrictions based on the achievement of specific performance goals or on the continuation of service or employment. Payments of earned restricted stock units may be made, in the administrator's discretion, in cash, with shares of our common stock or other securities, or a combination thereof.

Dividend Equivalent Rights: Our 2013 Plan allows for the grant of dividend equivalent rights. Dividend equivalent rights are awards that entitle the recipients to compensation measured by the dividends we pay with respect to our common stock.

Transferability of Awards: Our 2013 Plan allows for the transfer of awards under the 2013 Plan only (i) by will; (ii) by the laws of descent and distribution and (iii) for awards other than incentive stock options, to the extent authorized by the administrator. Only the recipient of an incentive stock option may exercise such award during his or her lifetime.

Certain Adjustments: In the event of certain changes in our capitalization, to prevent diminution or enlargement of the benefits or potential benefits available under the 2013 Plan, the administrator will make adjustments to one or more of the number or class of shares that are covered by outstanding awards, the exercise or purchase price of outstanding awards, the numerical share limits contained in the 2013 Plan and any other terms that the administrator determines require adjustment. In the event of our complete liquidation or dissolution, all outstanding awards will terminate immediately upon the consummation of such transaction.

Corporate Transactions and Changes in Control: Our 2013 Plan provides that in the event of a corporate transaction, as defined in the 2013 Plan, each outstanding award will terminate upon the consummation of the corporate transaction to the extent that such awards are not assumed by the acquiring or succeeding corporation. Prior to or upon the consummation of a corporate transaction or a change in control, as defined in the 2013 Plan, an outstanding award may vest, in whole or in part, to the extent provided in the award agreement or as determined by the administrator in its discretion. The administrator may condition the vesting of an award upon the subsequent termination of the recipient's service or employment within a specified period of time following the consummation of a corporate transaction or change in control. The administrator will not be required to treat all awards similarly in the event of a corporate transaction or change in control.

Plan Amendments and Termination: Our 2013 Plan will automatically terminate ten (10) years following the date it became effective (in 2023) unless we terminate it sooner. In addition, our board of directors has the authority to amend, suspend or terminate the 2013 Plan provided such action does not impair the rights under any outstanding award unless mutually agreed to in writing by the recipient and us.

2019 Employee Stock Purchase Plan

The 2019 Employee Stock Purchase Plan ("ESPP") was adopted by the board of directors, and approved by stockholders at the 2019 annual meeting of stockholders. The purpose of the ESPP is to allow the Company to provide eligible employees of the Company and its participating parents and subsidiaries with the opportunity to purchase common stock of the Company at a discount from the then current market price through accumulated payroll deductions. The ESPP, and the right of participants to make purchases thereunder, is intended to qualify under the provisions of Sections 421 and 423 of the Internal Revenue Code.

Under the ESPP, eligible employees may authorize payroll deductions of up to 15% of eligible compensation for the purchase of the Company's common stock on specified purchase dates established by the plan administrator. Initially, the Company intends to have six-month offering periods, commencing January 1 and July 1 of each year, with the first offering period beginning July 1, 2019. The purchase price for shares in an offering period may be equal to either (1) 85% of the fair market value of a share of our common stock on the date of purchase or (2) 85% of the fair market value of a share of our common stock on the first day of the offering period or the purchase date, whichever is lower. Unless determined otherwise by the plan administrator, the purchase price will be equal to 85% of the fair market value of a share of our common stock on the first day of the offering period or the purchase date, whichever is lower.

Administration: The ESPP may be administered by the Board or a committee of the Board designated from time to time by resolution of the Board, which we refer to in this proposal as the "plan administrator." The plan administrator has full authority to adopt such rules and procedures as it may deem necessary for the proper plan administration and to interpret the provisions of the ESPP, including the authority to determine whether the purchase price for any purchase period will be equal to the lower of: (1) 85% of the fair market value of a share of our common stock on the date of purchase or (2) 85% of the fair market value of a share of our common stock on the first day of the offering period or the purchase date. To the extent permitted by applicable law, the Compensation Committee may delegate its authority under the ESPP.

Shares Available Under the ESPP: A total of one million (1,000,000) shares of common stock are authorized for under the ESPP, subject to adjustment in the event of a stock split, reverse stock split, stock dividend, combination or reclassification or similar event. The ESPP's share limit will be increased effective January 1 of each year commencing January 1, 2020 by an amount equal to the least of: (i) one percent (1%) of the outstanding shares of common stock on the last day of the immediately preceding calendar year; and (ii) a lesser number of shares determined by the plan administrator.

Offering Periods: The ESPP will initially provide only one offering period during each six-month period beginning each January 1 and July 1. The plan administrator may alter the duration of future offering periods in advance without stockholder approval. Each participant is granted a separate purchase right to purchase shares of common stock for each offering period in which he or she participates. Purchase rights under the ESPP are granted on the start date of each offering period and are automatically exercised on the last day of the offering period. Each purchase right entitles the participant to purchase the whole number of shares of common stock obtained by dividing the participant's payroll deductions for the offering period by the purchase price in effect for such period.

Eligibility: Except as described in this paragraph with respect to certain foreign employees, all employees of the Company and any designated parent or subsidiary who are regularly expected to work for more than 20 hours per week for more than five months per calendar year and who have been employed for such continuous period as the plan administrator may require (which period must be less than two years) are eligible to participate in the ESPP. An eligible employee may only join an offering period in advance of the start date of that period. Designated parents and subsidiaries include any parent or subsidiary corporations of the Company, whether now existing or hereafter organized, which elect, with the approval of the plan administrator, to extend the benefits of the ESPP to their eligible employees. Employees who are citizens or residents of a non-U.S. jurisdiction (without regard to whether he or she is also a citizen of the United States or a resident alien (within the meaning of Section 7701(b)(1)(A) of the Internal Revenue Code)) are ineligible to participate in the ESPP if his or her participation is prohibited under the laws on the applicable non-U.S. jurisdiction or if complying with the laws of the applicable non-U.S. jurisdiction would cause the ESPP or an offering to violate Section 423 of the Internal Revenue Code.

Purchase Provisions: Each participant in the ESPP may authorize periodic payroll deductions that may not exceed 15% of his or her compensation, which is defined in the ESPP to include the regular U.S. payroll base salary, unless the plan administrator determines otherwise. Unless otherwise determined by the plan administrator, compensation will not include overtime, bonuses, annual awards, other incentive payments, reimbursements or other expense allowances, loan forgiveness, fringe benefits, moving expenses, deferred compensation, or contributions (other than contributions under a 401(k) or cafeteria plan). A participant may reduce his or her rate of payroll deductions during an offering period, subject to the rules set by the plan administrator. On the last day of each offering period, the accumulated payroll deductions of each participant are automatically applied to the purchase shares of common stock at the purchase price in effect for that period.

Purchase Price: The purchase price per share at which common stock is purchased on the participant's behalf for each offering period may be equal to either (1) 85% of the fair market value of a share of our common stock on the date of purchase or (2) 85% of the fair market value of a share of our common stock on the first day of the offering period or the purchase date, whichever is lower. Unless determined otherwise by the plan administrator, the purchase price will be equal to 85% of the fair market value of a share of our common stock on the first day of the offering period or the purchase date, whichever is lower.

Valuation: The fair market value of the common stock on a given date is the closing sales price of the common stock on one or more established stock exchanges or national market systems, including without limitation The NASDAQ Global Select Market, The NASDAQ Global Market or The NASDAQ Capital Market of The NASDAQ Stock Market LLC as of such date. As of April 11, 2019, the fair market value of a share of the Company's common stock as reported on the Nasdaq Capital Market was $1.48.

Special Limitations: The ESPP imposes certain limitations upon a participant's right to acquire common stock, including the following limitations:

- No purchase right may be granted to any individual, immediately after such grant, would own stock (including stock purchasable under any outstanding options or purchase rights) possessing 5% or more of the total combined voting power or value of all classes of stock of the Company or any of its affiliates.
- No purchase right granted to a participant may permit such individual to purchase common stock at a rate which exceeds $25,000 worth of such common stock (valued at the time such purchase right is granted) for each calendar year.

Termination of Purchase Rights: A participant's purchase right immediately terminates upon such participant's loss of eligible employee status, and his or her accumulated payroll deductions for the offering period in which the purchase right terminates are refunded. A participant may withdraw from an offering period by giving advance notice prior to the end of that period and his or her accumulated payroll for the offering period in which withdrawal occurs may be refunded.

Assignability: No purchase right will be assignable or transferable (other than by will or the laws of descent and distribution) and will be exercisable only by the participant.

Corporate Transaction: In the event of a proposed sale of all or substantially all of the assets of the Company or certain mergers, (each, a "Corporate Transaction") during an offering period, all outstanding purchase rights shall be assumed by the successor corporation (or a parent or subsidiary thereof), unless the plan administrator determines, in its sole discretion, to shorten the offering period then in-effect to a new purchase date. If the plan administrator shortens the offering period then in progress to a new purchase date, the plan administrator will provide notice to each participant that (i) his or her purchase right will be automatically exercised on the new purchase date or (ii) the Company will pay to him or her, on the new purchase date, cash, cash equivalents, or property as determined by the plan administrator that is equal to the difference in the fair market value of the shares of common stock covered by his or her purchase right and the purchase price due had the purchase right been automatically exercised on the new purchase date.

Changes in Capitalization: In the event any change is made to the outstanding shares of common stock by reason of any stock split, stock dividend, recapitalization, combination of shares, exchange of shares, other increases or decreases in the number of shares of common stock outstanding effected without the Company's receipt of consideration or similar transactions, the plan administrator may make appropriate adjustments to (i) the maximum number of securities issuable under the ESPP and (ii) the number of securities subject to each outstanding purchase right and the purchase price payable per share thereunder.

Amendment and Termination: The ESPP will terminate ten years after it becomes effective, unless terminated earlier by the plan administrator. The plan administrator may at any time terminate or amend the ESPP. To the extent required by Section 423 of the Internal Revenue Code (or any successor rule or provision or any other applicable law), the Company will seek stockholder approval of amendments in such a manner and to such a degree as so required.

Director Compensation

Director Compensation for Fiscal Year 2019

Our non-employee directors who served during the fiscal year ended December 31, 2019 received the following compensation for their service on our board of directors.

NAME	STOCK AWARDS ($)[1][2]	TOTAL ($)[2]
George Kerckhove	90,343	90,343
Yogesh Mago	84,553	84,553
Keith McGovern	75,015	75,015
Zachary S. Wochok, Ph.D.	90,804	90,804
Robert A. Woods	119,296	119,296
Stuart Woolf	75,015	75,015

(1) The grant date fair value for these awards was estimated pursuant to FASB ASC 718, Compensation—Share based compensation (ASC 718). Valuation assumptions are described in Note 9 of the Notes to Consolidated Financial Statements included in Part II—Item 8—"Financial Statements and Supplementary Data" in our Annual Report on Form 10-K for the fiscal year ended December 31, 2019.

(2) The following table sets forth the aggregate number of option awards and RSUs held by each non-employee director as of December 31, 2019:

NAME	AGGREGATE NUMBER OF OPTION AWARDS	AGGREGATE NUMBER OF RESTRICTED STOCK UNITS
George Kerckhove	20,866	201,145
Yogesh Mago	—	151,458
Keith McGovern	—	104,755
Zachary S. Wochok, Ph.D.	—	238,482
Robert A. Woods	—	223,803
Stuart Woolf	—	104,755

Discussion of Director Compensation

Our non-employee director compensation policy is as follows:

- *Initial Equity Grants*. Each non-employee director who joins the board of directors will receive RSUs valued at $50,000, based on the average of the closing price of our common stock as quoted on the Nasdaq Capital Market for the ten trading days prior to and including such director's date of appointment, with one-third of the RSUs vesting on the first anniversary of the director's service, and with respect to 1/36th of the total shares vesting monthly thereafter for 24 months, such that all the shares will be fully vested upon the third anniversary of the director's service.

- *Annual Meeting Grant*. Each non-employee director continuing to serve as of our annual stockholders' meeting will receive RSUs valued at $25,000, based on the average of the closing price of our common stock as quoted on the Nasdaq Capital Market for the ten trading days prior to and including the date of the annual meeting, with all such RSUs vesting after one year.

- *Quarterly Retainers.* Each non-employee director will also receive a retainer for service on the board of directors, in addition to retainers for service as chair of our board of directors, or as a member or chair of committees of our board of directors, as set forth in the table below. These retainers will be paid in the form of fully vested RSUs made on a quarterly basis, prorated based on service during the applicable quarter, with such RSUs awarded on the last date of each fiscal quarter.

Annual retainer RSUs for service as a member or chair of (with chair RSUs inclusive of RSUs for service as a member), paid on a quarterly basis:

	Member	Chair
Board of Directors	28,250	50,750
Audit Committee	8,500	17,000
Compensation Committee	5,750	11,500
Nominating and Corporate Governance Committee	4,250	8,500

In addition to its standard policies, our board of directors from time to time may consider additional payments to our directors in respect of extraordinary service by such director. During the year ended December 31, 2019, our board of directors granted Dr. Wochok a discretionary performance award of 7,352 restricted stock units, valued at $10,000 based on the closing price of our common stock on the date of grant, for his time and efforts in connection with our acquisition of Pro Farm.

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

Beneficial Ownership of Our Common Stock

The following table sets forth certain information with respect to the beneficial ownership of our common stock as of February 29, 2020, for:

- each person or group of affiliated persons known by us to be the beneficial owner of more than 5% of our common stock;
- each of our named executive officers;
- each of our directors and director nominees; and
- all current executive officers and directors as a group.

We have determined beneficial ownership in accordance with SEC rules. The information does not necessarily indicate beneficial ownership for any other purpose. Under these rules, the number of shares of common stock deemed outstanding includes shares issuable upon exercise of options held by the respective person or group that may be exercised within 60 days after February 29, 2020. For purposes of calculating each person's or group's percentage ownership, stock options and warrants exercisable within 60 days after February 29, 2020 are included for that person or group but not the stock options of any other person or group.

Applicable percentage ownership is based on 139,531,261 shares of common stock outstanding as of February 29, 2020. In computing the number of shares of common stock beneficially owned by a person and the percentage ownership of that person, we deemed to be outstanding all shares of common stock subject to such person's options and warrants exercisable within 60 days of February 29, 2020. We did not deem these shares outstanding, however, for the purpose of computing the percentage ownership of any other person.

Unless otherwise indicated and subject to applicable community property laws, to our knowledge, each stockholder named in the following table possesses sole voting and investment power over the shares listed. Unless otherwise noted below, the address of each person listed in the table is c/o Marrone Bio Innovations, Inc., 1540 Drew Avenue, Davis, CA 95618.

NAME AND ADDRESS OF BENEFICIAL OWNER	SHARES BENEFICIALLY OWNED	
	SHARES (#)	SHARES (%)
5% Stockholders:		
Entities affiliated with Ospraie Ag Science LLC[1] 437 Madison Avenue, 28th Floor New York, NY 10022	69,712,205	41.96
Entities affiliated with Waddell & Reed Financial, Inc.[2] 6300 Lamar Avenue Overland Park, KS 66202	29,006,987	19.99
Entities affiliated with Ardsley Advisory Partners[3] 262 Harbor Drive Stamford, CT 06902	17,115,275	11.88
Van Herk Investments B.V.[4] Lichtenauerlaan 30, 3062ME Rotterdam, The Netherlands	10,544,980	7.23
Directors, Director Nominees and Named Executive Officers:		
Pamela G. Marrone, Ph.D.[5]	1,789,547	1.27
Robert A. Woods[6]	198,002	*
George Kerckhove[7]	210,332	*
Yogesh Mago[8]	127,021	*
Keith McGovern[9]	78,769	*
Zachary S. Wochok, Ph.D.[10]	227,603	*
Stuart Woolf[11]	78,769	*
James B. Boyd[12]	912,143	*
Kevin Hammill[13]	292,072	*
All current directors and executive officers as a group (9 persons)	3,914,258	2.77

* Represents beneficial ownership of less than 1% of our outstanding common stock.

(1) Includes 44,072,851 shares of our common stock and 25,639,354 shares of our common stock issuable upon exercise of warrants to purchase shares of our common stock. As reported in the Schedule 13D/A filed on January 3, 2020, Mr. Dwight Anderson is the Managing Member of Ospraie Ag Science LLC and, in such capacity, may be deemed to have voting and dispositive power over the securities held for the account of Ospraie Ag Science LLC. Ospraie Ag Science LLC disclaims any beneficial ownership in such securities. The address for each of Ospraie Ag Science LLC and Mr. Dwight Anderson is c/o Ospraie Management LLC, 437 Madison Avenue, 28th Floor, New York, New York 10022. Does not include 5,027,313 warrants not exercisable within 60 days.

(2) Includes 24,401,392 shares of our common stock and 605,595 shares of our common stock issuable upon exercise of warrants to purchase shares of our common stock. Does not include 3,394,405 shares of common stock issuable upon other warrants to purchase shares of common stock not issuable within 60 days of February 29, 2020, due to beneficial ownership-based exercise limitations. As reported in the Schedule 13G/A filed on February 14, 2020, the securities reported on herein are beneficially owned by one or more open-end investment companies or other managed accounts which are advised or sub-advised by Ivy Investment Management Company, or IICO, an investment advisory subsidiary of Waddell & Reed Financial, Inc., or WDR. The investment advisory contracts grant IICO all investment and/or voting power over securities owned by such advisory clients. The investment sub-advisory contracts grant IICO investment power over securities owned by such sub-advisory clients and, in most cases, voting power. Any investment restriction of a sub-advisory contract does not restrict investment discretion or power in a material manner. Therefore, IICO or WDR, because of its control relationship to IICO, may be deemed the beneficial owner of the securities covered by this statement under Rule 13d-3 of the Act. The address of the entities is 6300 Lamar Avenue Overland Park, Kansas 66202.

(3) Includes 13,530,582 shares of our common stock and 3,584,693 shares of our common stock issuable upon exercise of warrants to purchase shares of our common stock. As reported in the Schedule 13D/A filed on February 7, 2020, the securities reported on herein are beneficially owned by one or more open-end investment companies or other managed accounts which are owned, advised or sub-advised by Ardsley Advisory Partners LP, Ardsley Advisory Partners GP LLC, Ardsley Partners I GP LLC, Phillip J. Hempleman, Ardsley Partners Fund II, L.P., Ardsley Partners Advanced Healthcare Fund, L.P., Ardsley Partners Renewable Energy Fund, L.P., Ardsley Duckdive Fund, L.P. and Ardsley Ridgecrest Partners Fund, LP. The address for these entities is 262 Harbor Drive, 4th Floor, Stamford, Connecticut 06902. Does not include 1,748,640 warrants not exercisable within 60 days.

(4) Includes 5,211,647 shares of our common stock and 5,333,333 issuable upon exercise of warrants to purchase shares of our common stock. As reported in Schedule 13G/A filed on February 14, 2020, the securities reported on herein are beneficially owned by (i) Van Herk Investments B.V., a private company with limited liability incorporated under the laws of the Netherlands, or Van Herk, (ii) Van Herk Private Equity Investments B.V., a private company with limited liability incorporated under the laws of the Netherlands, or VHPI, (iii) Stichting Administratiekantoor Penulata, a foundation organized under the laws of the Netherlands, or Penulata, (iv) Van Herk Management Services B.V., a private company with limited liability incorporated under the laws of the Netherlands, or VHMS, (v) Onroerend Goed Beheer- en Beleggingsmaatschappij A. van Herk B.V., a private company with limited liability incorporated under the laws of the Netherlands, or OGBBA, (vi) A. van Herk Holding B.V., a private company with limited liability incorporated under the laws of the Netherlands, or Holdings, (vii) Stichting Administratiekantoor Abchrys, a foundation organized under the laws of the Netherlands, or Abchrys, and (viii) Adrianus van Herk, or Mr. van Herk Each of Mr. van Herk, VHPI, Penulata, VHMS, OGBBA, Holdings and Abchrys disclaims beneficial ownership of the securities reported on herein. The address for these entities is Lichtenauerlaan 30, 3062ME, Rotterdam, The Netherlands.

(5) Includes 800,471 shares of common stock issuable upon the exercise of options exercisable within 60 days and 87,954 shares of common stock subject to restricted stock units settleable within 60 days, 6,442 shares of common stock held by Florence H. Marrone TOD Pamela G. Marrone and 53,134 shares of common stock held by Dr. Marrone and Michael Rogers. Does not include 718,707 shares of common stock issuable to Dr. Marrone upon the exercise of options not exercisable within 60 days.

(6) Includes 194,502 shares subject to restricted stock units settleable within 60 days and 3,500 shares of common stock held by Mr. Woods and Lynn Woods. Does not include 29,301 shares of common stock issuable to Mr. Woods upon the settlement of restricted stock units not exercisable within 60 days.

(7) Includes 20,866 shares of common stock issuable upon the exercise of options exercisable within 60 days and 186,466 shares of common stock subject to restricted stock units settleable within 60 days. Does not include 14,679 shares of common stock issuable to Mr. Woods upon the settlement of restricted stock units not exercisable within 60 days.

(8) Includes 127,021 shares subject to restricted stock units settleable within 60 days. Does not include 24,437 shares of common stock issuable to Mr. Mago upon the settlement of restricted stock units not exercisable within 60 days.

(9) Includes 78,769 shares subject to restricted stock units settleable within 60 days. Does not include 25,986 shares of common stock issuable to Mr. McGovern upon the settlement of restricted stock units not exercisable within 60 days.

(10) Includes 223,803 shares subject to restricted stock units settleable within 60 days and 3,000 shares of common stock held by The Zachary S Wochok & Barbara N Wochok Trust. Does not include 14,679 shares of common stock issuable to Mr. Wochok upon the settlement of restricted stock units not exercisable within 60 days.

(11) Includes 78,769 shares subject to restricted stock units settleable within 60 days. Does not include 25,986 shares of common stock issuable to Mr. Woolf upon the settlement of restricted stock units not exercisable within 60 days.

(12) Includes 639,017 shares of common stock issuable upon the exercise of options exercisable within 60 days and 231,876 shares of common stock subject to restricted stock units settleable within 60 days. Does not include 350,983 shares of common stock issuable to Mr. Boyd upon the exercise of options not exercisable within 60 days. Does not include 16,656 shares of common stock issuable to Mr. Boyd upon the settlement of restricted stock units not exercisable within 60 days.

(13) Includes 247,955 shares of common stock issuable upon the exercise of options exercisable within 60 days and 44,117 shares of common stock subject to restricted stock units settleable within 60 days. Does not include 452,045 shares of common stock issuable to Mr. Hammill upon the exercise of options not exercisable within 60 days.

401(k) Plan

We maintain a 401(k) retirement savings plan. Each participant who is a U.S. employee may contribute to the 401(k) plan, through payroll deductions, up to a statutorily prescribed annual limit imposed by the Internal Revenue Service (which limit was $18,000 in 2016). All amounts contributed by employee participants and earnings on these contributions are fully vested at all times and are not taxable to participants until withdrawn. Employee participants may elect to invest their contributions in various established funds. We may make contributions to the accounts of plan participants.

Limitations of Liability and Indemnification Matters

We have adopted provisions in our current certificate of incorporation that limit or eliminate the liability of our directors for monetary damages for breach of their fiduciary duties, except for liability that cannot be eliminated under the Delaware General Corporation Law. Accordingly, our directors will not be personally liable for monetary damages for breach of their fiduciary duties as directors, except with respect to the following:

- any breach of their duty of loyalty to us or our stockholders;
- acts or omissions not in good faith or that involve intentional misconduct or a knowing violation of law;
- unlawful payments of dividends or unlawful stock repurchases or redemptions as provided in Section 174 of the Delaware General Corporation Law; or
- any transaction from which the director derived an improper personal benefit.

This limitation of liability does not apply to liabilities arising under the federal securities laws and does not affect the availability of equitable remedies such as injunctive relief or rescission. If Delaware law is amended to authorize the further elimination or limiting of director liability, then the liability of our directors will be eliminated or limited to the fullest extent permitted by Delaware law as so amended.

Our certificate of incorporation and our bylaws also provide that we shall indemnify our directors and executive officers and shall indemnify our other officers and employees and other agents to the fullest extent permitted by law. We believe that indemnification under our bylaws covers at least negligence and gross negligence on the part of indemnified parties. Our bylaws, as currently in effect, also permit us to secure insurance on behalf of any officer, director, employee or other agent for any liability arising out of his or her actions in this capacity, regardless of whether our bylaws would permit indemnification.

We have entered and intend to continue to enter into separate indemnification agreements with certain of our directors and executive officers that are, in some cases, broader than the specific indemnification provisions provided by Delaware law and our charter documents, and may provide additional procedural protection. These agreements will require us, among other things, to:

- indemnify officers and directors against certain liabilities that may arise because of their status as officers and directors;
- advance expenses, as incurred, to officers and directors in connection with a legal proceeding subject to limited exceptions; and
- cover officers and directors under any general or directors' and officers' liability insurance policy maintained by us.

We believe that these provisions and agreements are necessary to attract and retain qualified persons as directors and executive officers. Insofar as indemnification for liabilities arising under the Securities Act of 1933, as amended, or the Securities Act, may be permitted to directors, officers or persons controlling our Company pursuant to the foregoing provisions, the opinion of the Security and Exchange Commission (the "SEC") is that such indemnification is against public policy as expressed in the Securities Act and is therefore unenforceable.

In addition, we maintain standard policies of insurance under which coverage is provided to our directors and officers against loss arising from claims made by reason of breach of duty or other wrongful act, and to us with respect to payments which may be made by us to such directors and officers pursuant to the above indemnification provisions or otherwise as a matter of law. We also make available standard life insurance and accidental death and disability insurance policies to our employees.

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

Review and Approval of Related Party Transactions

Our board of directors reviews related party transactions for potential conflict of interest issues. Our board of directors has adopted a written related person transaction policy to set forth the policies and procedures for the review and approval or ratification of related person transactions. This policy covers any transaction, arrangement or relationship, or any series of similar transactions, arrangements or relationships in which we were or are to be a participant, the amount involved exceeds $120,000 or one percent of the average of our total assets at year-end for the last two completed fiscal years and a related person had or will have a direct or indirect material interest, including, without limitation, purchases of goods or services by or from the related person or entities in which the related person has a material interest, indebtedness, guarantees of indebtedness or employment by us or a related person.

Certain Related-Person Transactions

We describe below the transactions and series of similar transactions, since December 31, 2017, to which we were a participant or will be a participant, in which:

- transactions in which the amount involved exceeds the lesser of $120,000 or one percent of the average of the smaller reporting company's total assets at year-end for the last two completed fiscal years; and

- any of our directors, executive officers, holders of more than 5% of our capital stock (which we refer to as "5% stockholders") or any member of their immediate family had or will have a direct or indirect material interest, other than compensation arrangements with directors and executive officers.

Purchase Agreement and Debt Refinancing

On December 15, 2017, we entered into the Purchase Agreement with certain accredited investors named therein, including Ospraie, affiliates of Ardsley and affiliates of Van Herk Investments B.V., each of which is currently a 5% stockholder. Pursuant to the Purchase Agreement, 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 shares of our common stock. Concurrently with the entry into the Purchase Agreement, we entered into amendments to our senior promissory notes held by Ivy Science & Technology Fund, Waddell & Reed Advisors Science & Technology Fund and Ivy VIP Science & Technology (such notes, the "Waddell Notes") and to our secured promissory notes issued in October 2012 and April 2013 (the "October 2012 and April 2013 Promissory Notes"). In addition, on December 22, 2017, we entered into an amendment and restatement to the unsecured convertible promissory note previously entered into with Dwight W. Anderson, an affiliate of Ospraie (the "Anderson Note").

The Purchase Agreement includes customary representations and warranties, indemnification and covenants by the Company. In addition to other customary covenants, we also agreed to:

- Limitations with respect to our ability to file any registration statement with the SEC or issue additional equity securities without the prior written consent of Ospraie;

- Not further amend the terms of the Waddell Notes and October 2012 and April 2013 Promissory Notes without the prior written consent of Ospraie;

- Solicit stockholder approval with respect to an increase of 4,000,000 shares under the 2013 Plan, as amended, with such shares to be reserved for issuance to certain advisors;

- Appoint two new directors designated by Ospraie to our board of directors effective upon the closing of the transactions contemplated by the Purchase Agreement;

- Take all necessary actions to procure the election of two additional directors designated by Ospraie to our board of directors as Class II directors at our 2018 annual meeting of stockholders;

- Grant Ospraie the right to appoint individuals to serve as advisors to our board of directors; and

- Grant Ospraie the right, should they choose, to review and make recommendations to our board of directors regarding certain key management positions.

On February 5, 2018, we completed the transactions contemplated in the Purchase Agreement, the note amendments and certain related agreements (the "February 2018 Financing Transactions"), which resulted in:

- the issuance of an aggregate of 44,000,001 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 Anderson 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 aggregate principal amount 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 aggregate principal amount 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 our common stock and warrants to purchase 2,017,143 shares of common stock to National Securities Corporation, as our exclusive placement agent and financial adviser facilitating the February 2018 Financing Transactions.

Voting and Lock-up Agreement

On February 5, 2018, in connection with the closing of the February 2018 Financing Transactions, we entered into a Voting and Lock-up Agreement (the "Voting and Lock-up Agreement") with Ospraie and one of its affiliates, Ivy Science & Technology Fund, Waddell & Reed Advisors Science & Technology Fund and Ivy VIP Science & Technology (collectively, "Waddell"), Ardsley Advisory Partners and certain of its affiliates ("Ardsley"), and Pamela G. Marrone, our Chief Executive Officer, collectively referred to herein as the "Voting Parties." Pursuant to the Voting and Lock-up Agreement, among other things, Ospraie and its affiliates, Waddell, and Ardsley and its affiliates, each of which is a 5% stockholder, and Pamela G. Marrone, our Chief Executive Officer, each agreed to vote their existing shares of common stock in favor of the election of up to two directors designated by Ospraie at our 2018 annual meeting of stockholders, subject to certain conditions and limitations.

Registration Rights Agreement

On December 15, 2017, we entered into a Registration Rights Agreement (the "Registration Rights Agreement") with the parties to the February 2018 Financing Transactions (the "Holders"), pursuant to which we agreed to file a registration statement with the SEC within 60 days of the closing date of the February 2018 Financing Transactions covering the resale of the shares (including shares issuable upon exercise of warrants) issued in connection therewith. Pursuant to the terms of the Registration Rights Agreement, we will maintain the effectiveness of the registration statement until the date upon which the securities held by the Holders cease to be Registerable Securities (as that term is defined in the Registration Rights Agreement). The Registration Rights Agreement also provides that each of the Holders will not sell or otherwise dispose of their shares of our common stock or securities exercisable for or convertible into shares of our common stock, commencing on December 15, 2017 and ending 180 days after the closing date of the February 2018 Financing Transactions, subject to customary exceptions. We filed a registration statement with the SEC pursuant to the Registration Rights Agreement on April 6, 2018, which was subsequently declared effective, and which expires upon the filing of this Annual Report on Form 10-K. Until the Company has an effective registration statement on Form S-1, outstanding warrants under the Purchase Agreement (as defined below) and Warrant Facility (as defined below) are exercisable via cashless "net" exercise.

Anderson Note

Dwight W. Anderson is an affiliate of Ospraie, one of our 5% stockholders. On December 22, 2017, we and Mr. Anderson entered into the Anderson Note, which amended and restated in its entirety that certain Amended and Restated Promissory Note, dated as of October 23, 2017, which was given in replacement of, and amended and restated in its entirety, that certain Promissory Note, dated as of October 12, 2017. The Anderson Note was a secured promissory note in the aggregate principal amount of up to $6,000,000, due on October 12, 2020. Pursuant to the Anderson Note, Anderson funded amounts to us in various separate disbursements, each payable at his sole discretion: (i) on October 12, 2017, in an aggregate principal amount of $1,000,000, (ii) on October 23, 2017, in an aggregate principal amount of $1,000,000, (iii) on December 1, 2017, in an aggregate principal amount of $500,000, (iv) on December 4, 2017, in an aggregate principal amount of $500,000, (v) on December 8, 2017, in an aggregate principal amount of $500,000; (vi) on December 26, 2017, in an aggregate principal amount of $500,000; (vii) on January 11, 2018 in an aggregate principal amount of $1,000,000 and (vii) on January 17, 2018 in the aggregate principal amount of $1,000,000. As discussed above under "–Purchase Agreement and Debt Refinancing," all of the outstanding principal under the Anderson Note converted into shares of our common stock and warrants to purchase shares of our common stock issued to Ospraie at the closing of the February 2018 Financing Transactions.

Warrant Amendment and Plan of Reorganization Agreement

On August 6, 2019, we entered into a warrant amendment and plan of reorganization Agreement, which we refer to as the Warrant Facility. Under the Warrant Facility, for certain holders of warrants issued in connection with the February 2018 Financing Transactions (the "February 2018 Warrants"), their warrant expiration date was extend from December 2020 to December 2021, and these warrant holders agreed, at any time the Company's stock trades above $1.00, upon request by the Company, to exercise up to 36,600,000 of their respective February 2018 Warrants, in consideration for the delivery of (x) the shares subject to the February 2018 Warrants so exercised and (y) the delivery of new warrants ("August 2019 Warrants") to purchase such additional number of shares of common stock equal to the amount of shares so exercised and delivered under February 2018 Warrants. For the 3 days prior to the filing of this Annual Report, our stock has closed below $1.00 per share.

In connection with the Warrant Facility, the Company entered into a registration rights agreement (the "Registration Rights Agreement"), pursuant to which the Company has agreed to file a registration statement with the Securities and Exchange Commission no later than March 31, 2020 covering the resale of the shares of common stock issuable upon exercise of the August 2019 Warrants and to maintain the effectiveness of the registration statement until the date upon which the shares of common stock issuable upon exercise of the August 2019 Warrants cease to be Registrable Securities (as that term is defined in the Registration Rights Agreement).

As of March 3, 2020, a total of 12,000,000 shares under February 2018 Warrants were exercised following the Company's call, resulting in the Company issuing 12,000,000 common shares and August 2019 Warrants to purchase 12,000,000 shares.

Woods and Mago Consulting Agreements with Ospraie

Each of our directors Robert A. Woods and Yogesh Mago has a consulting agreement with Ospraie Management, an affiliate of Ospraie, one of our 5% stockholders. For their services as consultants to Ospraie Management, each of Mr. Woods and Mr. Mago has and will continue to receive a monthly fee for the term of their respective consulting agreements. In addition, Mr. Woods and Mr. Mago each have been granted an indirect interest in our equity securities held by Ospraie and its affiliates, and therefore have an indirect interest in the transactions described above in "—Purchase Agreement and Debt Refinancing" and "—Warrant Amendment and Plan of Reorganization Agreement."

Executive Compensation and Employment Arrangements

Please see the section entitled "Executive Compensation" above for information on compensation arrangements with our executive officers and agreements with, and offer letters to, our executive officers containing compensation and termination provisions, among others.

Director and Officer Indemnification and Insurance

See the section entitled "Limitations of Liability and Indemnification Matters" above.

ITEM 14. PRINCIPAL ACCOUNTING FEES AND SERVICES

Independent Registered Public Accounting Firm Fee Information

In connection with the audit of our 2019 financial statements, we have entered into an engagement agreement with Marcum LLP that will set forth the terms by which Marcum LLP would perform audit services for us, including responsibilities of Marcum LLP and management in the conduct of the audit and estimated fees. Our engagement agreements with Marcum LLP are typically subject to alternative dispute resolution procedures.

The following table summarizes the estimated fees of Marcum LLP for the year ended December 31, 2019 and the fees of Marcum LLP for the year ended December 31, 2018.

FEE CATEGORY	FISCAL 2019	FISCAL 2018
Audit fees(1)	$ 1,358,000	967,000
Audit-related fees(2)		-
Tax fees(3)		-
Total fees	$ 1,358,000	967,000

(1) Audit fees consist of professional services rendered in connection with the audit of our consolidated financial statements and review of our quarterly consolidated financial statements, as well as the delivery of consents and reviews of documents filed with the SEC.
(2) Audit-related fees consist of professional services for assurance and related services that are reasonably related to the performance of the audit or review of our consolidated financial statements and are not reported under "Audit Fees." These services include accounting consultations concerning financial accounting and reporting standards.
(3) Tax fees consist of fees for professional services rendered for tax compliance, tax planning and tax advice.

The audit committee pre-approves all audit and non-audit services to be, and has approved all of the foregoing audit and non-audit services, performed by the independent registered public accounting firm in accordance with the audit committee charter.

Pre-Approval Procedures of Audit and Non-Audit Services by the Independent Registered Public Accounting Firm

The audit committee's charter requires it to pre-approve all audit and non-audit services performed by the independent registered public accounting firm. In determining whether to approve audit and non-audit services to be performed by Marcum LLP, the audit committee takes into consideration the fees to be paid for such services and whether such fees would affect the independence of the independent registered public accounting firm in performing its audit function. In addition, when determining whether to approve non-audit services to be performed by Marcum LLP, the audit committee considers whether the performance of such services is compatible with maintaining the independence of the independent registered public accounting firm in performing its audit function, and confirms that the non-audit services will not include the prohibited activities set forth in Section 201 of the Sarbanes-Oxley Act of 2002. The audit committee has determined that the rendering of the services other than audit services by Marcum LLP in fiscal year 2019 was compatible with maintaining the registered public accounting firm's independence.

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	Fifth Amended and Restated Bylaws of Marrone Bio Innovations, Inc.	8-K	001-36030	3.1	April 26, 2019	
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	

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	4.4	December 18, 2017	
4.10	Form of Warrants issued by Marrone Bio Innovations, Inc. in connection with June 2013 Credit Facility.	S-1	333-189753	10.33	July 1, 2013	
4.11	Form of Warrants issued by Marrone Bio Innovations, Inc. in connection with June 2017 Consulting Agreement.					X
4.12	Warrant Amendment and Plan of Reorganization Agreement, dated August 6, 2019, by and among Marrone Bio Innovations, Inc., Ospraie AG Science LLC, Ardsley Partners Renewable Energy Fund, L.P. and Ivan Saval.	8-K	001-36030	4.1	August 8, 2019	
4.13	Form of Warrant issued by Marrone Bio Innovations, Inc. in connection with the August 6, 2019 Warrant Agreement	8-K	001-36030	4.2	August 8, 2019	
4.14	Description of Registrant's Securities					X
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	

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
10.10#	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

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

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 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 (b)	April 5, 2018

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

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	10.35	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	
10.29	First Amendment to Lease, dated April 25, 2019, by and between San Carlos Retail Venture, L.P., Verbenta URP Partners, LP, Fulcrum URP Investors, LP, Gray & Affrime Family LLC, and Flores-Lopez Anvary LLC.	10-Q	001-36030	10.2	August 8, 2019	
10.30β	Share Purchase Agreement, dated August 7, 2019, by and among Marrone Bio Innovations, Inc., Pro Farm Technologies OY, the Shareholders and Matti Tiainen as Shareholders' Representative.	8-K	001-36030	10.1	August 8, 2019	
10.31	Registration Rights Agreement, dated August 6, 2019, by and between Marrone Bio Innovations, Inc. and the investors named therein.	8-K	001-36030	10.3	August 8, 2019	
10.32β	Asset Purchase Agreement dated September 10, 2019, by and among Austin Grant, Inc., Marrone Bio Innovations, Inc., and Bill Grant and Lucie Grant	10-Q	001-36030	10.3	November 19, 2019	
10.33#	Employment Separation Agreement, dated December 1, 2019, between Marrone Bio Innovations, Inc. and Dr. Pamela G. Marrone.					X
10.34#	Consulting Agreement, dated December 1, 2019, between Marrone Bio Innovations, Inc. and Dr. Pamela G. Marrone.					X
10.35#	Marrone Bio Innovations, Inc. 2019 Employee Stock Purchase Plan	DEF 14A	001-36030	Appendix A	April 30, 2019	
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.					X
23.1	Consent of Marcum LLP, Independent Registered Public Accounting Firm.					X
31.1	Certification of Principal Executive Officer Required Under Rule 13a-14(a) and 15d-14(a) of the Securities Exchange Act of 1934, as amended.					X

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, 2019 and 2018; (ii) Consolidated Statements of Operations for the years ended December 31, 2019 and 2018; (iii) Consolidated Statements of Convertible Preferred Stock and Stockholders' Equity (Deficit) for the years ended December 31, 2019 and 2018; (iv) Consolidated Statements of Cash Flows for the years ended December 31, 2019 and 2018 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.
β Confidential portions of this exhibit have been omitted as permitted by applicable regulations.

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 16, 2020.

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 16, 2020
/s/ James B. Boyd James B. Boyd	President and Chief Financial Officer (Principal Financial Officer and Principal Accounting Officer)	March 16, 2020
/s/ Robert A. Woods Robert A. Woods	Chair of the Board	March 16, 2020
/s/ George Kerckhove George Kerckhove	Director	March 16, 2020
/s/ Yogesh Mago *Yogesh Mago*	Director	March 16, 2020
/s/ Zachery Wochok Zachary Wochok	Director	March 16, 2020
/s/ Keith McGovern Keith McGovern	Director	March 16, 2020
/s/ Stuart Woolf Stuart Woolf	Director	March 16, 2020

Exhibit 4.11

THE SECURITIES REPRESENTED HEREBY (AND THE SECURITIES ISSUABLE UPON THE EXERCISE HEREOF) HAVE BEEN ISSUED PURSUANT TO AN EXEMPTION FROM THE REGISTRATION REQUIREMENTS OF THE UNITED STATES SECURITIES ACT OF 1933, AS AMENDED (THE "SECURITIES ACT"). THE HOLDER HEREOF, BY PURCHASING SUCH SECURITIES, AGREES FOR THE BENEQT OF THE COMPANY THAT SUCH SECURITIES MAY NOT BE OFFERED, SOLD PLEDGED OR OTHERWISE TRANSFERRED UNLESS THE SECURITIES ARE GISTERED UNDER THE SECURITIES ACT OR AN EXEMPTION FROM THE REGISTRATION REQUIREMENTS OF THE SECURITIES ACT IS AVAILABLE. IN **ADDITION, HEDGING TRANSACTIONS INVOLVING SUCH SECURITIES MAY NOT BE CONDUCTED UNLESS** IN **COMPLIANCE WITH THE SECURITIES ACT.**

Effective Date: June 6, 2017 Void After: June 6, 2027

MARRONE BIO INNOVATIONS, INC.

WARRANTTOPURCHASECOMMONSTOCK

Marrone Bio Innovations, Inc., a Delaware corporation (the **"Company"),** for value received on June 6, 2017 (the **"Effective Date"),** hereby issues to MZHCI, LLC (the **"Holder")** this Warrant (the **"Warrant")** to purchase up to 80,000 shares of the Company's Common Stock (as defined below) at the Exercise Price (as defined below) on or before June 6, 2027 (the **"Expiration Date"),** all subject to the following terms and conditions. This Warrant shall be exercisable, in whole or in part, at any time from time to time, as follows: the shares shall vest in six equal tranches on the 6th day of each month following the issuance of this Warrant, subject to the continued effectiveness of the investor relations consulting agreement dated June 6, 2017 by and between the Holder and the Company. The Warrant Shares (as defined below) issued upon exercise of this Warrant shall be subject to the provisions of the Company's certificate of incorporation, as in effect from time to time. This Warrant, together with any other Warrants issued upon the transfer or exchange of all or any part of such Warrant or Warrants, are collectively referred to as the **"Warrants",** and any Holder, together with any other holder of Warrants, are collectively referred to as the **"Holders".**

As used in this Warrant:

(i) "Affiliate" means any Person that, directly or indirectly, through one or more intermediaries, controls, is controlled by, or is under common control with, a Person, as such terms are used and construed in Rule 144 promulgated under the Securities Act of 1933, as amended (the **"Securities Act");**

(ii) **"Business Day"** means any day other than Saturday, Sunday or any other day on which commercial banks in the City of New York, New York, are authorized or required by law or executive order to close;

(iii) **"Common Stock"** means (i) the Common Stock, par value $0.00001 per share, of the Company, and (ii) any share capital into which such Common Stock shall have been changed or any share capital resulting from a reclassification of such Common Stock;

(iv) **"Exercise Price"** means $1.10 per whole share of Common Stock, subject to adjustment as provided herein;

(v) **"Person"** means an individual, a limited liability company, a partnership, a joint venture, a corporation, a trust, an unincorporated organization, any other entity and a government or any department or agency thereof;

(vi) **"Trading Day"** means any day on which the Common Stock is traded on the primary national or regional stock exchange on which the Common Stock is listed, or if not so listed, the OTC Bulletin Board, if quoted thereon, is open for the transaction of business, provided that "Trading Day" shall not include any day on which the Common Stock is scheduled to trade on such exchange or market for less than 4.5 hours or any day that the Common Stock is suspended from trading during the final hour of trading on such exchange or market (or if such exchange or market does not designate in advance the closing time of trading on such exchange or market, then during the hour ending at 4:00:00 p.m., New York City time); and

(vii) **Warrant Shares"** means the shares of Common Stock issuable upon exercise of the Warrant, including any securities issued or issuable with respect thereto or into which or for which such shares may be exchanged, or converted, pursuant to any stock dividend, stock split, stock combination, recapitalization, reclassification, reorganization or other similar event.

1. DURATION AND EXERCISE OF WARRANT

(a) Exercise Period. Subject to the terms of this Warrant, including the vesting schedule set forth herein, the Holder may exercise this Warrant at any time and from time to time, in whole or in part, on any Business Day on or before 5:00 P.M., Eastern Time, on the Expiration Date, at which time this Warrant shall become void and of no value, and all rights hereunder shall thereupon cease.

(b) Exercise Procedures.

(i) While this Warrant remains outstanding and exercisable in accordance with Section l(a), the Holder may exercise this Warrant, in whole or in part, as follows:

(A) By presentation and surrender of this Warrant to the Company at its principal offices or at such other office or agency as the Company may specify in writing to the Holder, with a duly executed copy of the Notice of Exercise attached as **Exhibit A;** and

(B) Payment of the then-applicable Exercise Price per share multiplied by the number of Warrant Shares being purchased upon exercise of the Warrant (such amount, the **"Aggregate Exercise Price")** made in the form of cash, or by certified check, bank draft or money order payable in lawful money of the United States of America or in the form of a Cashless Exercise (as defined below) to the extent permitted in Section l(b)(ii) below.

(ii) In addition, while this Warrant remains outstanding and exercisable in accordance with Section l(a), the Holder may also, in its sole discretion, exercise (so long as at the time of exercise, the fair market value (as defined below) exceeds the then-current Exercise Price) all or any part of the Warrant in a "cashless" or "net-issue" exercise (a **"Cashless Exercise")** by delivering to the Company **(1)** the Notice of Exercise and (2) the original Warrant, pursuant to which the Holder shall surrender the right to receive upon exercise of this Warrant, a number of Warrant Shares having a fair market value (as determined below) equal to the Aggregate Exercise Price, in which case, the number of Warrant Shares to be issued to the Holder upon such exercise shall be calculated using the following formula:

$$X = \frac{Y * (A - B)}{A}$$

with: X= the number of Warrant Shares to be issued to the Holder

Y = the number of Warrant Shares with respect to which the Warrant is being exercised

A = the fair market value per share of Common Stock on the date of exercise of the Warrant

B = the then-current Exercise Price of the Warrant

Solely for the purposes of this Section I(b)(ii), "fair market value" per share of Common Stock shall mean (A) if the Common Stock is publicly traded, the average of the closing sales prices, as quoted on the primary national or regional stock exchange on which the Common Stock is listed, or, if not listed, the OTC Bulletin Board if quoted thereon, on the twenty (20) Trading Days immediately preceding the date on which the Notice of Exercise is deemed to have been sent to the Company, or (B) if the Common Stock is not publicly traded as set forth in clause (A) of this sentence, as reasonably and in good faith determined by the Board of Directors of the Company as of the date which the Notice of Exercise is deemed to have been sent to the Company (subject to Section 15).

For purposes of Rule 144(d) promulgated under the Securities Act, as in effect on the date hereof, it is intended that the Warrant Shares issued in a Cashless Exercise shall be deemed to have been acquired by the Holder, and the holding period for the Warrant Shares shall be deemed to have commenced, on the date this Warrant was originally issued.

(iii) Upon the exercise of this Warrant in compliance with the provisions of this Section l (b), the Company shall promptly issue and cause to be registered with the Company's transfer agent (the **"Transfer Agent")** a book entry position for the total number of Warrant Shares for which this Warrant is being exercised. Each exercise of this Warrant shall be effective immediately prior to the close of business on the date (the **"Date of Exercise")** on which the conditions set forth in Section l(b) have been satisfied. On or before the second Business Day following the date on which the Company has received each of the Notice of Exercise and the Aggregate Exercise Price (or notice of a Cashless Exercise in accordance with Section l(b)(ii)) (the **"Exercise Delivery Documents"),** the Company shall transmit an acknowledgment of receipt of the Exercise Delivery Documents to the Transfer Agent. Upon delivery of the Exercise Delivery Documents, the Holder shall be deemed for all corporate purposes to have become the holder of record of the Warrant Shares with respect to which this Warrant has been exercised. If the number of Warrant Shares represented by this Warrant is greater than the actual number of Warrant Shares being acquired upon such an exercise, then the Company shall as soon as practicable and in no event later than five (5) Business Days after any exercise, and at its own expense, issue a new Warrant of like tenor representing the right to purchase the number of Warrant Shares purchasable immediately prior to such exercise under this Warrant, less the number of Warrant Shares with respect to which this Warrant is exercised.

(c) Partial Exercise. Subject to the terms of this Warrant, including the vesting schedule set forth herein, this Warrant shall be exercisable, either in its entirety or, from time to time, for only part of the number of Warrant Shares referenced by this Warrant. If this Warrant is exercised in part, the Company shall issue, at its expense, a new Warrant, in substantially the form of this Warrant, referencing such reduced number of Warrant Shares that remain subject to this Warrant.

(d) Disputes. In the case of a dispute as to the determination of the Exercise Price or the arithmetic calculation of the Warrant Shares, the Company shall promptly issue to the Holder the number of Warrant Shares that are not disputed and resolve such dispute in accordance with Section 16.

2. ISSUANCE OF WARRANT SHARES

(a) The Company covenants that all Warrant Shares will, upon issuance in accordance with the terms of this Warrant, be (i) duly authorized, fully paid and non-assessable, and (ii) free from all liens, charges and security interests, with the exception of claims arising through the acts or omissions of the Holder and except as arising from applicable federal and state securities laws.

(b) The Company shall register this Warrant upon records to be maintained by the Company for that purpose in the name of the record holder of such Warrant from time to time. The Company may deem and treat the registered Holder of this Warrant as the absolute owner thereof for the purpose of any exercise thereof, any distribution to the Holder thereof and for all other purposes.

(c) The Company will not, by amendment of its certificate of incorporation or bylaws or through any reorganization, transfer of assets, consolidation, merger, dissolution, issue or sale of securities or any other voluntary action, avoid or seek to avoid the observance or performance of any of the terms to be observed or performed hereunder by the Company, but will at all times in good faith assist in the carrying out of all the provisions of this Warrant and in the taking of all action necessary or appropriate in order to protect the rights of the Holder to exercise this Warrant, or against impairment of such rights.

3. ADJUSTMENTS OF EXERCISE PRICE, NUMBER AND TYPE OF WARRANT SHARES; FUNDAMENTAL TRANSACTION

(a) The Exercise Price and the number of shares purchasable upon the exercise of this Warrant shall be subject to adjustment from time to time upon the occurrence of certain events described in this Section 3(a); provided, that notwithstanding the provisions of this Section 3(a), the Company shall not be required to make any adjustment if and to the extent that such adjustment would require the Company to issue a number of shares of Common Stock in excess of its authorized but unissued shares of Common Stock, less all shares of Common Stock that have been reserved for issuance upon the conversion of all outstanding securities convertible into shares of Common Stock and the exercise of all outstanding options, warrants and other rights exercisable for shares of Common Stock. If the Company does not have the requisite number of authorized but unissued shares of Common Stock to make any adjustment, the Company shall use commercially reasonable efforts to obtain the necessary shareholder consent to increase the authorized number of shares of Common Stock to make such an adjustment pursuant to this Section 3(a).

(i) Subdivision or Combination of Stock. If the Company at any time after the date of issuance of this Warrant subdivides (by any stock split, stock dividend, recapitalization or otherwise) its outstanding shares of Common Stock into a greater number of shares, the Exercise Price in effect immediately prior to such subdivision shall be proportionately reduced and the number of Warrant Shares shall be proportionately increased. If the Company at any time after the date of issuance of this Warrant combines (by combination, reverse stock split or otherwise) its outstanding shares of Common Stock into a smaller number of shares, the Exercise Price in effect immediately prior to such combination will be proportionately increased and the number of Warrant Shares shall be proportionately decreased. Any adjustment under this Section 3(a)(i) shall become effective at the close of business on the date the subdivision or combination becomes effective. The Exercise Price and the Warrant Shares, as so adjusted, shall be readjusted in the same manner upon the happening of any successive event or events described in this Section 3(a)(i).

(ii) Distribution of Assets. If at any time or from time to time the holders of Common Stock (or any shares of stock or other securities at the time receivable upon the exercise of this Warrant) shall have received or become entitled to receive, without payment therefore: (x) Common Stock or any shares of stock or other securities which are at any time directly or indirectly convertible into or exchangeable for Common Stock, or any rights or options to subscribe for, purchase or otherwise acquire any of the foregoing by way of dividend or other distribution (other than a dividend or distribution covered in Section 3(a)(i) above); (y) any cash paid or payable otherwise than as a cash dividend; or (z) Common Stock or additional stock or other securities or property (including cash) by way of spinoff, split-up, reclassification, combination of shares or similar corporate rearrangement (other than shares of Common Stock pursuant to Section 3(a)(i) above); then and in each such case, the Holder hereof will, upon the exercise of this Warrant, be entitled to receive, in addition to the number of shares of Common Stock receivable thereupon, and without payment of any additional consideration therefor, the amount of stock and other securities and property (including cash in the cases referred to in clauses (y) and (z) above) which such Holder would hold on the date of such exercise had such Holder been the holder of record of such Common Stock as of the date on which holders of Common Stock received or became entitled to receive such shares or all other additional stock and other securities and property.

(b) Certificate as to Adjustments. Upon the occurrence of each adjustment or readjustment pursuant to this Section 3, the Company at its expense shall promptly compute such adjustment or readjustment in accordance with the terms hereof and furnish to the Holder of this Warrant a certificate setting forth such adjustment or readjustment and showing in detail the facts upon which such adjustment or readjustment is based. The Company shall promptly furnish or cause to be furnished to the Holder a like certificate setting forth: (i) such adjustments and readjustments; and (ii) the number of shares and the amount, if any, of other property which at the time would be received upon the exercise of the Warrant.

(c) Fundamental Transaction. If, at any time while this Warrant is outstanding, (i) the Company, directly or indirectly, in one or more related transactions effects any merger or consolidation of the Company with or into another Person (but excluding a migratory merger effected solely for the purpose of changing the jurisdiction of incorporation of the Company), (ii) the Company, directly or indirectly, effects any sale, assignment, transfer or other disposition of all or substantially all of its assets in one or a series of related transactions, (iii) any, direct or indirect, purchase offer, tender offer or exchange offer (whether by the Company or another Person) is completed pursuant to which holders of Common Stock are permitted to sell, tender or exchange their shares for other securities, cash or property and has been accepted by the holders of 50% or more of the outstanding Common Stock or (iv) the Company, directly or indirectly, in one or more related transactions effects any reclassification, reorganization or recapitalization of the Common Stock or any compulsory share exchange pursuant to which the Common Stock is effectively converted into or exchanged for other securities, cash or property (each a **"Fundamental Transaction"),** then, this Warrant shall terminate, provided, however, that Company shall cause the portion of this Warrant that has vested and is exercisable as of the date of such Fundamental Transaction to be redeemed in connection with such Fundamental Transaction (which shall include an express provision in the definitive agreement related to such Fundamental Transaction to obligate the parties to effectuate the redemption or similar repurchase or "cash out" of the vested and exercisable portion of this Warrant as contemplated in this Section 3(c)) for the same consideration that would have been payable in respect of all of the vested and exercisable Warrant Shares that would have been issuable to the Holder if this Warrant had been fully exercised by Cashless Exercise on the date of, and immediately prior to, the Fundamental Transaction.

4. TRANSFERS AND EXCHANGES OF WARRANT AND WARRANT SHARES

(a) Registration of Transfers and Exchanges. Subject to Section 4(c), upon the Holder's surrender of this Warrant, with a duly executed copy of the Form of Assignment attached as **Exhibit B,** to the Secretary of the Company at its principal offices or at such other office or agency as the Company may specify in writing to the Holder, the Company shall register the transfer of all or any portion of this Warrant. Upon such registration of transfer, the Company shall issue a new Warrant, in substantially the form of this Warrant, evidencing the acquisition rights transferred to the transferee and a new Warrant, in similar form, evidencing the remaining acquisition rights not transferred, to the Holder requesting the transfer.

(b) Warrant Exchangeable for Different Denominations. The Holder may exchange this Warrant for a new Warrant or Warrants, in substantially the form of this Warrant, evidencing in the aggregate the right to purchase the number of Warrant Shares that may then be purchased hereunder, each of such new Warrants to be dated the date of such exchange and to represent the right to purchase such number of Warrant Shares as shall be designated by the Holder. The Holder shall surrender this Warrant with duly executed instructions regarding such re-certification of this Warrant to the Secretary of the Company at its principal offices or at such other office or agency as the Company may specify in writing to the Holder.

(c) Warrant not Transferrable; Restrictions on Transfers. This Warrant may not be transferred at any time without both (x) the consent of the Company, in its sole discretion, and (y) either (i) registration under the Securities Act or (ii) an exemption from such registration and a written opinion of legal counsel addressed to the Company that the proposed transfer of the Warrant may be effected without registration under the Securities Act, which opinion will be in form and from counsel reasonably satisfactory to the Company.

(d) Permitted Transfers and Assignments. Notwithstanding any prov1s10n to the contrary in this Section 4, the Holder may transfer, with or without consideration, this Warrant or any of the Warrant Shares (or a portion thereof) to the Holder's Affiliates (as such term is defined under Rule 144 of the Securities Act) without obtaining the consent of the Company or the opinion from counsel that may be required by Section 4(c)(ii); provided that the Holder delivers to the Company and its counsel certification, documentation, and other assurances reasonably required by the Company's counsel to enable the Company's counsel to render an opinion to the Company's Transfer Agent that such transfer does not violate applicable securities laws.

5. MUTILATED OR MISSING WARRANT CERTIFICATE

If this Warrant is mutilated, lost, stolen or destroyed, upon request by the Holder, the Company will, at its expense, issue, in exchange for and upon cancellation of the mutilated Warrant, or in substitution for the lost, stolen or destroyed Warrant, a new Warrant, in substantially the form of this Warrant, representing the right to acquire the equivalent number of Warrant Shares provided that, as a prerequisite to the issuance of a substitute Warrant, the Company may require satisfactory evidence of loss, theft or destruction as well as an indemnity from the Holder of a lost, stolen or destroyed Warrant.

6. PAYMENT OFT AXES

The Company shall not be required to pay any tax in respect of the preparation, issuance, delivery or transfer of this Warrant or the Warrant Shares to the Holder or any other Person.

7. FRACTIONAL WARRANT SHARES

No fractional Warrant Shares shall be issued upon exercise of this Warrant. The Company, in lieu of issuing any fractional Warrant Share, shall round up the number of Warrant Shares issuable to nearest whole share. The Company shall not be required to make any cash or other adjustment in respect of such fraction of a share to which the Holder would otherwise be entitled.

8. REPRESENTATIONS AND WARRANTIES

(a) Holder Representations. The Holder represents and warrants to, and covenants with, the Company that: (i) the Holder is an "accredited investor" as defined in Regulation D under the Securities Act and the Holder is also knowledgeable, sophisticated and experienced in making, and is qualified to make, decisions with respect to investments in shares presenting an investment decision like that involved in the purchase of the Warrant, including investments in comparable companies, and has requested, received, reviewed and considered all information it deemed relevant in making an informed decision to purchase the Warrant; (ii) the Holder is acquiring the Warrant in the ordinary course of its business and for its own account for investment only and with no present intention of distributing the Warrant or entering into any arrangement or understanding with any other persons regarding the distribution of the Warrant; and (iii) the Holder will not, directly or indirectly, offer, sell, pledge, transfer or otherwise dispose of (or solicit any offers to buy, purchase or otherwise acquire or take a pledge of) the Warrant except in compliance with the Securities Act, applicable state securities laws and the respective rules and regulations promulgated thereunder. The Holder understands that its acquisition of the Warrant has not been registered under the Securities Act or registered or qualified under any state securities law in reliance on specific exemptions therefrom, which exemptions may depend upon, among other things, the bona fide nature of the Holder' s investment intent as expressed herein.

(b) Compliance With Securities Laws. The Holder hereby covenants with the Company not to make a sale of the Warrant, including the Warrant Shares, without complying with the provisions of this Warrant, and without effectively causing the prospectus delivery requirement under the Securities Act to be satisfied (unless the Holder is selling such Warrant in a transaction not subject to the prospectus delivery requirements), and the Holder acknowledges that any certificates evidencing the Warrant or Warrant Shares, will be imprinted with a legend that prohibits their transfer except in accordance therewith.

(c) Disclosure of Information. Holder believes it has received all the information it considers necessary or appropriate for deciding whether to purchase the Warrant. Holder further represents that it has had an opportunity to ask questions and receive answers from the Company regarding the terms and conditions of the offering of the Warrant and the business, properties, prospects and financial condition of the Company.

(d) Investment Decision by Holder. The Holder understands that nothing in this Warrant or any other materials presented to the Holder in connection with the purchase and sale of the Warrant constitutes legal, tax or investment advice. The Holder has consulted such legal, tax and investment advisors as it, in its sole discretion, has deemed necessary or appropriate in connection with its purchase of the Warrant.

9. NO EQUITY INTEREST RIGHTS AND LEGEND

No holder of this Warrant, as such, shall be entitled to vote or be deemed the holder of any other securities of the Company that may at any time be issuable on the exercise hereof, nor shall anything contained herein be construed to confer upon the holder of this Warrant, as such, the rights of a shareholder of the Company or the right to vote for the election of directors or upon any matter submitted to shareholders at any meeting thereof, or give or withhold consent to any corporate action or to receive notice of meetings or other actions affecting shareholders (except as provided herein), or to receive dividends or subscription rights or otherwise (except as provide herein).

Each certificate or book entry position for Warrant Shares initially issued upon the exercise of this Warrant, and each certificate or book entry position for Warrant Shares issued to any subsequent transferee of such Warrant Shares, shall be stamped or otherwise imprinted with a legend in substantially the following form:

THE SECURITIES REPRESENTED HEREBY HAVE BEEN ISSUED PURSUANT TO AN EXEMPTION FROM THE REGISTRATION REQUIREMENTS OF THE UNITED STATES SECURITIES ACT OF 1933, AS AMENDED (THE "SECURITIES ACT"). THE HOLDER HEREOF, BY PURCHASING SUCH SECURITIES, AGREES FOR THE BENEFIT OF THE COMPANY THAT SUCH SECURITIES MAY NOT BE OFFERED, SOLD, PLEDGED OR OTHERWISE TRANSFERRED UNLESS THE SECURITIES ARE REGISTERED UNDER THE SECURITIES ACT OR AN EXEMPTION FROM THE REGISTRATION REQUIREMENTS OF THE SECURITIES ACT IS AVAILABLE. IN ADDITION, HEDGING TRANSACTIONS INVOLVING SUCH SECURITIES MAY NOT BE CONDUCTED UNLESS IN COMPLIANCE WITH THE SECURITIES ACT.

10. NOTICES

All notices, consents, waivers and other communications under this Warrant must be in writing and will be deemed given to a party: (a) when delivered to the appropriate address of the Holder or the Company, as applicable, by hand or by nationally recognized overnight courier service (costs prepaid); (b) when sent by facsimile or e-mail to the Holder or the Company, as applicable, with confirmation of transmission by the transmitting equipment; (c) when received or rejected by the addressee, if sent by certified mail, return receipt requested, to the Holder or the Company, as applicable; or (d) seven days after the placement of the notice into the mails (first class postage prepaid), to the Holder or the Company, as applicable. Such notices shall be sent, if to the Holder, to MZHCI, LLC, 5055 Avenida Encinas, Suite 130, Carlsbad, CA 92008, or if to the Company, to it at 1540 Drew Ave., Davis CA 95618, Attention: Linda V. Moore, General Counsel (or to such other address, facsimile number or e-mail address as the Holder or the Company as a party may designate by notice the other party) with a copy to Morrison & Foerster LLP, 755 Page Mill Road, Palo Alto, CA 94304, Attention: Charles S. Farman, Esq.

11. SEVERABILITY

If a court of competent jurisdiction holds any provision of this Warrant invalid or unenforceable, the other provisions of this Warrant will remain in full force and effect. Any provision of this Warrant held invalid or unenforceable only in part or degree will remain in full force and effect to the extent not held invalid or unenforceable.

12. BINDING EFFECT

This Warrant shall be binding upon and inure to the sole and exclusive benefit of the Company, its successors and assigns, the registered Holder or Holders from time to time of this Warrant and the Warrant Shares.

13. SURVIVAL OF RIGHTS AND DUTIES

This Warrant shall terminate and be of no further force and effect on the earlier of 5:00 P.M., Eastern Time, on the Expiration Date or the date on which this Warrant has been exercised in full.

14. GOVERNING LAW

This Warrant shall be governed by and construed in accordance with California law without giving effect to any .choice of law rule that would cause the application of the laws of any jurisdiction other than the internal laws of the State of California to the rights and duties of the parties.

15. DISPUTE RESOLUTION

In the case of a dispute as to the determination of the Exercise Price or the arithmetic calculation of the Warrant Shares, the Company shall submit the disputed determinations or arithmetic calculations via facsimile within two (2) Business Days of receipt of the Notice of Exercise giving rise to such dispute, as the case may be, to the Holder. If the Holder and the Company are unable to agree upon such determination or calculation of the Exercise Price or the Warrant Shares within three Business Days of such disputed determination or arithmetic calculation being submitted to the Holder, then the Company shall, within two (2) Business Days, submit via facsimile the disputed determination of the Exercise Price to an independent reputable investment bank or accounting firm selected by the Company and approved by the Holder. The Company shall cause at its expense the investment bank or the accountant, as the case may be, to perform the determinations or calculations and notify the Company and the Holder of the results no later than ten (10) Business Days from the time it receives the disputed determinations or calculations. Such investment bank's or accountant's determination or calculation, as the case may be, shall be binding upon all parties absent demonstrable error.

16. NOTICES OF RECORD DATE

Upon (a) any establishment by the Company of a record date of the holders of any class of securities for the purpose of determining the holders thereof who are entitled to receive any dividend or other distribution, or right or option to acquire securities of the Company, or any other right, or (b) any capital reorganization, reclassification, recapitalization, merger or consolidation of the Company with or into any other corporation, any transfer of all or substantially all the assets of the Company, or any voluntary or involuntary dissolution. liquidation or winding up of the Company, or the sale, in a single transaction, of a majority of the Company's voting equity securities (whether newly issued, or from treasury, or previously issued and then outstanding, or any combination thereof), the Company shall mail to the Holder at least ten (10) Business Days, or such longer period as may be required by law, prior to the record date specified therein, a notice specifying (i) the date established as the record date for the purpose of such dividend, distribution, option or right and a description of such dividend, option or right, (ii) the date on which any such reorganization, reclassification, transfer, consolidation, merger, dissolution, liquidation or winding up, or sale is expected to become effective and (iii) the date, if any, fixed as to when the holders of record of Common Stock shall be entitled to exchange their shares of Common Stock for securities or other property deliverable upon such reorganization, reclassification, transfer, consolidation, merger, dissolution, liquidation or winding up.

17. RESERVATION OF SHARES

The Company shall reserve and keep available out of its authorized but unissued shares of Common Stock for issuance upon the exercise of this Warrant, free from pre-emptive rights, such number of shares of Common Stock for which this Warrant shall from time to time be exercisable. The Company will take all such reasonable action as may be necessary to assure that such Warrant Shares may be issued as provided herein without violation of any applicable law or regulation. Without limiting the generality of the foregoing, the Company covenants that it will use commercially reasonable efforts to take all such action as may be necessary or appropriate in order that the Company may validly and legally issue fully paid and non-assessable Warrant Shares upon the exercise of this Warrant and use commercially reasonable efforts to obtain all such authorizations, exemptions or consents, including but not limited to consents from the Company's shareholders or Board of Directors or any public regulatory body, as may be necessary to enable the Company to perform its obligations under this Warrant.

18. HEADINGS

The headings used in this Warrant are for the convenience of reference only and shall not, for any purpose, be deemed a part of this Warrant.

19. AMENDMENT AND WAIVERS

Any term of this Warrant may be amended and the observance of any term of this Agreement may be waived (either generally or in a particular instance and either retroactively or prospectively), with the written consent of the Company and the Holders of a majority of the Warrant Shares issuable upon exercise of the Warrants.

20. NO THIRD PARTY RIGHTS

This Warrant is not intended, and will not be construed, to create any rights in any parties other than the Company and the Holder, and no Person may assert any rights as third-party beneficiary hereunder.

SIGNATURE PAGE FOLLOWS

IN WITNESS WHEREOF, the Company has caused this Warrant to be duly executed as of the date first set forth above.

MARRONE BIO INNOVATIONS, INC.

By: */s/ Pamela G. Marrone*
Name: Pamela G. Marrone
Title: President and Chief Executive Officer

Agreed and acknowledged:

MZHCI, LLC

By: */s/ Ted Haberfield*
Name: Ted Haberfield
Title: President

EXHIBIT A

NOTICE OF EXERCISE

(To be executed by the Holder of Warrant if such Holder desires to exercise Warrant)

To Marrone Bio Innovations, Inc.:

The undersigned hereby irrevocably elects to exercise this Warrant and to purchase thereunder, _____ full shares of Marrone Bio Innovations, Inc. common stock issuable upon exercise of the Warrant and delivery of:

(1) $_ _ _ _ (in cash as provided for in the foregoing Warrant) and any applicable taxes payable by the undersigned pursuant to such Warrant; and

(2) _ _ _ _ _ shares of Common Stock (pursuant to a Cashless Exercise in accordance with Section l(b)(ii) of the Warrant) (check here if the undersigned desires to deliver an unspecified number of shares equal the number sufficient to effect a Cashless Exercise).

The undersigned requests that such shares be issued in the name of:

(Please print name, address and social security or federal employer identification number (if applicable))

If the shares issuable upon this exercise of the Warrant are not all of the Warrant Shares which the Holder is entitled to acquire upon the exercise of the Warrant, the undersigned requests that a new Warrant evidencing the rights not so exercised be issued in the name of and delivered to:

(Please print name, address and social security or federal employer identification number (if applicable))

Name of Holder (print): _____

(Signature): _____

(By:) _____

Title: _____

Dated: _____

EXHIBIT B

FORM OF ASSIGNMENT

FOR VALUE RECEIVED, _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ _ hereby sells, assigns and transfers to each assignee set forth below all of the rights of the undersigned under the Warrant (as defined in and evidenced by the attached Warrant) to acquire the number of Warrant Shares set opposite the name of such assignee below and in and to the foregoing Warrant with respect to said acquisition rights and the shares issuable upon exercise of the Warrant:

Name of Assignee	Address	Number of Warrant Shares

If the total of the Warrant Shares are not all of the Warrant Shares evidenced by the foregoing Warrant, the undersigned requests that a new Warrant evidencing the right to acquire the Warrant Shares not so assigned be issued in the name of and delivered to the undersigned.

Name of Holder (print): _____

(Signature): _____

(By:) _____

Title: _____

Dated: _____

Exhibit 4.14

DESCRIPTION OF THE REGISTRANT'S SECURITIES
REGISTERED PURSUANT TO SECTION 12 OF THE SECURITIES EXCHANGE ACT OF 1934

The following is a brief description of the common stock, $0.00001 par value per share (the "Common Stock"), of Marrone Bio Innovations, Inc. (the "Company"), which is the only security of the Company registered pursuant to Section 12 of the Securities Exchange Act of 1934, as amended.

Description of Common Stock

General

The following summary of the material features of our Common Stock and certain provisions of Delaware law do not purport to be complete and is subject to, and qualified in its entirety by, the provisions of our Fourth Amended and Restated Certificate of Incorporation, our Fifth Amended and Restated Bylaws, the Delaware General Corporation Law ("DGCL") and other applicable law. Copies of our Fourth Amended and Restated Certificate of Incorporation and our Fifth Amended and Restated Bylaws have been filed with the Securities and Exchange Commission (the "SEC") as Exhibit 3.1 and Exhibit 3.2, respectively, to our Annual Report on Form 10-K. All of our outstanding Common Stock are validly issued, fully paid and non-assessable. Our Common Stock is listed on the Nasdaq Capital Market and trades under the symbol "MBII."

Common Stock

Dividend rights

Subject to preferences that may apply to any shares of preferred stock outstanding at the time, the holders of Common Stock will be entitled to share equally, identically and ratably in any dividends that the board of directors may determine to issue from time to time out of legally available funds. We have never paid cash dividends on our Common Stock and do not anticipate paying periodic cash dividends on our Common Stock for the foreseeable future.

Voting rights

Each holder of our Common Stock is entitled to one vote for each share on all matters submitted to a vote of the stockholders. Subject to any rights that may be applicable to any then outstanding preferred stock, our Common Stock votes as a single class on all matters relating to the election and removal of directors on our board of directors and as provided by law. Holders of our Common Stock do not have cumulative voting rights. Except in respect of matters relating to the election and removal of directors on our board of directors and as otherwise provided in our Fourth Amended and Restated Certificate of Incorporation or required by law, all matters to be voted on by our stockholders must be approved by a majority of the shares present in person or by proxy at the meeting and entitled to vote on the subject matter. In the case of election of directors, all matters to be voted on by our stockholders must be approved by a plurality of the votes entitled to be cast by all shares of our Common Stock.

Liquidation Rights

In the event of any voluntary or involuntary liquidation, dissolution or winding up of our affairs, holders of our Common Stock would be entitled to share ratably in our assets that are legally available for distribution to stockholders after payment of our debts and other liabilities. If we have any preferred stock outstanding at such time, holders of the preferred stock may be entitled to distribution and/or liquidation preferences. In either such case, we must pay the applicable distribution to the holders of our preferred stock before we may pay distributions to the holders of our Common Stock.

No Preemptive or Similar Rights

Our stockholders have no preemptive, conversion or other rights to subscribe for additional shares of our Common Stock.

Limitation on Rights of Holders of Common Stock – Preferred Stock

The rights, preferences and privileges of the holders of Common Stock are subject to, and may be adversely affected by, the rights of the holders of shares of any series of preferred stock that we may designate in the future.

Our Fourth Amended and Restated Certificate of Incorporation authorizes our Board of Directors, without further stockholder action, to provide for the issuance of up to 20,000,000 shares of preferred stock. Our board of directors may, without further action by our stockholders, fix the rights, preferences, privileges and restrictions of up to an aggregate of shares of preferred stock in one or more series and authorize their issuance. These rights, preferences and privileges could include dividend rights, conversion rights, voting rights, terms of redemption, liquidation preferences, sinking fund terms and the number of shares constituting any series or the designation of such series, any or all of which may be greater than the rights of our Common Stock. The issuance of our preferred stock could adversely affect the voting power of holders of our Common Stock and the likelihood that such holders will receive dividend payments and payments upon liquidation. In addition, the issuance of preferred stock could have the effect of delaying, deferring or preventing a change of control or other corporate action.

Certain Anti-Takeover Matters

Fourth Amended and Restated Certificate of Incorporation and Fifth Amended and Restated Bylaw Provisions

Our Fourth Amended and Restated Certificate of Incorporation and Fifth Amended and Restated Bylaws contain certain provisions that are intended to enhance the likelihood of continuity and stability in the composition of our board of directors and in the policies formulated by our board of directors and to discourage an unsolicited takeover of our company if our board of directors determines that such a takeover is not in the best interests of our company and stockholders. However, these provisions could have the effect of discouraging certain attempts to acquire us or remove incumbent management even if some or a majority of our stockholders deemed such an attempt to be in their best interests, including those attempts that might result in a premium over the market price for the shares of our Common Stock held by stockholders.

Our Fourth Amended and Restated Certificate of Incorporation and Fifth Amended and Restated Bylaws provide that our board of directors is classified into three classes of directors. A third party may be discouraged from making a tender offer or otherwise attempting to obtain control of us as it is more difficult and time consuming for stockholders to replace a majority of the directors on a classified board of directors.

Our Fifth Amended and Restated Bylaws establish advance notice procedures with regard to stockholder proposals and the nomination, other than by or at the direction of the board of directors or a committee thereof, of candidates for election as directors. We may reject a stockholder proposal or nomination that is not made in accordance with such procedures. In addition, our Fifth Amended and Restated Bylaws provide that:

- special meetings of the stockholders of the Company may be called, for any purpose as is a proper matter for stockholder action under Delaware law, by only (i) the Chairperson of the board of directors, (ii) the Chief Executive Officer, or (iii) the Board of Directors;
- a director may not be removed from office without cause unless by the vote of the holders of 66 2/3% or more of the outstanding shares of our Common Stock entitled to vote at a special meeting of stockholders; and
- our Fifth Amended and Restated Bylaws may be altered, amended or repealed at any regular meeting of the stockholders (or at any special meeting thereof duly called for such purpose) by the affirmative vote of holders of at least 66 2/3% of our entire capital stock that is issued, outstanding and entitled to vote.

Section 203 of the Delaware General Corporation Law

We are subject to the provisions of Section 203 of the DGCL. Under Section 203, we would generally be prohibited from engaging in any business combination with any interested stockholder for a period of three years following the time that this stockholder became an interested stockholder unless:

- prior to this time, the board of directors of the corporation approved either the business combination or the transaction that resulted in the stockholder becoming an interested stockholder;
- upon consummation of the transaction that resulted in the stockholder's becoming an interested stockholder, the interested stockholder owned at least 85% of the voting stock of the corporation outstanding at the time the transaction commenced, excluding shares owned by persons who are directors and also officers, and by employee stock plans in which employee participants do not have the right to determine confidentially whether shares held subject to the plan will be tendered in a tender or exchange offer; or
- at or subsequent to such time, the business combination is approved by the board of directors and authorized at an annual or special meeting of stockholders, and not by written consent, by the affirmative vote of at least 66 2/3% of the outstanding voting stock that is not owned by the interested stockholder.

Under Section 203, a "business combination" includes:

- any merger or consolidation involving the corporation and the interested stockholder;
- any sale, transfer, pledge or other disposition of 10% or more of the assets of the corporation involving the interested stockholder;
- any transaction that results in the issuance or transfer by the corporation of any stock of the corporation to the interested stockholder, subject to limited exceptions;
- any transaction involving the corporation that has the effect of increasing the proportionate share of the stock of any class or series of the corporation beneficially owned by the interested stockholder; or
- the receipt by the interested stockholder of the benefit of any loans, advances, guarantees, pledges or other financial benefits provided by or through the corporation

In general, Section 203 defines an interested stockholder as an entity or person beneficially owning 15% or more of the outstanding voting stock of the corporation and any entity or person affiliated with or controlling or controlled by such entity or person.

Limitation of Liability and Indemnification Matters

Article VII of our Fourth Amended and Restated Certificate of Incorporation and Article 8 of our Fifth Amended and Restated Bylaws provide for indemnification of our directors, officers, employees and other agents to the maximum extent permitted by applicable law. We also have entered into indemnification agreements with our executive officers and directors and provide indemnity insurance pursuant to which directors and officers are indemnified or insured against liability or loss under certain circumstances which may include liability or related loss under the Securities Act and the Exchange Act.

Exhibit 10.33

EMPLOYMENT SEPARATION AGREEMENT

This Employment Separation Agreement (the "Agreement") is made and entered into by and between Pamela Marrone ("Executive") and Marrone Bio Innovations, Inc., a Delaware corporation (the "Company"), effective as of December 1, 2019 (the "Effective Date").

W I T N E S S E T H:

WHEREAS, Executive is the Chief Executive Officer of the Company and a member of the Company's board of directors (the "Board"); and

WHEREAS, Executive is party to an employment offer letter agreement with Marrone Organic Innovations, Inc., dated June 29, 2006 (the "Offer Letter"), an Employee Confidential Information and Assignment of Inventions Agreement with the Company, attached as Exhibit A (including exhibits thereto, the " Inventions and Restrictive Covenant Agreement") and a Change in Control Agreement with the Company, effective as of June 17, 2016 (the " Change in Control Agreement" and, together with the Offer Letter and the Inventions and Restrictive Covenant Agreement, the "Employment Agreements");

WHEREAS, the Executive wishes to retire from service as an employee and as Chief Executive Officer of the Company, with such retirement to be effective upon the Board's identification and retention of a new Chief Executive Officer for the Company;

WHEREAS, the Company and Executive wish to set forth herein certain agreements and understandings in this Agreement relating to Executive's resignation as Chief Executive Officer and termination of employment; and

WHEREAS, on the date hereof, the Executive is entering into a Consulting Services Agreement with the Company (the "Consulting Agreement") with respect to her provision of consulting services following her retirement; and

NOW, THEREFORE, in consideration of the mutual covenants and agreements herein contained, and for other good and valuable consideration, the legal sufficiency of which is hereby acknowledged, the Company and Executive agree as follows:

1. Employment Separation.

(a) Termination of Employment; Resignation as Officer; Continued Service on the Board. Executive's employment with the Company will terminate, and Executive shall be deemed to have resigned from service as Chief Executive Officer of the Company, effective at 11:59 P.M. Pacific Time on the date before the day another individual commences service as Chief Executive Officer of the Company, or on such earlier date as the Executive and the Company mutually agree (the "Retirement Date"), subject to the Company's continued right to terminate the Executive due to Executive's death or Disability (as defined in the Change in Control Agreement) or for "Cause" (as defined in the Change in Control Agreement). Executive will remain on the Board until such time as Executive resigns, refuses to stand for re-election, is not elected to the Board or is removed from office in accordance with the Company's bylaws. Executive shall not be compensated for her services on the Board during or after the Retirement Date unless otherwise agreed to by the Company.

(b) Payment of Accrued Amounts; COBRA; Legal Fees. In connection with Executive's termination of employment, Executive will receive (a) any unpaid salary earned through the Retirement Date and any unused vacation accrued through the Retirement Date (payable on the Retirement Date) and (b) reimbursement for any unreimbursed business expenses properly incurred by Executive through the Retirement Date, in accordance with the Company's expense reimbursement policy (the "Accrued Amounts"). Executive's termination of employment on the Retirement Date will constitute a "separation from service" for purposes of Executive's restricted stock unit awards that are outstanding on the Effective Date, and such awards shall settle on the first business day following the six-month anniversary of the Retirement Date. If Executive timely elects continuation coverage under the Consolidated Omnibus Budget Reconciliation Act ("COBRA"), the Company will pay Executive's COBRA continuation coverage premium for dental and vision benefits for Executive and her eligible dependents during the COBRA continuation period (not to exceed the maximum COBRA period), and Executive confirms that Executive has access to medical coverage from alternate sources. In addition, the Company shall directly pay Executive's legal fees and costs incurred in the negotiation of this Agreement within sixty (60) days of presentation of an invoice therefor, provided that such fees shall not exceed $15,000.

(c) No Further Employee Compensation and Benefits. Other than the payments and benefits specifically set forth in this Agreement, the Executive agrees that the Company and its subsidiaries and controlled affiliates do not owe Executive any additional payments, compensation, remuneration, bonuses, incentive compensation (cash or equity-based, including, without limitation, options, restricted stock and restricted stock units), benefits, warrants, severance, reimbursement of expenses or commissions of any kind whatsoever, or other similar compensation, including any obligations under the Offer Letter or the Change in Control Agreement, and except as provided in this Agreement, Executive is not entitled to any further compensation or eligibility for participation in any benefit plans, agreements, or arrangements maintained or contributed to by the Company or its subsidiaries and other affiliates, if any, after the Retirement Date; provided, however, that the foregoing shall not extend to (a) any vested benefits under the Company's 401(k) retirement plan, if any, (b) Executive's rights, if any, to indemnification or advancement of expenses in accordance with the Company's certificate of incorporation, bylaws or other corporate governance document, or any applicable insurance policy or applicable law or any indemnification agreement with Executive, or (c) Executive's rights and entitlements with respect to outstanding equity awards, which shall remain subject to the terms and conditions of the applicable award agreements and plan(s) pursuant to which such awards were granted, as may be amended from time to time, including by this Agreement.

(d) No Representation as Company Officer. With the exception of the duties and responsibilities set forth in this Agreement and Executive's duties and responsibilities as a member of the Board, Executive acknowledges and agrees that she is relieved of all duties and responsibilities for the Company and its subsidiaries and other affiliates as of the Retirement Date, that after the Retirement Date, Executive will not have the authority to bind the Company or any of its subsidiaries or other affiliates, and that after the Retirement Date, Executive will not contact the Company's stockholders or any past, current, or prospective customers, distributors, manufacturers, partners or suppliers of the Company or any of its subsidiaries, affiliates or licensees on behalf of the Company or any of its subsidiaries or other affiliates except as required in connection with the performance of the Services (defined in the Consulting Agreement). Effective as of 11:59 P.M. Pacific Time on the Retirement Date, Executive shall cease and be deemed to have resigned from any and all titles, positions and appointments the Executive holds with any of the Company's subsidiaries or controlled affiliates, whether as an officer, director, employee, trustee, committee member or otherwise. Executive agrees to execute any documents reasonably requested by the Company in accordance with the preceding sentence.

(e) General Release; Guaranteed Bonus; Continued Employment Terms. Provided Executive signs and delivers to the Company the general release attached as Exhibit B within twenty-one (21) days after Effective Date (the "General Release") and does not revoke the General Release within the seven (7) day revocation period described therein, (A) Executive will remain eligible to earn her full 2019 annual bonus without regard to the termination of her employment (i.e., without proration as to any partial service in 2019 and notwithstanding the annual bonus not generally being paid to terminated employees), calculated based on achievement of 100% of Executive's individual goals, and with Company-wide goals and all other terms determined, and the bonus paid, in accordance with the terms of the Company's annual bonus plan as applied to other active senior executives of the Company (the "Annual Bonus Entitlement") and (B) Executive's employment with the Company will continue through the Retirement Date at the same salary as presently in effect, subject to the terms of the Employment Agreements (except to the extent modified by this Agreement). Executive acknowledges and agrees that Executive's continued employment, and her entitlement to the Annual Bonus Entitlement notwithstanding her retirement, constitutes full and adequate consideration for the General Release.

(f) Reaffirmation Agreement; Vesting of Equity Awards. In addition to the Accrued Amounts described in Section 1(b), provided Executive signs and delivers to the Company the Reaffirmation Agreement attached as Exhibit C within twenty-one (21) days after the Retirement Date (the "Reaffirmation Agreement"), and does not revoke it within the seven (7) day revocation period described therein, all of Executive's outstanding unvested stock options will become fully vested as of the date the Reaffirmation Agreement becomes irrevocable (with all stock options remaining exercisable for the remainder of the options' original terms and otherwise in accordance with the terms of the applicable award agreements and plan pursuant to which the stock options were granted). Executive acknowledges and agrees that vesting of Executive's stock options constitutes full and adequate consideration for the Reaffirmation Agreement.

(g) Rights and Obligations under Offer Letter, Change in Control Agreement and Inventions and Restrictive Covenant Agreement . The Offer Letter and the Change in Control Agreement will terminate and be of no further force or effect after the Retirement Date. Except for the payments and benefits provided for in this Agreement, Executive acknowledges and agrees that she is not entitled to any severance payments or benefits under the Offer Letter, the Change in Control Agreement or otherwise as a result of the termination of her employment. Executive represents that she is in compliance with, and will continue to comply with all obligations set forth in the Inventions and Restrictive Covenant Agreement in accordance with their terms following the Retirement Date, and that nothing herein or otherwise alters in any way the terms of the Inventions and Restrictive Covenant Agreement or its survival after the termination of Executive's employment with the Company (except for the third sentence of Paragraph 8(a) of the Inventions and Restrictive Covenant Agreement, which the Company hereby waives). Executive further agrees to execute and deliver, in lieu of Exhibit C (Termination Certification) to the Inventions and Restrictive Covenant Agreement, the Termination Certificate in substantially the form attached hereto as Exhibit D, as of, or as soon as practicable after, the Retirement Date; provided, for the avoidance of doubt, that notwithstanding anything to the contrary in Exhibit C (Termination Certification) to the Inventions and Restrictive Covenant Agreement, Executive will be permitted to keep her Company-issued cell phone, cell phone number, laptop and iPad, provided that after the Retirement Date she shall not have access to the Company's internal drives or network.

(h) Protected Rights; Defend Trade Secrets Act Notification: Notwithstanding anything to the contrary in the Inventions and Restrictive Covenant Agreement: as follows:

(i) Executive is hereby notified that 18 U.S.C. § 1833(b) states

> "An individual shall not be held criminally or civilly liable under any Federal or State trade secret law for the disclosure of a trade secret that—(A) is made—(i) in confidence to a Federal, State, or local government official, either directly or indirectly, or to an attorney; and (ii) solely for the purpose of reporting or investigating a suspected violation of law; or (B) is made in a complaint or other document filed in a lawsuit or other proceeding, if such filing is made under seal."

Accordingly, notwithstanding anything to the contrary in this Agreement or the Inventions and Restrictive Covenant Agreement, Executive understands that she has the right to disclose in confidence trade secrets to federal, state, and local government officials, or to an attorney, for the sole purpose of reporting or investigating a suspected violation of law. Executive understands that she also has the right to disclose trade secrets in a document filed in a lawsuit or other proceeding, but only if the filing is made under seal and protected from public disclosure. Executive understands and acknowledges that nothing in this Agreement or the Inventions and Restrictive Covenant Agreement is intended to conflict with 18 U.S.C. § 1833(b) or create liability for disclosures of trade secrets that are expressly allowed by 18 U.S.C. § 1833(b).

(ii) Nothing in this Agreement, the Inventions and Restrictive Covenant Agreement, the General Release, the Reaffirmation Agreement or the Consulting Agreement shall prohibit or interfere with the Executive exercising protected rights, including rights under the National Labor Relations Act, filing a charge with the Equal Employment Opportunity Commission; reporting possible violations of law to or participating in an investigation by any federal, state or local government agency or commission such as the National Labor Relations Board, the Department of Labor, OSHA, the Department of Justice, or the Securities and Exchange Commission. Executive does not need the Company's advance permission to file any such charge or report or to participate in any such investigation. Executive does, however, waive any right to receive any monetary award or benefit resulting from such a charge, report, or investigation related to any Executive Released Claims, except that Executive may receive and retain a monetary award from a government-administered whistleblower award program.

2. Failure to Comply with Employment Agreements or Employment Separation Terms. If, prior to the Retirement Date, the Executive materially violates or otherwise materially breaches the terms of this Agreement or the Employment Agreements, where such breach remains uncured fifteen days after written notification is provided to the Executive (unless such breach is unable to be cured, in which case no fifteen day notice period shall be required), or Executive is terminated for "Cause" (as defined in the Change in Control Agreement") or resigns other than for "Good Reason" (as defined in the Change in Control Agreement), or if Executive has not executed (or revokes) the General Release and the Reaffirmation Agreement as provided for in Sections 1(e) and 1(f) of this Agreement (any such event, a "Termination Event"), all of Executive's unvested restricted stock units and all of Executive's unexercised stock options (whether or not vested) will immediately be forfeited and Executive will have no further rights with respect to such awards, Executive shall have no rights to the Annual Bonus Entitlement and the Company shall have no further obligations pursuant to Section 4(b). All other provisions of this Agreement shall survive a Termination Event. For purposes of this section, material breach of this Agreement includes, but is not limited to the following: any failure of Executive, whether due to bad faith or negligence, to comply with the terms of the Inventions or Restrictive Covenants Agreement.

3. No Admission of Liability. The parties acknowledge and agree that any payments or benefits provided to Executive under the terms of this Agreement do not constitute an admission by either party or any of their affiliates that they have violated any law or legal obligation with respect to any aspect of Executive's employment with the Company.

4. Non-Disparagement.

(a) Subject to Section 1(h)(ii), Executive agrees that she will not, directly or indirectly, (A) make any statement, whether in commercial or non-commercial speech, disparaging or criticizing in any way the Company or any of its subsidiaries or affiliates, or any products or services offered by any of these entities, or (B) engage in any other conduct or make any other statement that, in each case, should reasonably be expected to impair the goodwill or reputation of the Company; provided, however, that nothing herein or elsewhere shall prevent Executive from making truthful disclosures or statements (x) reasonably necessary in connection with any litigation, arbitration or mediation or (y) as required by law or by any court, arbitrator, governmental body or other person with apparent authority to require such disclosures or statements. Without limiting the foregoing, Executive acknowledges and agrees that negative, critical or disparaging statements regarding this Agreement or the circumstances of Executive's retirement will impair the goodwill and reputation of the Company and shall constitute grounds for a termination pursuant to Section 2(a).

(b) The Company will inform its executive officers with the title of Vice President and above and members of its board of directors, not to, directly or indirectly, individually or in concert with others, engage in any conduct or make any statement, calculated or likely to have the effect of undermining, disparaging or otherwise reflecting poorly upon Executive; provided, however, that nothing herein or elsewhere shall prevent such individual from making truthful disclosures or statements (x) reasonably necessary in connection with any litigation, arbitration or mediation or (y) as required by law or by any court, arbitrator, governmental body or other person with apparent authority to require such disclosures or statements.

5. Entire Agreement. The Company and Executive each represents and warrants that no promise or inducement has been offered or made except as herein set forth and that the consideration stated herein is the sole consideration for this Agreement. This Agreement (including the exhibits hereto) constitute the complete and entire agreement, and states fully all agreements, understandings, promises and commitments between the Company and Executive relating to the subject matter hereof. This Agreement supersedes and cancels any and all other negotiations, understandings and agreements, oral or written, respecting the subject matter hereof, between Executive and the Company or any of its subsidiaries or other affiliates (other than the Offer Letter and the Change in Control Agreement, each of which will remain in effect until the Retirement Date, and the Inventions and Restrictive Covenant Agreement, which shall remain in full force and effect indefinitely to the extent by its terms it survives termination of Executive's employment, and other than the third sentence of Paragraph 8(a) of the Inventions and Restrictive Covenant Agreement, which the Company hereby waives), provided, for the avoidance of doubt, that this Agreement does not supersede or cancel the Consulting Agreement, and that in the event of conflict between this Agreement and any of the Employment Agreements, this Agreement shall control. This Agreement may not be modified except by an instrument in writing signed by the party against whom the enforcement of any waiver, change, modification, or discharge is sought.

6. Assignability; Successors; Governing Law. This Agreement is personal to Executive and Executive may not assign, pledge, delegate or otherwise transfer to any person or entity any of Executive's rights, obligations or duties under this Agreement. Any successor to the Company (whether direct or indirect and whether by purchase, merger, consolidation, liquidation or otherwise) to all or substantially all of the Company's business and/or assets will assume the obligations under this Agreement and agree expressly to perform the obligations under this Agreement in the same manner and to the same extent as the Company would be required to perform such obligations in the absence of a succession. For all purposes under this Agreement, the term "Company" will include any successor to the Company's business and/or assets, regardless of whether such party executes and delivers any assumption agreement, or any other successor that becomes bound by the terms of this Agreement by operation of law. This Agreement shall be governed by, construed in accordance with, and enforced pursuant to the laws of the State of California without regard to principles of conflict of laws. Executive consents to venue and personal jurisdiction in the appropriate state of federal court in California for disputes arising under this Agreement.

7. Enforceability; Arbitration.

(a) Each of the covenants and agreements set forth in this Agreement are separate and independent covenants, each of which has been separately bargained for and the parties hereto intend that the provisions of each such covenant shall be enforced to the fullest extent permissible. Should the whole or any part or provision of any such separate covenant be held or declared invalid, such invalidity shall not in any way affect the validity of any other such covenant or of any part or provision of the same covenant not also held or declared invalid. If any covenant shall be found to be invalid but would be valid if some part thereof were deleted or the period or area of application reduced, then such covenant shall apply with such minimum modification as may be necessary to make it valid and effective. The failure of either party at any time to require performance by the other party of any provision hereunder will in no way affect the right of that party thereafter to enforce the same, nor will it affect any other party's right to enforce the same, or to enforce any of the other provisions in this Agreement; nor will the waiver by either party of the breach of any provision hereof be taken or held to be a waiver of any prior or subsequent breach of such provision or as a waiver of the provision itself.

(b) The Company and Executive each agrees that any and all disputes arising out of the terms of this Agreement and any of the matters herein released, will be subject to binding arbitration. In the event of a dispute, the parties (or their legal representatives) will promptly confer to select a single arbitrator mutually acceptable to both parties. If the parties cannot agree on an arbitrator, then the moving party may file a demand for arbitration with the Judicial Arbitration and Mediation Services ("JAMS") in San Francisco County, California, who will be selected and appointed consistent with the Employment Arbitration Rules and Procedures of JAMS (the "JAMS Rules"). Any arbitration will be conducted in a manner consistent with the JAMS Rules, supplemented by the California Rules of Civil Procedure. The parties further agree that the prevailing party in any arbitration will be entitled to injunctive relief in any court of competent jurisdiction to enforce the arbitration award. The parties hereby agree to waive their right to have any dispute between them resolved in a court of law by a judge or jury. This paragraph will not prevent either party from seeking provisional relief (including a temporary restraining order or preliminary injunction) from any court having jurisdiction over the parties and the subject matter of their dispute relating to Executive's obligations under this Agreement and the Company's form of confidential information agreement.

8. Counterparts. This Agreement may be executed in counterparts, each of which together constitute one and the same instrument. Signatures delivered by facsimile or email PDF shall be effective for all purposes.

9. Notices. Notices and all other communications contemplated by this Agreement will be in writing and will be deemed to have been duly given when personally delivered or when mailed by U.S. registered or certified mail, return receipt requested and postage prepaid. In the case of Executive, mailed notices will be addressed to her at the home address which she most recently communicated to the Company in writing. In the case of the Company, mailed notices will be addressed to its corporate headquarters, and all notices will be directed to the attention of the Company's Chief Executive Officer or General Counsel.

10. No Construction against Drafter. No provision of this Agreement or any related document will be construed against or interpreted to the disadvantage of any party hereto by any court or other governmental or judicial authority by reason of such party having or being deemed to have structured or drafted such provision.

11. Taxes. Notwithstanding anything to the contrary in this Agreement, the Company may withhold from all amounts payable under this Agreement all federal, state, local and foreign taxes that are required to be withheld pursuant to any applicable laws and regulations. Notwithstanding anything to the contrary in this Agreement, Executive and the Company agree that this Agreement shall be interpreted to comply with or be exempt from Section 409A of the Internal Revenue Code of 1986, as amended, and the regulations and authoritative guidance promulgated thereunder to the extent applicable (collectively "Section 409A"), and all provisions of this Agreement shall be construed in a manner consistent with the requirements for avoiding taxes or penalties under Section 409A. However, the Company makes no representation that any or all of the payments described in this Agreement will be exempt from or comply with Section 409A and makes no undertaking to preclude Section 409A from applying to any such payment. Executive understands and agrees that Executive shall be solely responsible for the payment of any taxes, penalties, interest or other expenses incurred by Executive on account of noncompliance with Section 409A and in no event will the Company, any of its subsidiaries or other affiliates, or any of their respective directors, officers, agents, attorneys, employees, executives, shareholders, investors, members, managers, trustees, fiduciaries, representatives, principals, accountants, insurers, successors or assigns be liable for any additional tax, interest or penalties that may be imposed on the Executive under Section 409A or any damages for failing to comply with Section 409A.

[*Signatures appear on following page*]

IN WITNESS WHEREOF, the parties hereto have executed and delivered this Employment Separation Agreement as of the day and year set forth below.

MARRONE BIO INNOVATIONS, INC.

Dated: December 1, 2019

By: */s/ Robert Woods*
Name: Robert Woods
Title: Chairman of the Board

Dated: December 1, 2019

EXECUTIVE

/s/ Pamela G. Marrone
Pamela G. Marrone

(SIGNATURE PAGE TO EMPLOYMENT SEPARATION AGREEMENT]

Exhibit A

Employee Confidential Information and Assignment of Inventions Agreement

Marrone Bio Innovations, Inc.

EMPLOYEE CONFIDENTIAL INFORMATION and ASSIGNMENT OF INVENTIONS AGREEMENT

Pamela G. Marrone
Name of Employee

As a condition of my employment or continued employment with Marrone Bio Innovations, Inc. (the **"Company"),** and in consideration of my employment with the Company and my receipt of the compensation and other benefits now and hereafter provided to me by the Company, I agree to the following:

I. **At-Will Employment.** I understand and acknowledge that my employment with the Company is for an unspecified duration and constitutes "at-will" employment. This employment relationship may be terminated by either the Company or me at any time, with or without advance notice, with or without cause, and for any reason whatsoever. Upon the termination of my employment, I will be entitled only to the compensation earned by me as of the date of termination.

2. Confidential Information.

(a) **Company Information.** At all times during the term of my employment and thereafter, I agree to hold Confidential Information in the strictest confidence, to use such Confidential Information only to perform my duties as an employee of the Company, and not to use such Confidential Information for my personal benefit or disclose such Confidential Information to any person outside of the Company or to any entity without written authorization from an officer of the Company. **"Confidential Information"** means Company Trade Secrets and any Company proprietary information, know-how, and technical data that is not publicly known. **"Trade Secrets"** means information that derives independent economic value, actual or potential, from not being generally known to the public or other persons who can obtain economic value from its disclosure or use, and is the subject of efforts that are reasonable under the circumstances to maintain its secrecy. For example, Confidential Information may include (but is not limited to) research, product plans, products, services, business plans, customer lists, customers (including, but not limited to, customers of the Company on whom I called or with whom I became acquainted during the term of my employment), markets, software, developments, inventions, processes, formulas, technology, designs, drawings, engineering, hardware configuration information, marketing plans, financial information, and other business information disclosed to me by the Company either directly or indirectly and by any means, including in writing, orally, by drawings, or by observation of parts or equipment. I will promptly notify the Company if I am legally compelled to disclose any Confidential Information by the order of any court or governmental investigative or judicial agency pursuant to proceedings over which such court or agency has jurisdiction.

Confidential Information does not include any of the foregoing items which: (i) become publicly known or generally available through no wrongful act by me or by others who were under confidentiality obligations as to the item(s) involved; (ii) I already knew prior to commencement of my employment with the Company, other than by disclosure to me by the Company; (iii) I lawfully receive from someone outside the Company who is not obligated to keep the information confidential; or (iv) are explicitly approved in writing for release by an officer of the Company.

(b) **Third Party Information.** Company has received and in the future will receive from third parties their confidential or proprietary information subject to a duty on the Company's part to maintain the confidentiality of such information and to use it only for certain limited purposes. I agree to hold all such confidential or proprietary information in the strictest confidence, to use such information only as necessary to perform my work for the Company consistent with the Company's agreement with such third party, and not to disclose such information to any person outside of the Company or to any entity. Such information will be deemed Confidential Information, subject to the exclusions specified in the last sentence of subsection (a) above.

(c) **Former Employer Information.** I agree that I will not, during my employment with the Company, bring onto Company premises or improperly use or disclose any confidential or proprietary information or Trade Secrets of any former or concurrent employer or other person or entity, without the explicit written consent of such employer, person or entity.

3. Inventions.

(a) **Inventions Retained and Licensed.** I have attached hereto as Exhibit A a list describing all inventions, original works of authorship, developments, improvements, and Trade Secrets which belong to me, either alone or jointly with others, as of the commencement date of my employment with the Company, and which relate to the Company's actual or proposed business, products, or research and development, and which are not assigned to the Company hereunder (collectively referred to as **"Prior Inventions").** If no such list is attached, I represent that there are no such Prior Inventions. If in the course of my employment with the Company, I incorporate into a Company product, process or machine a Prior Invention, I hereby grant to the Company a nonexclusive, royalty-free, perpetual, irrevocable, worldwide, transferable, and sublicensable license to make, have made, modify, use, sell, distribute, and import such Prior Invention and/or technology based upon such Prior Invention. I will not knowingly incorporate into anything that I develop for the Company any third-party materials (including, but not limited to, open source software), intellectual property, or proprietary information without the Company's prior written approval of such incorporation.

(b) **Assignment of Inventions.** I agree that I will promptly make full written disclosure to the Company, will hold in trust solely for the benefit of the Company, and do hereby assign and transfer to the Company or its designee, all of my right, title, and interest in and to any and all Inventions, including all intellectual property rights and moral rights relating thereto, except as provided in **Section 3(t)** below. **"Inventions"** means original works of authorship (including software), developments, concepts, improvements, and Trade Secrets, whether or not patentable or registrable under copyright or similar laws, which I may solely or jointly conceive, develop, or reduce to practice either (i) during the period of time I am employed by the Company, or (ii) after my employment with the Company ends if based upon any Confidential Information. I further acknowledge that all original works of authorship that are made by me (solely or jointly with others) within the scope of, and during the period of, my employment with the Company and which are protectible by copyright are "works made for hire," as that term is defined in the United States Copyright Act (17 USC § 101).

(c) **Inventions Assigned to the United States.** I agree to assign to the United States government all of my right, title, and interest in and to any and all Inventions whenever such full title is required to be in the United States by a contract between the Company and the United States or any of its agencies.

(d) **Maintenance of Records.** I will keep adequate and current written records of all Inventions made by me (solely or jointly with others) during the period of my employment with the Company. The records will be in the form of notes, sketches, drawings, and any other format that may be specified by the Company. The records will be available to and (subject to **Section 3(t)** below) will remain the sole property of the Company at all times.

(e) **Patent and Copyright Registrations.** I will assist the Company or its designee, at the Company's expense, in every proper way to secure the Company's right, title, and interest in the Inventions I am required to assign to the Company, including copyrights, patents, mask work rights, Trade Secrets, and other intellectual property rights relating thereto in any and all countries. Such assistance may include (but is not limited to) (i) disclosing to the Company all pertinent information and data relating to the assigned Inventions; (ii) executing all documents that are required to assign to the Company or its successors and assigns all right, title, and interest to the Inventions, including all intellectual property rights relating thereto; and (iii) executing all applications, specifications, oaths, and all other documents that are required for the Company to register copyrights, patents, mask works, or other intellectual property rights relating thereto. My obligations to provide such assistance and execute such documents will continue after the termination of my employment with the Company. The Company will provide reasonable compensation to you and reimbursement for your expenses, including potential attorneys' fees, if you, at the Company's request, provide such assistance following the termination of your employment with the Company.

If the Company is unable to obtain my signature, because of my mental or physical incapacity or for any other reason, then I hereby irrevocably appoint the Company and its duly authorized officers and agents as my agent and attorney-in- fact, which appointment is coupled with an interest and will therefore survive my death or incompetence, to execute and file any applications for United States or foreign patents, and copyright and mask work registrations, and other intellectual property rights protection for assigned Inventions, and to do all other lawful acts to further the prosecution and issuance of such patents and copyright and mask work registrations, with the same legal force and effect as if executed by me.

(f) **Exception to Assignments.** The provisions of **Section 3(b)** of this Agreement requiring assignment of Inventions to the Company do not apply to any Invention that qualifies fully under the provisions of California Labor Code Section 2870 (the full text of which is attached hereto as Exhibit B). All Inventions that qualify under Labor Code Section Code Section 2870 will be received in confidence by the Company.

4. **Adherence to Company Policies.** I agree to adhere to all Company employment policies, which may be modified from time-to-time by the Company in its sole discretion.

5. **No Conflicting Activities.** During the period of my employment with the Company, I will not engage in any other employment, occupation, consulting, or other business activity that is directly related to the business in which the Company is now involved or becomes involved; and I will not engage in any activities that conflict with my obligations to the Company.

6. **Returning Company Documents and Other Property.** All documents and tangible materials that I receive from the Company during the course of my employment with the Company, including (but not limited to) all such items that incorporate Confidential Information, are the Company' s property; and I will deliver to the Company all such documents and materials upon the termination of my employment, or earlier upon the Company's request. I will not keep copies of such documents or materials, recreate them, or deliver them to anyone else. I will also return all Company property, including, without limitation, laptop computer, mobile tele phone, and all memory sticks, credit cards, entry cards, identification badges and keys, and any other Company equipment in my possession, custody or control. Additionally, I will delete all Company documents and all Confidential Information that exist on any computer, mobile phone, or other electronic devices that I use and that are owned by me or by a third party.

7. **Termination Certification; Notification to New Employer{s).** Upon the termination of my employment with the Company, I will sign and deliver to the Company the "Termination Certification" attached hereto as Exhibit C, or the current version then being used by the Company. I hereby consent to the Company notifying my new employer(s) about my obligations under this Agreement.

8. **Non-Solicitation of Employees, Consultants, and Customers.**

(a) **Non-Solicitation of Employees and Consultants.** I recognize the highly competitive nature of the business of the Company and that Company employees are exposed to Trade Secrets of the Company, which may include Confidential Information regarding its employees and consultants. Accordingly, I shall not either directly or indirectly, on my own behalf or on behalf of others, use such Company Trade Secrets to (a) solicit, induce, recruit, or encourage any of the Company's employees or consultants to leave their employment or consulting relationship with the Company to work for a another entity, including without limitation, a competitor of the Company, or (b) attempt to do any of the foregoing. Additionally, for a period of twelve (12) months immediately following my separation from employment with the Company for any reason, I shall not either directly or indirectly, on my own behalf or on behalf of others, solicit, induce, recruit or encourage any of the Company's employees or consultants to leave their employment or consulting relationships with the Company to work for a competitor of the Company, or attempt to do any of the foregoing.

(b) **Non-Solicitation of Customers.** I recognize the highly competitive nature of the business of the Company, and acknowledge that Company employees are exposed to Trade Secrets of the Company which may include information regarding its customers and clients. Accordingly, I agree that I will not use such Company Trade Secrets to solicit, on my own behalf or on behalf of other, business from any person or entity.

9. General Provisions.

(a) **Governing Law; Consent to Personal Jurisdiction.** THIS AGREEMENT SHALL BE CONSTRUED IN ACCORDANCE WITH, AND ALL DISPUTES HEREUNDER SHALL BE GOVERNED BY, THE LAWS OF THE STATE OF CALIFORNIA AS APPLIED TO CONTRACTS MADE AND TO BE PERFORMED IN CALIFORNIA, WITHOUT APPLYING CONFLICT OF LAW RULES. I hereby expressly consent to the personal jurisdiction of the state and federal courts located in California for any litigation arising from or relating to this Agreement.

(b) **Voluntary Nature of this Agreement.** I acknowledge and agree that I have carefully read this Agreement and that I understand the terms, consequences and binding effect of this Agreement.

(c) **Entire Agreement; Amendment.** This Agreement, including all Exhibits attached hereto, is intended as the complete, final and exclusive agreement between the parties regarding its subject matter, and supersedes all prior understandings, writings, proposals, representations or communications, oral or written, relating to the subject matter hereof. This Agreement may not be modified except by a writing executed by me and an authorized officer of the Company. Any change in my title, duties, or compensation will not affect the validity or scope of this Agreement.

(d) **Waiver.** Failure of either party to enforce compliance with any provision of this Agreement shall not constitute a waiver of such provision unless accompanied by a clear written and signed statement that such provision is waived. A waiver of any default hereunder or of any of the terms and conditions of this Agreement shall not be deemed to be a continuing waiver or a waiver of any other default or of any other term or condition, but shall apply solely to the instance to which such waiver is directed.

(e) **Severability.** In the event any provision of this Agreement is found to be invalid, illegal or unenforceable, a modified provision shall be substituted which carries out as nearly as possible the original intent of the parties, and the validity, legality and enforceability of any of the remaining provisions shall not in any way be affected or impaired thereby. If no such substitution can be made, such invalid, illegal or unenforceable provision shall be deleted, and the remaining provisions shall not in any way be affected or impaired thereby.

(f) **Survival; Successors and Assigns.** This Agreement will survive termination of my employment with the Company for any reason and will be binding upon my heirs, executors, administrators and other legal representatives, and will protect the Confidential Information of, and be for the benefit of, the Company and its successors and assigns.

(g) **Headings.** Headings in this Agreement are for the purpose of convenience only, and are not intended to be used in its construction or interpretation.

EMPLOYEE:

Employee Signature:	*/s/ Pamela G. Marrone*
Printed Name:	Pamela G. Marrone
Date:	4/12/12

FOR MARRONE BIO INNOVATIONS, INC. (the "COMPANY"):

Signature:	*/s/ Pamela G. Marrone*
Printed Name	Pamela G. Marrone
Title:	CEO/FOUNDER
Date:	April 12,2012

EMPLOYEE CONFIDENTIAL INFORMATION and ASSIGNMENT OF INVENTIONS AGREEMENT

EXHIBIT A
LIST OF PRIOR INVENTIONS

Identifying Number or Brief Description

(Employee to initial below as applicable)

__X__ No inventions, original works of authorship, developments, improvements, or trade secrets required to be disclosed

____Additional sheets attached

Signature of Employee: */s/ Pamela G. Marrone*
Printed Name of Employee: Pamela G. Marrone
Date: *April 12,2012*

EMPLOYEE CONFIDENTIAL INFORMATION and ASSIGNMENT OF INVENTIONS AGREEMENT

EXHIBIT B
CALIFORNIA LABOR CODE SECTION 2870

§ **2870. Application of provision that employee shall assign or offer to assign rights in invention to employer**

(a) Any provision in an employment agreement which provides that an employee shall assign, or offer to assign, any of his or her rights in an invention to his or her employer shall not apply to an invention that the employee developed entirely on his or her own time without using the employer's equipment, supplies, facilities, or trade secret information except for those inventions that either:

(1) Relate at the time of conception or reduction to practice of the invention to the employer's business, or actual or demonstrably anticipated research or development of the employer; or

(2) Result from any work performed by the employee for the employer.

(b) To the extent a provision in an employment agreement purports to require an employee to assign an invention otherwise excluded from being required to be assigned under subdivision (a), the provision is against the public policy of this state and is unenforceable.

EMPLOYEE CONFIDENTIAL INFORMATION and ASSIGNMENT OF INVENTIONS AGREEMENT

EXHIBIT C
TERMINATION CERTIFICATION

This is to certify that I have returned and do not have in my possess ion, custody, or control any equipment (such as laptop computers, mobile telephone, memory sticks, credit cards, entry cards, identification badges, and keys), records, data, notes, reports, proposals, lists, correspondence, specifications, drawings, blueprints, sketches, materials, computer programs or listings, other documents or property, or reproductions of any aforementioned items belonging to Marrone Bio Innovations, Inc. **("Company").** I have deleted all Company documents and all Company Confidential Information that exist on any computer, mobile phone or other electronic devices that I have used and that are owned by me or by a third party.

I further certify that I have complied with all the terms of the Company's Employee Confidential Information and Assignment of inventions Agreement **("Employee Agreement")** signed by me, including the reporting of any Inventions (as defined therein) and original works of authorship conceived or developed by me (solely or jointly with others) and covered by the Employee Agreement.

I acknowledge my obligation, in compliance with the Employee Agreement, not to disclose any Company Confidential Information (as defined therein), including all Company Trade Secrets (as defined therein), proprietary information, know-how, technical data, and financial information that is not publicly known relating to any business of the Company or any of its employees, clients, consultants, or licensees, and not to disclose any third-party confidential information covered by the Employee Agreement.

I also acknowledge my ongoing obligation, in compliance with the Employee Agreement, not to use any Company Trade Secrets (i) to directly or indirectly solicit, induce, recruit, or encourage any of the Company's employees to leave their employment or consultants to leave their consulting assignment, or attempt to do any of the foregoing, either for myself or for any other person or entity; or (ii) to solicit, on my own behalf or on behalf of others, business from any person or entity. I further confirm my obligation, for a period of twelve (12) months immediately following my separation from employment with the Company for any reason, not to either directly or indirectly, on my own behalf or on behalf of others, solicit, induce, recruit or encourage any of the Company' s employees or consultants to leave their employment or consulting relationships with the Company to work for a competitor of the Company, or attempt to do any of the foregoing.

Employee Signature: _____

Printed Name: _____

Date: _____

Exhibit B

GENERAL RELEASE

This General Release ("Release") is entered into as of December 1, 2019, by and between Pamela Marrone ("Executive") and Marrone Bio Innovations, Inc. (the "Company"). Executive and the Company are sometimes collectively referred to as the "Parties."

1. In consideration for Executive's execution of this Release and Executive's promises and covenants contained (a) herein and (b) in the Employment Separation Agreement between the Company and Executive (the "Employment Separation Agreement"), the Company agrees to provide to Executive the benefit described in Section 1(e) of the Employment Separation Agreement, subject to the effectiveness of this Release in accordance with paragraph 9 of this Release.

2. Executive, on behalf of herself, her heirs, executors, agents, representatives, and assigns (collectively, the "Releasors") hereby fully acquits, releases, waives and discharges the Company, its and their affiliated, related, parent or subsidiary companies, and its and their predecessors, successors, and present and former officers, directors, committee members, representatives, attorneys, agents or employees (the "Company Parties") from any and all claims, obligations, liabilities, complaints, causes of action, charges, debts, and demands of whatever kind whatsoever, in law or in equity, known or unknown, asserted or unasserted ("Claims"), which Executive has ever had or now has against the Company Parties, including without limitation, Claims arising out of or in any way related to Executive's relationship with any or all of the Company Parties and all Claims with respect to any aspect of Executive's employment, compensation, or termination from employment by the Company ("Executive Released Claims"). Executive Released Claims include, but are not limited to:

(i) all Claims arising from Executive's employment with the Company or the termination of that employment, including Claims for wrongful termination or retaliation and the terms and conditions of employment;

(ii) all Claims related to Executive's compensation or benefits from the Company, including, salary, wages, overtime, meal and rest breaks, bonuses, commissions, incentive compensation, profit sharing, retirement benefits, paid time off, vacation, sick leave, leaves of absence, expense reimbursements, equity, severance pay, and fringe benefits;

(iii) all Claims for breach of contract, breach of quasi-contract, promissory estoppel, detrimental reliance, and breach of the implied covenant of good faith and fair dealing;

(iv) all tort Claims, including Claims for fraud, defamation, slander, libel, disparagement, negligent or intentional infliction of emotional distress, personal injury, negligence, compensatory or punitive damages, negligent or intentional misrepresentation, and discharge in violation of public policy;

(v) all federal, state, and local statutory Claims, including Claims for discrimination, harassment, retaliation, attorneys' fees, medical expenses, experts' fees, costs and disbursements; and

(vi) any other Claims of any kind whatsoever, arising from the beginning of time until the date Executive signs this Release, in each case whether based on contract, tort, statute, local ordinance, regulation or any comparable law, public policy or common law in any jurisdiction.

By way of example and not in limitation of the foregoing, Executive Released Claims include any Claims arising under Title VII of the Civil Rights Act of 1964, 42 U.S.C. § 2000e *et seq*.; the Civil Rights Act of 1991; the Civil Rights Acts of 1866 and/or 1871, 42 U.S.C. Section 1981; the Americans with Disabilities Act, 42 U.S.C. 12101 *et seq*., the Age Discrimination in Employment Act ("ADEA"), 29 U.S.C. § 621 et seq.; the Family Medical Leave Act, 29 U.S.C. § 2601 *et seq.*; Executive Retirement Income Security Act of 1974 ("ERISA"), 29 U.S.C. § 1001 *et seq.*; the federal Worker Adjustment Retraining Notification Act ("WARN Act"), 29 U.S.C. § 2102 *et seq*., the California WARN Act, California Labor Code § 1400 et seq., the California Fair Employment and Housing Act, Cal. Gov. Code §12900 *et seq*., the California Labor Code and the orders of the California Industrial Welfare Commission. Executive and the Company intend for this release to be enforced to the fullest extent permitted by law. EXECUTIVE UNDERSTANDS AND AGREES THAT THIS RELEASE CONTAINS A GENERAL RELEASE OF ALL CLAIMS.

3. Executive further unconditionally releases and forever discharges the Company Parties from any and all Claims that Executive may have as of the date Executive signs this Release arising under the ADEA. By signing this Release, Executive acknowledges and confirms that: (i) Executive has been advised by the Company to consult with an attorney of Executive's choice before signing this Release; (ii) Executive was given no fewer than twenty-one (21) days to consider the terms of this Release, although Executive may sign it sooner if desired; (iii) Executive is providing this release in exchange for consideration in addition to that to which Executive is already entitled; (iv) Executive has seven (7) days from the date of signing this Release to revoke this Release by providing the Company with a written notice of revocation delivered to Linda Moore, General Counsel and Corporate Secretary, at lmoore@marronebio.com or to the Company's physical address at 1540 Drew Avenue, Davis, California 95618, in a manner reasonably calculated to be received by the Company on or before the end of such seven-day period ("Revocation Period"); (v) this Release will not become effective, until the Revocation Period passes without Executive revoking the Agreement; (vi) the release contained in this paragraph does not apply to rights and claims that may arise after the date on which Executive signs this Release, and (vii) Executive knowingly and voluntarily accepts the terms of this Release. Executive further agrees that any change to this Release, whether material or immaterial, will not restart the twenty-one (21) day period for Executive to consider the terms of this Release.

4. The Releasors and the Company acknowledge that they are aware of the provisions of California Civil Code, Section 1542, which reads as follows:

> "A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS THAT THE CREDITOR OR RELEASING PARTY DOES NOT KNOW OR SUSPECT TO EXIST IN HIS OR HER FAVOR AT THE TIME OF EXECUTING THE RELEASE AND THAT, IF KNOWN BY HIM OR HER WOULD HAVE MATERIALLY AFFECTED HIS OR HER SETTLEMENT WITH THE DEBTOR OR RELEASED PARTY."

The Releasors hereby expressly give up all the benefits of Section 1542 and of any other similar law of this or any other jurisdiction. The Releasors acknowledge that there may exist claims or facts in addition to or different from those which are now known or believed by the Releasors to exist and the Releasors agree that it is their intention to fully settle and release such claims, whether known or unknown, that may exist as of the date of this Release.

5. Notwithstanding anything to the contrary set forth in paragraph 2, 3 or 4 of this Release, the Releasors do not waive, release or discharge the Company Parties from Executive's rights, if any, to vested benefits under the Company's 401(k) retirement plan or with respect to Executive's outstanding equity awards, if any; Executive's rights, if any, to indemnification or advancement of expenses in accordance with the Company's certificate of incorporation, bylaws or other corporate governance document, or any applicable insurance policy or applicable law, including Section 2802 of the California Labor Code; any Claim which may arise in the future from events or actions occurring after the date that Executive executes this Release; Claims for worker's compensation benefits; Claims for unemployment insurance benefits; any Claims that cannot be released in accordance with applicable law; and any rights created by this Release or the Employment Separation Agreement.

6. Executive hereby represents that Executive has not filed or commenced any proceeding against any of the Releasees based upon any Executive Released Claims.

7. Executive warrants that no promise or inducement has been offered for this Release other than as set forth herein and that this Release is executed without reliance upon any other promises or representations, oral or written. Any modification of this Release must be made in writing and be signed by Executive and the Company.

8. If any provision of this Release or compliance by Executive or the Company with any provision of the Release constitutes a violation of any law, or is or becomes unenforceable or void, then such provision, to the extent only that it is in violation of law, unenforceable or void, will be deemed modified to the extent necessary so that it is no longer in violation of law, unenforceable or void, and such provision will be enforced to the fullest extent permitted by law. If such modification is not possible, such provision, to the extent that it is in violation of law, unenforceable or void, will be deemed severable from the remaining provisions of this Release, which provisions will remain binding on both Executive and the Company. This Release is governed by, and construed and interpreted in accordance with the laws of the State of California, without regard to principles of conflicts of law. This Release, together with the Employment Separation Agreement, represents the entire understanding of the Parties with respect to subject matter herein; no oral representations have been made or relied upon by the Parties. The Parties each agrees that any and all disputes arising out of the terms of this Release will be subject to binding arbitration. In the event of a dispute, the parties (or their legal representatives) will promptly confer to select a single arbitrator mutually acceptable to both parties. If the parties cannot agree on an arbitrator, then the moving party may file a demand for arbitration with the Judicial Arbitration and Mediation Services ("JAMS") in San Francisco County, California, who will be selected and appointed consistent with the Employment Arbitration Rules and Procedures of JAMS (the "JAMS Rules"). Any arbitration will be conducted in a manner consistent with the JAMS Rules, supplemented by the California Rules of Civil Procedure. The Parties further agree that the prevailing party in any arbitration will be entitled to injunctive relief in any court of competent jurisdiction to enforce the arbitration award. The Parties hereby agree to waive their right to have any dispute between them resolved in a court of law by a judge or jury. This paragraph will not prevent either party from seeking provisional relief (including a temporary restraining order or preliminary injunction) from any court having jurisdiction over the parties and the subject matter of their dispute relating to Executive's obligations under this Release and the Inventions and Restrictive Covenant Agreement (as defined in the Employment Separation Agreement).

9. No action taken by the Parties hereto, or either of them, either previously or in connection with this Release, shall be deemed or constructed to be: (a) an admission of the truth or falsity of any claims heretofore made; or (b) an acknowledgment or admission by either party of any fault or liability whatsoever to the other party or to any third party.

10. Each of the Company Parties, other than the Company, is intended to be a third party beneficiary of this Release.

[*Signatures appear on following page*]

EXECUTIVE'S ACCEPTANCE OF RELEASE

BEFORE SIGNING MY NAME TO THE RELEASE, I STATE THE FOLLOWING: I HAVE READ THE RELEASE, I UNDERSTAND IT AND I KNOW THAT I AM GIVING UP IMPORTANT RIGHTS. I HAVE OBTAINED SUFFICIENT INFORMATION TO INTELLIGENTLY EXERCISE MY OWN JUDGMENT. I HAVE BEEN ADVISED THAT I SHOULD CONSULT WITH AN ATTORNEY BEFORE SIGNING IT, AND I HAVE SIGNED THE RELEASE KNOWINGLY AND VOLUNTARILY.

Date delivered to Executive: December 1, 2019.

Executed this 1st day of December, 2019.

/s/ Pamela G. Marrone

Pamela G. Marrone

[SIGNATURE PAGE TO GENERAL RELEASE]

Exhibit C

REAFFIRMATION AGREEMENT

This Reaffirmation Agreement (the "Reaffirmation Agreement") is entered into as of [●], 20[●], by and between Pamela Marrone ("Executive") and Marrone Bio Innovations, Inc. (the "Company"). Executive and the Company are sometimes collectively referred to as the "Parties."

1. Executive's employment with the Company terminated on [●], 20[●] (the "Retirement Date").

2. The purpose of this Reaffirmation Agreement is to effectuate the intent and agreement of the Parties as reflected in the General Release between the Parties dated as of [●], 2019 (the "General Release"), by advancing to the execution date of this Reaffirmation Agreement the effective date of Executive's general waiver and release of all Claims against the Released Parties, as set forth in the Release Agreement.

3. In consideration for Executive's execution of this Reaffirmation Agreement and Executive's promises and covenants contained (a) herein and (b) in the Employment Separation Agreement between the Company and Executive (the "Employment Separation Agreement"), the Company agrees to provide to Executive the benefit described in Section 1(f) of the Employment Separation Agreement, subject to the effectiveness of this Release in accordance with paragraph 11 of this Release.

4. Accordingly, with her signature below, Executive, on behalf of herself, her heirs, executors, agents, representatives, and assigns (collectively, the " Releasors"), hereby specifically acknowledges and reaffirms that she the fully acquits, releases, waives and discharges the Company, its and their affiliated, related, parent or subsidiary companies, and its and their predecessors, successors, and present and former officers, directors, committee members, representatives, attorneys, agents or employees (the "Company Parties") from any and all claims, obligations, liabilities, complaints, causes of action, charges, debts, and demands of whatever kind whatsoever, in law or in equity, known or unknown, asserted or unasserted ("Claims"), which Executive has ever had or now has against the Company Parties, including without limitation, Claims arising out of or in any way related to Executive's relationship with any or all of the Company Parties and all Claims with respect to any aspect of Executive's employment, compensation, or termination from employment by the Company ("Executive Released Claims"). Executive Released Claims include, but are not limited to:

(i) all Claims arising from Executive's employment with the Company or the termination of that employment, including Claims for wrongful termination or retaliation and the terms and conditions of employment;

(ii) all Claims related to Executive's compensation or benefits from the Company, including, salary, wages, overtime, meal and rest breaks, bonuses, commissions, incentive compensation, profit sharing, retirement benefits, paid time off, vacation, sick leave, leaves of absence, expense reimbursements, equity, severance pay, and fringe benefits;

(iii) all Claims for breach of contract, breach of quasi-contract, promissory estoppel, detrimental reliance, and breach of the implied covenant of good faith and fair dealing;

(iv) all tort Claims, including Claims for fraud, defamation, slander, libel, disparagement, negligent or intentional infliction of emotional distress, personal injury, negligence, compensatory or punitive damages, negligent or intentional misrepresentation, and discharge in violation of public policy;

(v) all federal, state, and local statutory Claims, including Claims for discrimination, harassment, retaliation, attorneys' fees, medical expenses, experts' fees, costs and disbursements; and

(vi) any other Claims of any kind whatsoever, arising from the beginning of time until the date Executive signs this Release, in each case whether based on contract, tort, statute, local ordinance, regulation or any comparable law, public policy or common law in any jurisdiction.

By way of example and not in limitation of the foregoing, Executive Released Claims include any Claims arising under Title VII of the Civil Rights Act of 1964, 42 U.S.C. § 2000e *et seq*.; the Civil Rights Act of 1991; the Civil Rights Acts of 1866 and/or 1871, 42 U.S.C. Section 1981; the Americans with Disabilities Act, 42 U.S.C. 12101 *et seq*., the Age Discrimination in Employment Act ("ADEA"), 29 U.S.C. § 621 et seq.; the Family Medical Leave Act, 29 U.S.C. § 2601 *et seq.*; Executive Retirement Income Security Act of 1974 ("ERISA"), 29 U.S.C. § 1001 *et seq.*; the federal Worker Adjustment Retraining Notification Act ("WARN Act"), 29 U.S.C. § 2102 *et seq*., the California WARN Act, California Labor Code § 1400 et seq., the California Fair Employment and Housing Act, Cal. Gov. Code §12900 *et seq*., the California Labor Code and the orders of the California Industrial Welfare Commission. Executive and the Company intend for this release to be enforced to the fullest extent permitted by law. EXECUTIVE UNDERSTANDS AND AGREES THAT THIS RELEASE CONTAINS A GENERAL RELEASE OF ALL CLAIMS.

Executive understands and agrees that such waiver and release will be effective as to all Claims arising on or before the date she executes this Reaffirmation Agreement, subject to his effectuation of this Reaffirmation Agreement in the manner set forth in the next Section hereof. Executive further understands and agrees that she will not be entitled to the consideration provided for in Section 1(f) of the Employment Separation Agreement unless and until Executive executes this Reaffirmation Agreement and the Revocation Period described in the next Section hereof passes without Executive revoking this Reaffirmation Agreement.

5. Executive further unconditionally releases and forever discharges the Company Parties from any and all Claims that Executive may have as of the date Executive signs this Reaffirmation Agreement arising under the ADEA. By signing this Reaffirmation Agreement, Executive acknowledges and confirms that: (i) Executive has been advised by the Company to consult with an attorney of Executive's choice before signing this Reaffirmation Agreement; (ii) Executive was given no fewer than twenty-one (21) days to consider the terms of this Reaffirmation Agreement, although Executive may sign it sooner if desired; (iii) Executive is providing the release provided for in in this Reaffirmation Agreement is in exchange for consideration in addition to that to which Executive is already entitled; (iv) Executive has seven (7) days from the date of signing this Reaffirmation Agreement to revoke this Reaffirmation Agreement by providing the Company with a written notice of revocation delivered to Linda Moore, General Counsel and Corporate Secretary, at lmoore@marronebio.com or to the Company's physical address at 1540 Drew Avenue, Davis, California 95618, in a manner reasonably calculated to be received by the Company on or before the end of such seven-day period ("Revocation Period"); (v) this Reaffirmation Agreement will not become effective, until the Revocation Period passes without Executive revoking this Reaffirmation Agreement; (vi) the release contained in this Reaffirmation Agreement does not apply to rights and claims that may arise after the date on which Executive signs this Reaffirmation Agreement, and (vii) Executive knowingly and voluntarily accepts the terms of this Reaffirmation Agreement. Executive further agrees that any change to this Reaffirmation Agreement or the Release Agreement, whether material or immaterial, will not restart the twenty-one (21) day period for Executive to consider the terms of this Reaffirmation Agreement.

6. The Releasors and the Company acknowledge that they are aware of the provisions of California Civil Code, Section 1542, which reads as follows:

> "A GENERAL RELEASE DOES NOT EXTEND TO CLAIMS THAT THE CREDITOR OR RELEASING PARTY DOES NOT KNOW OR SUSPECT TO EXIST IN HIS OR HER FAVOR AT THE TIME OF EXECUTING THE RELEASE AND THAT, IF KNOWN BY HIM OR HER WOULD HAVE MATERIALLY AFFECTED HIS OR HER SETTLEMENT WITH THE DEBTOR OR RELEASED PARTY."

The Releasors hereby expressly give up all the benefits of Section 1542 and of any other similar law of this or any other jurisdiction. The Releasors acknowledge that there may exist claims or facts in addition to or different from those which are now known or believed by the Releasors to exist and the Releasors agree that it is their intention to fully settle and release such claims, whether known or unknown, that may exist as of the date of this Release.

7. Notwithstanding anything to the contrary set forth in paragraph 4, 5 or 6 of this Release, the Releasors do not waive, release or discharge the Company Parties from Executive's rights, if any, to vested benefits under the Company's 401(k) retirement plan or with respect to Executive's outstanding equity awards, if any; Executive's rights, if any, to indemnification or advancement of expenses in accordance with the Company's certificate of incorporation, bylaws or other corporate governance document, or any applicable insurance policy or applicable law, including Section 2802 of the California Labor Code; any Claim which may arise in the future from events or actions occurring after the date that Executive executes this Reaffirmation Agreement; Claims for worker's compensation benefits; Claims for unemployment insurance benefits; any Claims that cannot be released in accordance with applicable law; and any rights created by this Reaffirmation Agreement, the General Release or the Employment Separation Agreement.

8. Executive hereby represents that Executive has not filed or commenced any proceeding against any of the Releasees based upon any Executive Released Claims.

9. Executive warrants that no promise or inducement has been offered for this Reaffirmation Agreement other than as set forth herein and that this Reaffirmation Agreement is executed without reliance upon any other promises or representations, oral or written. Any modification of this Reaffirmation Agreement must be made in writing and be signed by Executive and the Company.

10. If any provision of this Reaffirmation Agreement or compliance by Executive or the Company with any provision of this Reaffirmation Agreement constitutes a violation of any law, or is or becomes unenforceable or void, then such provision, to the extent only that it is in violation of law, unenforceable or void, will be deemed modified to the extent necessary so that it is no longer in violation of law, unenforceable or void, and such provision will be enforced to the fullest extent permitted by law. If such modification is not possible, such provision, to the extent that it is in violation of law, unenforceable or void, will be deemed severable from the remaining provisions of this Reaffirmation Agreement, which provisions will remain binding on both Executive and the Company. This Reaffirmation Agreement is governed by, and construed and interpreted in accordance with the laws of the State of California, without regard to principles of conflicts of law. This Reaffirmation Agreement, together with the Employment Separation Agreement, represents the entire understanding of the Parties with respect to subject matter herein; no oral representations have been made or relied upon by the Parties. The Parties each agrees that any and all disputes arising out of the terms of this Reaffirmation Agreement will be subject to binding arbitration. In the event of a dispute, the parties (or their legal representatives) will promptly confer to select a single arbitrator mutually acceptable to both parties. If the parties cannot agree on an arbitrator, then the moving party may file a demand for arbitration with the Judicial Arbitration and Mediation Services ("JAMS") in San Francisco County, California, who will be selected and appointed consistent with the Employment Arbitration Rules and Procedures of JAMS (the "JAMS Rules"). Any arbitration will be conducted in a manner consistent with the JAMS Rules, supplemented by the California Rules of Civil Procedure. The Parties further agree that the prevailing party in any arbitration will be entitled to injunctive relief in any court of competent jurisdiction to enforce the arbitration award. The Parties hereby agree to waive their right to have any dispute between them resolved in a court of law by a judge or jury. This paragraph will not prevent either party from seeking provisional relief (including a temporary restraining order or preliminary injunction) from any court having jurisdiction over the parties and the subject matter of their dispute relating to Executive's obligations under this Reaffirmation Agreement and the Inventions and Restrictive Covenant Agreement (as defined in the Employment Separation Agreement).

11. No action taken by the Parties hereto, or either of them, either previously or in connection with this Reaffirmation Agreement, shall be deemed or constructed to be: (a) an admission of the truth or falsity of any claims heretofore made; or (b) an acknowledgment or admission by either party of any fault or liability whatsoever to the other party or to any third party.

12. Each of the Company Parties, other than the Company, is intended to be a third party beneficiary of this Reaffirmation Agreement.

[*Signatures appear on following page*]

EXECUTIVE'S ACCEPTANCE OF RELEASE

BEFORE SIGNING MY NAME TO THE REAFFIRMATION AGREEMENT, I STATE THE FOLLOWING: I HAVE READ THE REAFFIRMATION AGREEMENT, I UNDERSTAND IT AND I KNOW THAT I AM GIVING UP IMPORTANT RIGHTS. I HAVE OBTAINED SUFFICIENT INFORMATION TO INTELLIGENTLY EXERCISE MY OWN JUDGMENT. I HAVE BEEN ADVISED THAT I SHOULD CONSULT WITH AN ATTORNEY BEFORE SIGNING THE REAFFIRMATION AGREEMENT, AND I HAVE SIGNED IT KNOWINGLY AND VOLUNTARILY.

Date delivered to Executive: [●], 20[●].

Executed this day of [●], 20[●].

Pamela Marrone

[SIGNATURE PAGE TO REAFFIRMATION AGREEMENT]

Exhibit D

TERMINATION CERTIFICATION

This certificate is issued pursuant to my Employment Separation Agreement (the "**Separation Agreement**") with Marrone Bio Innovations, Inc. ("**Company**") in lieu of the termination certificate required to be delivered pursuant to my Employee Confidential Information and Assignment of Inventions Agreement ("**Employee Agreement**") with the Company. Capitalized terms used and not defined herein shall have the meanings set forth in the Employee Agreement.

This is to certify that I have returned and do not have in my possession, custody, or control any equipment (such as laptop computers, mobile telephone, memory sticks, credit cards, entry cards, identification badges, and keys), or other tangible property belonging to the Company or containing Company Confidential Information, other than my Company-issued cell phone, cell phone number, laptop and iPad. I certify that I have returned all records, data, notes, reports, proposals, lists, correspondence, specifications, drawings, blueprints, sketches, materials, computer programs or listings, other documents or intangible property, or reproductions of any aforementioned items, except for such materials and other Company Confidential Information that exist on my Company-issued cell phone, laptop or iPad. I acknowledge that notwithstanding the Company's agreement that during the Consulting Period (as defined in the Consulting Agreement), I may keep such documents and Company Confidential Information on my cell phone, laptop or iPad (subject to my ongoing obligations under the Employee Agreement and the Consulting Agreement with respect to such documents and Company Confidential Information), the Company reserves the right to require me to return or destroy such documents and Company Confidential Information following the expiration of the Consulting Period.

I further certify that I have complied with all the terms of the Separation Agreement and the Employee Agreement, including the reporting of any Inventions and original works of authorship conceived or developed by me (solely or jointly with others) and covered by the Employee Agreement, all of which Inventions I confirm are reflected in Schedule 1 to this certificate.

I acknowledge my obligation, in compliance with the Employee Agreement, not to disclose any Company Confidential Information including all Company Trade Secrets, proprietary information, know- how, technical data, and financial information that is not publicly known relating to any business of the Company or any of its employees, clients, consultants, or licensees, and not to disclose any third-party confidential information covered by the Employee Agreement.

I also acknowledge my ongoing obligation, in compliance with the Employee Agreement, not to use any Company Trade Secrets (i) to directly or indirectly solicit, induce, recruit, or encourage any of the Company's employees to leave their employment or consultants to leave their consulting assignment, or attempt to do any of the foregoing, either for myself or for any other person or entity; or (ii) to solicit, on my own behalf or on behalf of others, business from any person or entity.

Employee Signature: _____

Printed Name: _____

Date: _____

Schedule 1

List of Inventions

[See attached Excel file]

CONSULTING SERVICES AGREEMENT

This Consulting Services Agreement (the "Agreement"), dated December 1, 2019, is entered into between Pamela Marrone ("Consultant") and Marrone Bio Innovations, Inc., a Delaware corporation (the "Company").

WHEREAS, for the parties' mutual benefit, following Consultant's retirement from service as an employee and Chief Executive Officer of the Company pursuant to that certain Employment Separation Agreement, dated as of December 1, 2019, by and between Consultant and the Company (the "Separation Agreement"), the Company would like to engage the services of Consultant, and Consultant would like to provide consulting services to the Company on the terms set forth below.

NOW, THEREFORE, in consideration of the mutual covenants and premises set forth in this agreement, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the Company and Consultant agree as follows:

1. CONSULTING SERVICES.

a. **Term**. The term of Consultant's service as a consultant to the Company will commence on the day immediately following the Retirement Date (as defined in the Separation Agreement), and will continue for a term of three years thereafter, unless terminated earlier as set forth below, or extended by mutual agreement of the Company and the Consultant (the "Consulting Period").

b. **Services**. Consultant agrees to provide consulting services to the Company as requested by the Chief Executive Officer from time to time during the Consulting Period and reporting to the Chief Executive Officer (the "Services"). The scope, timing and other terms of the Services and related deliverables will be as mutually agreed to between Consultant and the Company's Chief Executive Officer from time to time, each in their sole discretion, but initially such Services shall be as set forth on Exhibit A. Participation in internal meetings at the Company or any subsidiaries or other affiliates (other than meetings of the Company's Board of Directors (the "Board") or any committee's thereof in which Consultant is a member) will be by invitation only. During the Consulting Period, Consultant will have the title of Founder.

2. CONSULTING FEES.

a. **Monthly Consulting Fees**. Subject to Consultant's satisfactory provision of the consulting services during the Consulting Period, Consultant will be paid a consulting fee of $19,583.33 per month (the "Monthly Consulting Fees"), in arrears commencing the month after the Retirement Date.

b. **RSU Grant**. Additionally, as consideration for Consultant's provision of consulting services during the Consulting Period, subject to approval by the Board, the Company will grant Consultant 1,250,000 restricted stock units (the "RSUs") under the Company's 2013 Stock Incentive Plan, as amended (the "Plan"), as soon as practicable after the Retirement Date. The RSUs will vest in 1/3 installments on each of the first three anniversaries of the Retirement Date, subject to Consultant's "Continuous Service" (as that term is defined in the Plan, except that solely with respect to the RSUs described in this paragraph, Consultant's continued service as a Board director without continued service as a consultant shall not be deemed "Continuous Service") through the applicable vesting dates. The RSUs will be granted pursuant to the Company's standard form of time-vesting RSU agreement, provided that the RSUs will settle immediately upon vesting.

c. **Expenses**. Travel expenses reasonably incurred by Consultant directly relating to Consultant's provision of consulting services during the Consulting Period are eligible for reimbursement by the appropriate affiliate with respect to which the consulting services are being performed; provided that such travel expenses are pre-approved by the Company (acting through its Chief Executive Officer) and within the scope of agreed upon consulting activities; and further provided that such expenses are reasonable, properly documented and otherwise in accordance with Company policies for travel expense reimbursement.

d. **No Other Benefits**. During the Consulting Period, Consultant will not be eligible to participate in any vacation, group medical or life insurance, disability, profit sharing or retirement plans (other than with respect to vested benefits as of the Retirement Date, including the COBRA benefits described in the Separation Agreement), or any other fringe benefits or benefit plans offered by the Company to its employees, nor will Consultant be provided an office or office support other than for processing of expenses.

3. TERMINATION

a. **Termination Event under Separation Agreement**. Unless explicitly waived by the Company, this Agreement (and the Consulting Period, if already commenced) shall terminate automatically if there shall have been a Termination Event (as defined in the Separation Agreement).

b. **Termination on Notice**. The Consultant may terminate the Consulting Period prior to the third anniversary of the Retirement Date by providing not less than thirty (30) days advance written notice. The Company may not terminate the Consulting Period or this Agreement except pursuant to Sections 3(a), 3(c), 3(d), 3(e) or 3(f).

c. **Termination in Connection with Change in Control**. The Company may terminate the Consulting Period within eighteen (18) months of the date on which the Company shall have completed a Change in Control, where "Change in Control" shall mean any of the following transactions, provided, however, that the Company shall determine under parts (iii) and (iv) whether multiple transactions are related, and its determination shall be final, binding and conclusive: (i) a merger or consolidation in which the Company is not the surviving entity, except for a transaction the principal purpose of which is to change the state in which the Company is incorporated; (ii) the sale, transfer or other disposition of all or substantially all of the assets of the Company; (iii) any reverse merger or series of related transactions culminating in a reverse merger (including, but not limited to, a tender offer followed by a reverse merger) in which the Company is the surviving entity but (A) the shares of Company common stock outstanding immediately prior to such merger are converted or exchanged by virtue of the merger into other property, whether in the form of securities, cash or otherwise, or (B) in which securities possessing more than fifty percent (50%) of the total combined voting power of the Company's outstanding securities are transferred to a person or persons different from those who held such securities immediately prior to such merger or the initial transaction culminating in such merger, but excluding any such transaction or series of related transactions that the Company determines shall not be a Change in Control; (iv) acquisition in a single or series of related transactions by any person or related group of persons (other than the Company or by a Company-sponsored employee benefit plan) of beneficial ownership (within the meaning of Rule 13d-3 of the Exchange Act) of securities possessing more than fifty percent (50%) of the total combined voting power of the Company's outstanding securities but excluding any such transaction or series of related transactions that the Company determines shall not be a Change in Control; provided that any such transaction must also constitute a "change in the ownership or effective control, or in the ownership of a substantial portion of the assets" (as defined in Section 409A) of the Company.

d. **Default or Breach**. If either party defaults in the performance of this Agreement or the Separation Agreement, or materially breaches any of their respective provisions, the non-breaching party may terminate this Agreement (and the Consulting Period, if then commenced) by giving written notification to the breaching party. Such termination will be effective fifteen days after written notification is provided to the breaching party unless such breach is unable to be cured, in which case no fifteen day notice period shall be required. For purposes of this section, material breach of this Agreement includes, but is not limited to the following: (i) failure of Consultant to materially provide the Services following the commencement of the Consulting Period, (ii) failure of the Company to pay for Consultant's Services within sixty (60) days after receipt of Consultant's written demand for payment when due, or (iii) any failure of Consultant, whether due to bad faith, negligence or otherwise, to comply with Section 1(d) of the Separation Agreement or Section 9(c) of this Agreement regarding Company representation, Section 6 of this Agreement regarding confidential information, or Section 8 of this Agreement regarding non-solicitation.

e. **Duty of Loyalty**. The Company may terminate the Consulting Period immediately if, during the Consulting Period, and during such time as Consultant remains in service as a member of the Board, without the prior written consent of the Company, Consultant performs services for any business operating in the biological agricultural products space, other than the Company or its affiliates, or Ospraie Management, LLC ("Ospraie") or its affiliates (a "Biologicals Business"), provided that the Company's consent is not to be unreasonably withheld if such business is not competitive with the Company and Consultant's service to such business would not be inconsistent with her duty of loyalty to the Company. For the purposes of this Section 3(e), the Company hereby consents to Consultant's continued service as an advisor to Pheronym, Inc. (provided there are no material changes to the scope of such services), as well as her performance of services for any educational or other charitable nonprofit institutions, any mutual benefit organizations in which the Company is a member, for any industry research organizations and for any institutional, private equity, venture capital, sovereign wealth or other financial investor, including Ospraie and its affiliates (but not for any strategic or corporate investor and not for any subsidiary, portfolio company or other investee of any of the foregoing operating in the biological agricultural products space).

f. **Other Termination Grounds**. The Company may terminate the Consulting Period immediately if the Consultant has (i) (x) committed a material breach of any surviving terms of the Employee Confidential Information and Assignment of Inventions Agreement between the Consultant and the Company (the "Inventions and Restrictive Covenant Agreement") or any other material written policy of the Company, or (y) negligently or in bad faith breached the surviving terms of the Inventions and Restrictive Covenant Agreement, whether or not such breach is material, in each case which breach is not cured to the satisfaction of the Chief Executive Officer within fifteen days after written notice of such breach is provided to the Consultant from the Chief Executive Officer (unless the Chief Executive Officer determines that such breach is unable to be cured, in which case no fifteen day notice period shall be required), (ii) been indicted for any felony or convicted of a crime involving dishonesty or physical harm to any person, (iii) engaged in dishonesty, unethical conduct, gross negligence or willful misconduct in the performance of her duties to the Company which has resulted in, or is reasonably expected to result in, material injury to the business or reputation of the Company, (iv) engaged in conduct which constitutes a material violation of federal or state law relating to the Company or its business, (v) misappropriated assets of the Company or (viii) been under the influence of alcohol or illegal drugs (or has engaged in abusive use of legal drugs) in performing the Services.

g. **Effect of Termination**. If this Agreement becomes automatically terminated pursuant to Section 3(a), the Consulting Period will not commence or, if commenced, will automatically terminate, the Parties will have no rights or obligations under Section 1, and all of Consultant's then-unvested RSUs and all of Consultant's unexercised stock options (whether or not vested) will immediately be forfeited and Consultant will have no further rights with respect to such awards. If Consultant terminates the Consulting Period pursuant to Section 3(b), Consultant will not be entitled to any further Monthly Consulting Fees, all of Consultant's unvested RSUs granted pursuant to Section 2(b) of this Agreement will immediately be forfeited, and the treatment of Consultant's other equity awards will be governed by the terms of the applicable award agreement and plan pursuant to which the restricted stock units and other equity awards were granted, with no accelerated vesting due to the termination. If the Company terminates this Agreement pursuant to Section 3(c), or if Consultant terminates the Consulting Period pursuant to Section 3(d), Consultant will receive a lump sum payment within sixty (60) days of such event equal to the sum of the then remaining Monthly Consulting Fees payable under this Agreement through the third anniversary of the Retirement Date and all of Consultant's unvested RSUs granted pursuant to Section 2(b) of this Agreement will become immediately vested and settle and her vested stock options shall remain outstanding and be exercisable via cashless "net exercise" until three months after the later of (i) Consultant's termination of service as a director and (ii) the third anniversary of the Retirement Date. If the Company terminates the Consulting Period pursuant to Section 3(d) or Section 3(f), Consultant will not be entitled to any further Monthly Consulting Fees, all of Consultant's unvested RSUs granted pursuant to Section 2(b) of this Agreement and all of Consultant's unexercised stock options (whether or not vested) will immediately be forfeited and Consultant will have no further rights with respect to such awards. If the Company terminates the Consulting Period pursuant to Section 3(e), Consultant will not be entitled to any further Monthly Consulting Fees, and all of Consultant's unvested RSUs granted pursuant to Section 2(b) of this Agreement will immediately be forfeited and Consultant will have no further rights with respect to such awards, and all of Consultant's unvested stock options will immediately cease vesting and shall terminate within 90 days of the termination of the Consulting Period. The provisions of Sections 3 through 17 of this Agreement shall survive any termination of the Consulting Period or this Agreement.

4. RELATIONSHIP OF THE PARTIES AND CONSULTANT COVENANTS.

a. **Independent Contractor Status**. Consultant will perform the Services as an independent contractor (not an employee). During the Consulting Period, Consultant shall not have, nor shall Consultant hold herself out as having, any authority to create any contract or obligation, express or implied, which is binding upon the Company. Consultant agrees that she will not at any time, before any court, tribunal, administrative body or governmental agency or authority, assert or attempt to assert an employment relationship with the Company following the Retirement Date.

b. **Standard of Care**. Consultant shall comply with all applicable laws in connection with or related to the performance of the Services, and will perform the Services professionally and with due care.

5. DEFENSE AND INDEMNITY.

a. **Indemnification of Company by Consultant**. Consultant agrees to indemnify, defend, and hold harmless the Company, and the Company's officers, directors, employees and shareholders, from and against any and all claims, demands, losses, costs, expenses, obligations, liabilities, damages, recoveries, and deficiencies, including interest, penalties, and reasonable attorney fees and costs (collectively, "Claims"), that the Company may incur or suffer that result from, or are related to, any breach or failure of Consultant to perform any of the covenants, representations, warranties, and agreements in this Agreement.

b. **Indemnification of Consultant by Company**. The Company agrees to indemnify, defend, and hold harmless the Consultant from and against any and all Claims that Consultant may incur or suffer arising from the performance of any Services requested by the Chief Executive Officer of the Company, except to the extent arising from Consultant's gross negligence, reckless or willful misconduct, or breach or failure to perform any of the covenants, representations, warranties, and agreements in this Agreement.

6. CONFIDENTIAL INFORMATION.

a. **Confidentiality; Limited Use**. Consultant acknowledges that she is presently in possession of Confidential Information of the Company, and that the Company and its affiliates may disclose Confidential Information to Consultant to enable her to perform the Services. Consultant agrees that, except as required by law, regulatory directive, or judicial order, she will not, without the prior written consent of the Company, during the Consulting Period or at any time thereafter, disclose or permit to be disclosed to any third party by any method whatsoever any Confidential Information of the Company or any of its affiliates, or use, lecture upon or publish any of the Confidential Information, except to the extent such disclosure, use or publication may be required in direct connection with Consultant's performing requested Services for the Company or is expressly authorized in writing by the Chief Executive Officer of the Company. In addition, Consultant understands that the Company has received and in the future will receive from third parties confidential or Confidential Information ("Third Party Information") subject to a duty on the Company's part to maintain the confidentiality of such information and to use it only for certain limited purposes. During the Consulting Period and thereafter, Consultant will hold Third Party Information in the strictest confidence and will not disclose or use Third Party Information, except in connection with Consultant's performing requested Services for the Company, or as expressly authorized in writing by the Chief Executive Officer of the Company. For purposes of this Agreement, "Confidential Information" shall include, but not be limited to, any and all trade secrets, records, notes, memoranda, data, ideas, processes, methods, techniques, systems, formulas, patents, models, devices, programs, computer software, writings, research, personnel information, customer information, or financial information of the Company or any of its affiliates, plans, or any other information of whatever nature in the possession or control of the Company which has not been published or disclosed to the general public (other than by acts of Consultant or her agents in violation of this Agreement), or which gives to the Company or any of its affiliates an opportunity to obtain an advantage over competitors who do not know of or use it.

b. **No Improper Use of Materials**. Consultant agrees not to bring to the Company or to use in the performance of Services for the Company any materials or documents obtained by Consultant from a third party under a binder of confidentiality, unless such materials or documents are generally available to the public or Consultant has authorization from such third party for the possession and unrestricted use of such materials.

c. **Return of Property**. Upon termination of the Consulting Period for any reason, Consultant shall be obligated to promptly return to the Company—and not retain any copies of—all the Company property, including, without limitation, all documents and data in whatever form maintained, Confidential Information, Third Party Information, computer hardware or software, files, papers, memoranda, correspondence, client lists, employee information, financial records and information, credit cards, keys, access cards, tape recordings, pictures and any other items of any nature which were or are the property of the Company (provided that Consultant will be permitted to keep her Company-issued cell phone, cell phone number, laptop and iPad).

7. ASSIGNMENT OF INTELLECTUAL PROPERTY.

a. **Inventions.** Consultant agrees that any and all ideas, inventions, discoveries, improvements, know-how and techniques that the Consultant conceives, reduces to practice or develops (a) during the Consulting Period, alone or in conjunction with others, during or as a result of specifically in connection with and pertinent to performing the Services for the Company under this Agreement or (b) if arising out of access or use to, or based in whole or in part on, Confidential Information, after termination of the Consulting Period (collectively, the "Inventions") shall be the sole and exclusive property of the Company.

b. **Unrelated Inventions**. For the avoidance of doubt, Inventions shall not include any Inventions that do not principally relate to the Company's business, expertise and skills and that can be used, subject to Sections 6, 8 and 9(a) hereof, in other contexts without negative impact on the Company's business or operations ("Unrelated Inventions"), provided that Consultant agrees that if, in the course of performing the Services, Consultant incorporates into any Unrelated Invention developed under this Agreement, Consultant hereby grants the Company a perpetual, irrevocable, fully paid-up, royalty-free, transferable, sublicensable (through multiple levels of sublicensees), worldwide right and license to reproduce, distribute, display and perform (whether publicly or otherwise), prepare derivative works of and otherwise modify, make, have made, sell, offer to sell, import and otherwise use and exploit (and have others exercise such rights on behalf of the Company) all or any portion of such Unrelated Invention in connection with developing, enhancing, marketing, distributing or providing, maintaining or supporting, or otherwise using or exploiting, Company products and services, in any form or media (now known or later developed), without any obligation to account to Consultant or any third party.

c. **Assignment**. Consultant hereby assigns and agrees to assign to the Company to the fullest extent permitted by law all right, title and interest in and to all Inventions. Consultant hereby designates the Company as her agent for, and grants to the Company a power of attorney with full power of substitution, which power of attorney shall be deemed coupled with an interest, solely for the purpose of effecting the foregoing assignments from the Consultant to the Company.

d. **Cooperation**. Consultant further agrees to cooperate and provide reasonable assistance to the Company to obtain and from time to time enforce United States and foreign patents, copyrights, and other rights and protections claiming, covering or relating to the Inventions in any and all countries including, without limitation,

i. promptly notifying the Company in writing of full details of any Inventions in particular to enable Company to file for patent rights with the earliest possible priority date;

ii. doing all such acts and things and sign all such deeds and documents as may be necessary to vest full right, title and interest in and to any Inventions;

iii. not to registering nor attempting to register any registerable rights in the Confidential Information or Inventions unless requested to do so by Company; and

iv. keeping proper notes and records of the conception or generation of any Confidential Information or Inventions.

e. **Publications**. Consultant agrees to submit to the Company any proposed publication that contains any discussion relating to the Company's Confidential Information, Inventions or work performed by Consultant for the Company hereunder. Consultant further agrees that no such publication shall be made without the prior written consent of the Company, which consent shall not be unreasonably withheld. Any such consent shall be given with sixty (60) days.

f. **Full and Adequate Consideration**. Consultant acknowledges that no further remuneration or compensation other than that provided for in this Agreement is or may become due to Consultant in respect of the performance of the obligations under this Section 7.

8. NON-SOLICITATION. Consultant agrees that, during the period commencing on the Effective Date and ending on the later of (i) the termination of the Consulting Period and (ii) the termination of Consultant's service as a Board director, Consultant shall not, in any capacity, whether for her own account or on behalf of any other person or organization, directly or indirectly, with or without compensation, (A) solicit, divert or encourage any officers, directors, employees, agents, consultants or representatives of the Company (including any subsidiary or other affiliate), to terminate his, her or its relationship with the Company (including any subsidiary or other affiliate), (B) hire any such officer, director, employee, consultant or representative so solicited, diverted or encouraged, or (C) solicit, divert or encourage any officers, directors, employees, agents, consultants or representatives of the Company (including any subsidiary or other affiliate) to become officers, directors, employees, agents, consultants or representatives of another business, enterprise or entity; provided, that solicitations incidental to general advertising or other general solicitations in the ordinary course not specifically targeted at such persons and employment of any person not otherwise solicited in violation hereof shall not be considered a violation of this Section 8. In addition, Consultant shall not be in violation of this Section 8 solely by providing a reference for a former employee of the Company.

9. OTHER OBLIGATIONS.

a. **No Conflicts**. Consultant represents that her performance of all of the terms of this Agreement and the performing of the Services for the Company do not and will not breach or conflict with any agreement with a third party, including an agreement to keep in confidence any Confidential Information (defined below) of another entity acquired by Consultant in confidence or in trust prior to the date of this Agreement. Consultant hereby agrees not to enter into any agreement that conflicts with this Agreement, and, in order to enable the Company to confirm and monitor compliance with the terms of this Section 9(a), the other terms of this Agreement and the surviving terms of the Inventions and Restrictive Covenants Agreement, Consultant agrees to provide the Company with fifteen (15) days' notice prior to performing, or entering into an agreement to perform, services for any Biologicals Business.

b. **Litigation Cooperation**. Consultant agrees that Consultant will cooperate fully with the Company in connection with any existing or future litigation involving the Company, whether administrative, civil or criminal in nature, in which and to the extent the Company deems Consultant's cooperation necessary. The Company shall pay all reasonable, documented travel and other expenses incurred by the Consultant in connection therewith as long as such expenses and costs are approved in advance in writing by the Company.

c. **No Representation of Company**. With the exception of the duties and responsibilities set forth in this Agreement and Consultant's duties and responsibilities as a member of the Board, Consultant acknowledges and agrees that will not have the authority to bind the Company or any of its subsidiaries or other affiliates.

10. ENTIRE AGREEMENT. The Company and Consultant each represents and warrants that no promise or inducement has been offered or made except as herein set forth and that the consideration stated herein is the sole consideration for this Agreement. This Agreement (including the exhibits hereto) constitute the complete and entire agreement, and states fully all agreements, understandings, promises and commitments between the Company and Consultant relating to the subject matter hereof. This Agreement supersedes and cancels any and all other negotiations, understandings and agreements, oral or written, respecting the subject matter hereof, including, without limitation, any offer letters, change in control agreements or other employment agreements between Consultant and the Company or any of its subsidiaries or other affiliates (other than the Inventions and Restrictive Covenant Agreement, which remains in full force and effect to the extent by its terms it survives termination of Consultant's employment, and other than the third sentence of Paragraph 8(a) of the Inventions and Restrictive Covenant Agreement, which the Company hereby waives), provided, for the avoidance of doubt, that this Agreement does not supersede or cancel the Separation Agreement. This Agreement may not be modified except by an instrument in writing signed by the party against whom the enforcement of any waiver, change, modification, or discharge is sought.

11. ASSIGNABILITY; SUCCESSORS; GOVERNING LAW. This Agreement is personal to Consultant, and Consultant may not assign, pledge, delegate or otherwise transfer to any person or entity any of Consultant's rights, obligations or duties under this Agreement. Any successor to the Company (whether direct or indirect and whether by purchase, merger, consolidation, liquidation or otherwise) to all or substantially all of the Company's business and/or assets will assume the obligations under this Agreement to the same extent as the Company would be required to perform such obligations in the absence of a succession. For all purposes under this Agreement, the term "Company" will include any successor to the Company's business and/or assets, regardless of whether such party executes and delivers any assumption agreement, or any other successor that becomes bound by the terms of this Agreement by operation of law. This Agreement shall be governed by, construed in accordance with, and enforced pursuant to the laws of the State of California without regard to principles of conflict of laws. Consultant consents to venue and personal jurisdiction in the appropriate state of federal court in California for disputes arising under this Agreement.

12. ENFORCEABILITY. Each of the covenants and agreements set forth in this Agreement are separate and independent covenants, each of which has been separately bargained for and the parties hereto intend that the provisions of each such covenant shall be enforced to the fullest extent permissible. Should the whole or any part or provision of any such separate covenant be held or declared invalid, such invalidity shall not in any way affect the validity of any other such covenant or of any part or provision of the same covenant not also held or declared invalid. If any covenant shall be found to be invalid but would be valid if some part thereof were deleted or the period or area of application reduced, then such covenant shall apply with such minimum modification as may be necessary to make it valid and effective. The failure of either party at any time to require performance by the other party of any provision hereunder will in no way affect the right of that party thereafter to enforce the same, nor will it affect any other party's right to enforce the same, or to enforce any of the other provisions in this Agreement; nor will the waiver by either party of the breach of any provision hereof be taken or held to be a waiver of any prior or subsequent breach of such provision or as a waiver of the provision itself.

13. ARBITRATION. The Company and Consultant each agrees that any and all disputes arising out of the terms of this Agreement and any of the matters herein released, will be subject to binding arbitration. In the event of a dispute, the parties (or their legal representatives) will promptly confer to select a single arbitrator mutually acceptable to both parties. If the parties cannot agree on an arbitrator, then the moving party may file a demand for arbitration with the Judicial Arbitration and Mediation Services ("JAMS") in San Francisco County, California, who will be selected and appointed consistent with the Comprehensive Arbitration Rules and Procedures of JAMS (the "JAMS Rules"). Any arbitration will be conducted in a manner consistent with the JAMS Rules, supplemented by the California Rules of Civil Procedure. The parties further agree that the prevailing party in any arbitration will be entitled to injunctive relief in any court of competent jurisdiction to enforce the arbitration award. The parties hereby agree to waive their right to have any dispute between them resolved in a court of law by a judge or jury. This paragraph will not prevent either party from seeking provisional relief (including a temporary restraining order or preliminary injunction) from any court having jurisdiction over the parties and the subject matter of their dispute relating to Consultant's obligations under this Agreement and the Company's form of confidential information agreement.

14. COUNTERPARTS. This Agreement may be executed in counterparts, each of which together constitute one and the same instrument. Signatures delivered by facsimile or email PDF shall be effective for all purposes.

15. NOTICES. Notices and all other communications contemplated by this Agreement will be in writing and will be deemed to have been duly given when personally delivered or when mailed by U.S. registered or certified mail, return receipt requested and postage prepaid. In the case of Consultant, mailed notices will be addressed to her at the home address which she most recently communicated to the Company in writing. In the case of the Company, mailed notices will be addressed to its corporate headquarters, and all notices will be directed to the attention of the Company's Chief Executive Officer or General Counsel.

16. NO CONSTRUCTION AGAINST DRAFTER. No provision of this Agreement or any related document will be construed against or interpreted to the disadvantage of any party hereto by any court or other governmental or judicial authority by reason of such party having or being deemed to have structured or drafted such provision.

17. TAXES.

a. Notwithstanding anything to the contrary in this Agreement, the Company may withhold from all amounts payable under this Agreement all federal, state, local and foreign taxes that are required to be withheld pursuant to any applicable laws and regulations; however, the Company will not be responsible for withholding or paying any income, payroll, or other applicable taxes, making any insurance contributions, including for unemployment or disability, or obtaining workers' compensation insurance on Consultant's behalf with respect to any compensation or benefits provided for Consultant's services as a consultant. Notwithstanding the foregoing, Consultant shall be responsible for the payment of Consultant's portion of any and all required federal, state, local and foreign taxes incurred, or to be incurred, in connection with any amounts payable to Consultant under this Agreement, and in no event will Consultant be entitled to any reimbursement, gross-up, indemnification or other reimbursement for any taxes Consultant may incur under this Agreement or otherwise in connection with services provided to the Company or any subsidiary or other affiliate thereof.

b. Notwithstanding anything to the contrary in this Agreement:

i. Consultant and the Company agree that this Agreement shall be interpreted to comply with or be exempt from Section 409A of the Internal Revenue Code of 1986, as amended, and the regulations and authoritative guidance promulgated thereunder to the extent applicable (collectively "Section 409A"), and all provisions of this Agreement shall be construed in a manner consistent with the requirements for avoiding taxes or penalties under Section 409A. However, the Company makes no representation that any or all of the payments described in this Agreement will be exempt from or comply with Section 409A and makes no undertaking to preclude Section 409A from applying to any such payment. Consultant understands and agrees that Consultant shall be solely responsible for the payment of any taxes, penalties, interest or other expenses incurred by Consultant on account of noncompliance with Section 409A and in no event will the Company, any of its subsidiaries or other affiliates, or any of their respective directors, officers, agents, attorneys, employees, executives, shareholders, investors, members, managers, trustees, fiduciaries, representatives, principals, accountants, insurers, successors or assigns be liable for any additional tax, interest or penalties that may be imposed on the Consultant under Section 409A or any damages for failing to comply with Section 409A.

ii. Payments pursuant to this Agreement are intended to constitute separate payments for purposes of Treasury Regulation Section 1.409A-2(b)(2)(i) and Monthly Consulting Fee payments pursuant to Section 2(a) of this Agreement are intended to constitute a series of separate payments for purposes of Treasury Regulation Section 1.409A-2(b)(2)(iii). All reimbursements for costs and expenses under this Agreement shall be paid in no event later than the end of the calendar year following the calendar year in which the Consultant incurs such expense. With regard to any provision herein that provides for reimbursement of costs and expenses or in-kind benefits, except as permitted by Section 409A, (i) the right to reimbursement or in-kind benefits shall not be subject to liquidation or exchange for another benefit, and (ii) the amount of expenses eligible for reimbursements or in-kind, benefits provided during any taxable year shall not affect the expenses eligible for reimbursement or in-kind benefits to be provided in any other taxable year.

[*Signatures appear on following page*]

The parties have duly executed this Consulting Services Agreement as of the date first written above.

MARRONE BIO INNOVATIONS, INC.

By *[/s/ Robert Woods]*
Name: Robert Woods
Title: Chairman of the Board

CONSULTANT

By: *[/s/ Pamela G. Marrone]*
Pamela G. Marrone

Exhibit A

INITIAL SCOPE OF SERVICES

***

Exhibit 21.1

LIST OF SUBSIDARIES OF MARRONE BIO INNOVATIONS, INC.

Marrone Bio Innovations, Inc. (Delaware)
Marrone Michigan Manufacturing, LLC (Michigan)
Pro Farm Inc. (Delaware)
Pro Farm Technologies Oy (Finland)
Pro Farm International Oy (Finland)
Pro Farm OU (Estonia)
Pro Farm Technogies Comercio de Insumos Agricolas do Braisil Ltda.(Brazil)
Glinatur SA (Uruguay)
Pro Farm Russia, LLC. (Russia)

Exhibit 23.1

INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM'S CONSENT

We consent to the incorporation by reference in the Registration Statement of Marrone Bio Innovations, Inc. on Form S-8 (File No.'s 333-191048, 333-219981, 333-222846, 333-225401, 333-229859 and 333-232039) of our report which includes an explanatory paragraph as to the Company's ability to continue as a going concern, dated March 16, 2020, with respect to our audits of the consolidated financial statements of Marrone Bio Innovations, Inc. as of December 31, 2019 and 2018 and for the each of the two years in the period ended December 31, 2019 and our report dated March 16, 2020 with respect to our audit of the effectiveness of internal control over financial reporting of Marrone Bio Innovations, Inc. as of December 31, 2019, which reports are included in this Annual Report on Form 10-K of Marrone Bio Innovations, Inc. for the year ended December 31, 2019.

Our report on the consolidated financial statements refers to a change in the method of accounting for leases effective January 1, 2019, due to the adoption of Accounting Standards Update No. 2016-02, *Leases (Topic 842), as amended*.

/s/ Marcum llp

Marcum llp
San Francisco, CA
March 16, 2020

Exhibit 31.1

I, Pamela G. Marrone, certify that:

1. I have reviewed this Annual Report on Form 10-K of Marrone Bio Innovations, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a–15(e) and 15d–15(e)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 16, 2020

/s/ Pamela G. Marrone

Pamela G. Marrone
Chief Executive Officer

Exhibit 31.2

I, James B. Boyd, certify that:

1. I have reviewed this Annual Report on Form 10-K of Marrone Bio Innovations, Inc.;

2. Based on my knowledge, this report does not contain any untrue statement of a material fact or omit to state a material fact necessary to make the statements made, in light of the circumstances under which such statements were made, not misleading with respect to the period covered by this report;

3. Based on my knowledge, the financial statements, and other financial information included in this report, fairly present in all material respects the financial condition, results of operations and cash flows of the registrant as of, and for, the periods presented in this report;

4. The registrant's other certifying officer(s) and I are responsible for establishing and maintaining disclosure controls and procedures (as defined in Exchange Act Rules 13a–15(e) and 15d–15(e)) for the registrant and have:

(a) Designed such disclosure controls and procedures, or caused such disclosure controls and procedures to be designed under our supervision, to ensure that material information relating to the registrant, including its consolidated subsidiaries, is made known to us by others within those entities, particularly during the period in which this report is being prepared;

(b) Designed such internal control over financial reporting, or caused such internal control over financial reporting to be designed under our supervision, 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;

(c) Evaluated the effectiveness of the registrant's disclosure controls and procedures and presented in this report our conclusions about the effectiveness of the disclosure controls and procedures, as of the end of the period covered by this report based on such evaluation; and

(d) Disclosed in this report any change in the registrant's internal control over financial reporting that occurred during the registrant's most recent fiscal quarter (the registrant's fourth fiscal quarter in the case of an annual report) that has materially affected, or is reasonably likely to materially affect, the registrant's internal control over financial reporting; and

5. The registrant's other certifying officer(s) and I have disclosed, based on our most recent evaluation of internal control over financial reporting, to the registrant's auditors and the audit committee of the registrant's board of directors (or persons performing the equivalent functions):

(a) All significant deficiencies and material weaknesses in the design or operation of internal control over financial reporting which are reasonably likely to adversely affect the registrant's ability to record, process, summarize and report financial information; and

(b) Any fraud, whether or not material, that involves management or other employees who have a significant role in the registrant's internal control over financial reporting.

Date: March 16, 2020

/s/ James B. Boyd

James B. Boyd
President and Chief Financial Officer

Exhibit 32.1

CERTIFICATION OF CHIEF EXECUTIVE OFFICER AND CHIEF FINANCIAL OFFICER
PURSUANT TO
18 U.S.C. SECTION 1350,
AS ADOPTED PURSUANT TO
SECTION 906 OF THE SARBANES-OXLEY ACT OF 2002

I, Pamela G. Marrone, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that the Annual Report of Marrone Bio Innovations, Inc. on Form 10-K for the fiscal year ended December 31, 2019 fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in such Annual Report on Form 10-K fairly presents in all material respects the financial condition and results of operations of Marrone Bio Innovations, Inc.

Date: March 16, 2020

By: */s/ Pamela G. Marrone*
Name: Pamela G. Marrone
Title: Chief Executive Officer

I, James B. Boyd, certify, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002, that the Annual Report of Marrone Bio Innovations, Inc. on Form 10-K for the fiscal year ended December 31, 2019 fully complies with the requirements of Section 13(a) or 15(d) of the Securities Exchange Act of 1934 and that information contained in such Annual Report on Form 10-K fairly presents in all material respects the financial condition and results of operations of Marrone Bio Innovations, Inc.

Date: March 16, 2020

By: */s/ James B. Boyd*
Name: James B. Boyd
Title: President and Chief Financial Officer

This certification accompanies this Report on Form 10-K pursuant to Section 906 of the Sarbanes-Oxley Act of 2002 and shall not be deemed filed by the Company for purposes of Section 18 of the Securities Exchange Act of 1934, as amended (the Exchange Act). Such certification will not be deemed to be incorporated by reference into any filing under the Securities Act of 1933, as amended, or the Exchange Act, except to the extent that the Company specifically incorporates it by reference.