

UNITED STATES
SECURITIES AND EXCHANGE COMMISSION
Washington, D.C. 20549

FORM 10-K

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

For the fiscal year ended December 31, 2017

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 000-50791

Senomyx, Inc.

(Exact name of registrant as specified in its charter)

Delaware
(State or other jurisdiction of incorporation or organization)

33-0843840
(I.R.S. Employer Identification No.)

4767 Nexus Centre Drive
San Diego, California 92121
(Address of principal executive offices) (Zip Code)

(858) 646-8300
(Registrant's telephone number, including area code)

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

<u>Title of Each Class</u>	<u>Name of Exchange on Which Registered</u>
Common Stock, par value \$0.001 per share	The NASDAQ Stock Market LLC

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

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

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

Indicate by check mark whether the registrant has submitted electronically and posted on its corporate Web site, if any, every Interactive Data File required to be submitted and posted pursuant to Rule 405 of Regulation S-T (§ 232.405) during the preceding 12 months (or for such shorter period that the registrant was required to submit and post such files). Yes No

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

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, 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 Non-accelerated filer Smaller reporting company 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

As of June 30, 2017, the aggregate market value of the voting stock held by non-affiliates of the registrant, computed by reference to the last sale price of such stock as of such date on the NASDAQ Stock Market LLC, was approximately \$33,207,000. Excludes an aggregate of 7,505,594 shares of common stock held by officers and directors and by each person known by the registrant to own 5% or more of the outstanding common stock as of June 30, 2017. Exclusion of shares held by any of these persons should not be construed to indicate that such person possesses the power, direct or indirect, to direct or cause the direction of the management or policies of the registrant, or that such person is controlled by or under common control with the registrant.

As of February 27, there were 47,786,793 shares of the registrant's common stock outstanding.

DOCUMENTS INCORPORATED BY REFERENCE

Portions of the registrant's definitive Proxy Statement for the 2018 Annual Meeting of Stockholders, to be filed with the Securities and Exchange Commission pursuant to Regulation 14A not later than 120 days after the end of the fiscal year covered by this Form 10-K, are incorporated by reference in Part III, Items 10-14 of this Form 10-K.

Senomyx, Inc.

Form 10-K

For the Fiscal Year Ended December 31, 2017

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SPECIAL NOTE REGARDING FORWARD-LOOKING STATEMENTS

This annual report on Form 10-K contains forward-looking statements within the meaning of Section 27A of the Securities Act of 1933, as amended, and Section 21E of the Securities Exchange Act of 1934, as amended. All statements included or incorporated by reference in this annual report on Form 10-K other than statements of historical fact, are forward-looking statements. You can identify these and other forward-looking statements by the use of words such as “may,” “will,” “could,” “anticipate,” “expect,” “intend,” “believe,” “continue” or the negative of such terms, or other comparable terminology. Forward-looking statements also include the assumptions underlying or relating to such statements.

Our actual results could differ materially from those anticipated in these forward-looking statements as a result of various factors, including those set forth below under the caption “Risk Factors” in Part I Item 1A and “Management’s Discussion and Analysis of Financial Condition and Results of Operations” in Part II Item 7 of this annual report on Form 10-K and elsewhere in this annual report on Form 10-K. Readers are cautioned not to place undue reliance on forward-looking statements. The forward-looking statements speak only as of the date on which they are made and we undertake no obligation to update such statements to reflect events that occur or circumstances that exist after the date on which they are made except as required by law.

PART I

Item 1. *Business*

Overview

We use proprietary taste receptor technologies to discover, develop and commercialize innovative flavor ingredients and natural high intensity sweeteners, or HIS, primarily for the packaged food, beverage and ingredient supply industries. We consider flavor ingredients to include flavors that impart a taste, such as savory and cooling, and flavors with modifying properties, such as sweet and salt taste modifiers and bitter blockers. Flavors with modifying properties is a term used by the flavor industry to describe ingredients that function as part of a flavor system to enhance the taste profile in a variety of food and beverages. We sometimes refer to these flavors with modifying properties as “modifiers.” We believe our flavor ingredients and natural HIS will enable packaged food, beverage and ingredient supply companies to improve the nutritional profile (e.g., reduce calories) of their products while maintaining or improving taste and, in certain cases, generating cost of goods savings.

Historically, we have derived our revenues from collaborative agreements by licensing our flavor ingredients to our collaborators on an exclusive or co-exclusive basis. As our technology has evolved and as we have demonstrated our ability to discover and develop novel flavor ingredients and natural HIS, we have transitioned to primarily non-exclusive licensing arrangements. We expect most future licenses of our flavor ingredients and natural HIS to be licensed to third-party collaborators on a non-exclusive basis. Non-exclusive collaborations provide our collaborators with access to our proprietary technology and products while not encumbering the commercial potential of the products we develop. We currently have collaborative agreements with several of the world’s leading packaged food, beverage and ingredient companies, including Ajinomoto Co., Inc., or Ajinomoto, Firmenich SA, or Firmenich, and PepsiCo, Inc., or PepsiCo. Depending upon the collaboration, our collaboration agreements historically have provided license fees, research and development funding, reimbursement of certain costs, milestone payments based upon our achievement of research or development goals and, in the event of commercialization, commercial milestones, minimum periodic royalties and/or royalties on sales of products incorporating our flavor ingredients.

In addition to revenues from collaborative agreements, we have a complementary commercialization strategy whereby we sell certain of our flavor ingredients directly to flavor companies for re-sale to their food and beverage company customers. The flavor companies add value by incorporating our ingredients into proprietary flavor systems, which include a combination or variety of flavor ingredients, for their customers. We also have the ability to sell certain of our flavor ingredients directly to food, beverage, consumer product and pharmaceutical customers. To support this direct sales program, we have established relationships with third party manufacturers. Our commercial revenues under the direct sales program are generated from sales of our flavor ingredients to flavor companies and other customers.

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Individuals experience the sensation of taste when food and beverage products interact with taste receptors in the mouth. A taste receptor functions either by physically binding to a flavor ingredient in a process analogous to the way a key fits into a lock or by acting as a channel to allow ions to flow directly into a taste cell. As a result of these interactions, signals are sent to the brain where a specific taste sensation is registered. There are currently five recognized primary tastes: sweet, umami (which is the savory taste of glutamate), bitter, salt and sour. In addition, there are secondary taste sensations, such as cool, hot and fat.

We are currently pursuing the discovery, development and/or commercialization of our flavor ingredients through five programs focused on sweet, savory, bitter, cooling and salt taste areas. Currently, the primary goals of our sweet taste program are the discovery, development and/or commercialization of both natural HIS and flavor modifiers that allow our customers to maintain the desired sweet taste in consumer products that have a significant reduction in sweeteners. The current goals of our savory flavor program are to commercialize our portfolio of novel flavor ingredients that mimic the taste of naturally occurring glutamate to enable the reduction or replacement of added monosodium glutamate, or MSG, and to provide new savory tastes to foods by combining our savory flavor ingredients with other ingredients to create unique new flavors. The current goal of our bitter blocker program is to support commercialization of our bitter blocker BB68 for use in products that reduce or block bitter taste to improve the overall taste characteristics of packaged foods, beverages, over the counter, or OTC, health care products and pharmaceutical products. The goal of our cooling taste program is to support the commercialization of novel cooling flavor ingredients that have advantages over currently available flavor ingredients for a variety of applications. The goal of our salt taste program is to validate a taste-related protein as a screening target to identify flavor ingredients that allow a significant reduction of sodium in foods and beverages yet maintain the salty taste desirable to consumers.

We were incorporated in September 1998 in Delaware. Our internet address is www.senomyx.com. We post links on our website to the following filings as soon as reasonably practicable after they are electronically filed with or furnished to the Securities and Exchange Commission, or SEC: annual reports on Form 10-K, quarterly reports on Form 10-Q, current reports on Form 8-K and any amendment to those reports filed or furnished pursuant to Section 13(a) or 15(d) of the Securities Exchange Act of 1934, as amended. All such filings are available through our website free of charge. Our filings may also be read and copied at the SEC's Public Reference Room at 100 F Street, NE Washington, DC 20549. Information on the operation of the Public Reference Room may be obtained by calling the SEC at 1-800-SEC-0330. The SEC also maintains an Internet website that contains reports, proxy and information statements, and other information regarding issuers that file electronically with the SEC. The address of that website is www.sec.gov.

Industry Background

High Intensity Sweetener Industry Overview

Natural and artificial HIS are used in a wide variety of packaged food, beverage and ingredient products throughout the world. In the United States, current artificial HIS approved for use include saccharin, aspartame, acesulfame potassium (Ace-K), sucralose, neotame, and advantame. The most widely used natural HIS products in the United States are derivatives of Stevia. Artificial HIS have fallen out of favor with many consumers. In light of this trend, along with the desire to reduce calories while maintaining great taste, efforts have increased in the pursuit of novel natural HIS. According to LMC International, in 2016, the annual worldwide consumption of HIS on a commercial basis was close to 127,500 metric tons at an estimated value of \$1.38 billion. The only natural HIS included in this estimate were Stevia products with approximately 3,800 metric tons consumed at an estimated value of \$332 million. Furthermore, the annual growth rate for HIS has exceeded that of both sucrose and high fructose corn syrup (6.1% growth for total HIS compared to 0.8% growth for sucrose and 0.5% for high fructose corn syrup). In the United States, HIS are regulated under the provisions of the Food, Drug and Cosmetic Act, or FD&C Act. The regulatory approval process for HIS can vary significantly and is further described under *Regulatory Process* below.

Flavor Industry Overview

Flavor ingredients are used in a variety of packaged food, beverage and ingredient products throughout the world. Flavor ingredients can be either natural or artificial compounds. Flavor ingredients are generally sold as part of a flavor system developed by a flavor company. Flavor systems are then sold for use by packaged food and beverage companies or companies that make pharmaceutical or OTC products.

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While a few packaged food, beverage and ingredient companies have their own internal flavor research and development programs, most have traditionally relied on purchases of flavor systems from third parties. Historically, most third party flavor companies have purchased or manufactured flavor ingredients on a commodity basis and then used these to create flavor systems for their packaged food and beverage customers. The ability to incorporate unique flavors that deliver a great taste profile in end products is a key consideration for packaged food and beverage companies as they strive to differentiate their brands in the marketplace. As such, flavor companies are constantly looking to identify unique, value-added ingredients that will help to meet their customers' needs for innovative flavor solutions.

Traditionally, companies have discovered new flavor ingredients primarily by using inefficient, non-automated and labor-intensive trial and error processes involving a limited number of trained taste testers. Using this approach, taste testers must physically taste each potential flavor ingredient to assess the taste characteristics of the compound. Taste testers can assess only a limited number of potential flavor ingredients at one time due to the sensory fatigue that results from repeated tasting. As a result, only a small fraction of the available universe of ingredients can be tested economically.

Flavor ingredients are regulated in the United States under provisions of the Food, Drug and Cosmetic Act, or FD&C Act. Flavor ingredients sold in countries and regions outside the United States are also subject to regulations imposed by national governments or regional regulatory authorities, as is the case in the European Union. The regulatory regime for flavor ingredients is further described under *Regulatory Process* below.

Packaged Food and Beverage Industry

Packaged food and beverage products include carbonated and non-carbonated beverages, baked goods, dairy products, frozen foods, snack foods, main meal and side dish mixes, canned soup and numerous other products. According to recent data from Euromonitor International, an independent research organization, over 762 million metric tons of packaged food were sold worldwide in 2016. This figure is comprised of the weight of ready-to-eat finished food products (e.g., yogurt) and the weight of the concentrated forms of products before adding water or other components required for reconstitution (e.g., condensed soup). The worldwide sales of packaged food and beverage products in 2016 were approximately \$3.0 trillion, of which over \$578 billion were generated in the United States. These figures represent annual growth rates of approximately 4.5% and 1.9%, respectively, over 2011 amounts. Based on these estimates, of the worldwide total, sales of packaged foods were approximately \$2.08 trillion and sales of non-alcoholic beverages were approximately \$913.6 billion.¹

Flavor Ingredients as a Source of Competitive Advantage

The packaged food, beverage and ingredient industries are comprised of a number of large and highly competitive market segments. Small market share gains in specific large market segments can translate into significant additional revenue for packaged food, beverage and ingredient companies. As a result of these market opportunities, packaged food, beverage and ingredient companies are constantly seeking ways to differentiate their products, as consumer demand can be greatly affected by very small actual or perceived improvements in flavor or health profiles. Flavor ingredients can potentially provide an important way to differentiate a particular product through improvements in nutritional profile, flavor innovation and cost of goods savings while delivering great taste.

Our Solution

We use our proprietary taste receptor-based assays and screening technologies to discover and develop novel flavor ingredients and natural HIS. We have developed proprietary taste receptor-based assays for use in our high-throughput screening systems to rapidly and efficiently screen our sample libraries and identify large numbers of novel potential flavor ingredients and natural HIS. We believe our approach improves the likelihood that ingredients with the desired characteristics can be discovered and then optimized into novel flavor ingredients.

¹ Amount does not include fountain or foodservice sales in certain beverage categories

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We believe our process will result in the discovery and development of flavor ingredients that will address the following key challenges faced by the packaged food, beverage, ingredient supply and consumer goods industries:

- *Identifying Natural Ingredients.* We are using our technologies to screen libraries of natural samples isolated from plants and other natural sources to discover new natural HIS and flavor ingredients.
- *Improving or Maintaining Taste.* Our goal is to discover, develop and commercialize flavor ingredients that will enable food and beverage manufacturers to improve or maintain the taste of their offerings while also enhancing the nutritional profile of packaged food, beverage and ingredient products.
- *Reducing Sweeteners, MSG and Salt in Packaged Food and Beverage Products.* Our resources are focused on discovering, developing and/or commercializing natural HIS and flavor ingredients that, when added as part of a flavor system, will enable food and beverage manufacturers to significantly reduce the levels of sugar, fructose, artificial sweeteners, MSG and salt in packaged food and beverage products while maintaining or improving taste. We believe reducing the levels of such ingredients will help to improve the nutritional profile of packaged food and beverage products.
- *Blocking Undesirable Tastes.* We have developed flavor ingredients that we believe will be useful in blocking bitter and other unwanted tastes associated with certain packaged food and beverage products. Our technology may also be used to improve the taste of products outside of food and beverages, such as OTC health care products and pharmaceutical products.
- *Delivering Proprietary Flavor Ingredients.* Through our direct sales program, we are able to offer flavor companies our proprietary flavor ingredients for incorporation into their flavor systems for re-sale to food and beverage manufacturers. We believe this approach will allow numerous food and beverage manufacturers to improve or maintain the taste of their offerings while improving the nutritional profile of packaged food, beverage and ingredient products. We are also able to offer our future collaborators and customers non-exclusive use of certain proprietary flavor ingredients in defined packaged food, beverage and ingredient product categories and geographies.
- *Reducing Cost of Goods.* We believe our proprietary flavor ingredients will enable food and beverage manufacturers to reduce overall raw material ingredient costs in certain cases, particularly for those products containing high levels of carbohydrate sweeteners and MSG.
- *Reducing Environmental Impact.* Flavor ingredients such as our sweet taste modifiers can be used as part of a flavor system to reduce the use of sweeteners such as sucrose, or common table sugar, and high fructose corn syrup. This can reduce the cost and environmental impact of transporting the goods, as well as the use of water and fertilizers to grow the associated crops. In addition, in the case of powdered or concentrated products, a reduction in the use of added sweeteners may allow manufacturers to reduce package sizes and therefore use less packaging materials without impacting serving sizes or the number of servings in a single package.

Our Strategy

Our goal is to become the leader in the discovery, development and commercialization of new natural HIS and proprietary flavor ingredients that are commercialized either through collaborations with leading companies or through direct sales by us. Key elements of our strategy include:

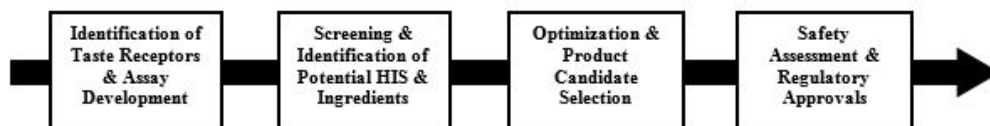
- *Maintaining and Expanding Our Technology Position.* We believe our proprietary taste receptor-based technologies, including our receptor discovery, assay development and high-throughput screening technologies, and our natural and artificial sample libraries provide us and our collaborators with significant competitive advantages. Our scientific staff continues to explore new assay conditions as a method to identify potential new lead HIS and flavor ingredient candidates. We intend to continue to add to our sample libraries and develop and acquire proprietary technologies and related intellectual property rights to expand and enhance our ability to discover, develop and commercialize new HIS and proprietary flavor ingredients.

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- *Developing Natural HIS.* We have discovered nearly 300 natural sweeteners since 2010 through our proprietary taste science technologies. After conducting a comprehensive analysis of the taste and physical properties, we have advanced our lead novel sweetener, siratose, a minor component of Luo Han Guo (also known as monk fruit), into the development phase. In addition, we continue to acquire and screen libraries of natural products for potential future product candidates.
- *Developing Flavor Ingredients that are Eligible for Flavor and Extract Manufacturers Association, or FEMA, Generally Recognized as Safe, or GRAS, Determination.* Historically, a primary focus has been on the development of flavors and flavors with modifying properties that will qualify for a FEMA GRAS determination. Sixteen flavor ingredients developed as part of our savory, sweet, bitter and cool programs have received FEMA GRAS determination. Upon receipt of GRAS determination, our collaborators and customers can begin to test market and commercialize retail products or flavor systems incorporating our flavor ingredients in several key markets.
- *Collaborating With Leading Packaged Food, Beverage and Ingredient Companies.* We are collaborating with leading packaged food, beverage, flavor and ingredient companies to develop and commercialize certain of our product candidates. Under our legacy license agreements, our collaborators are allowed exclusive use, co-exclusive use, or a limited period of exclusive use of certain of our proprietary flavor ingredients in defined packaged food, beverage and ingredient product categories and geographies. In general, our collaborators are responsible for manufacturing, marketing, selling and distributing their products incorporating flavor ingredients discovered and developed by us. In addition, our collaborators are responsible for all costs of manufacturing our flavor ingredients for their own use. As a result, we expect that certain of our flavor ingredients will be commercialized without incurring significant sales, marketing, manufacturing and distribution costs. We seek to establish additional natural HIS program collaborations with leading companies on a non-exclusive basis.
- *Pursuing Market Opportunities through Direct Sales.* We seek to optimize the value of our flavor ingredients by creating new opportunities to increase their usage by food, beverage and other consumer product companies. Our direct sales efforts are focused on selling certain of our flavor ingredients directly to flavor companies. We also have the ability to sell certain of our flavor ingredients directly to food, beverage, consumer product and pharmaceutical customers. We expect flavor companies to add value by incorporating our ingredients into proprietary flavor systems for re-sale to their consumer product company customers. Our sales team also reaches out directly to these consumer product companies to conduct introductory presentations and taste tests of our portfolio flavor ingredients. This effort has been effective in generating awareness of our direct sales program by these end users, which in turn is leading them to contact their preferred flavor company suppliers for additional information and to request samples. We believe the direct sales program enables a deeper and broader penetration of the food and beverage industry and accelerates commercialization by expanding the market for our products.

Our Discovery and Development Process and Programs

The following diagram summarizes our discovery and development process.



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The key elements of our Discovery and Development process are:

- *Identification of Relevant Taste Receptors and Proprietary Taste Receptor-Based Assay Development.* The first steps in our discovery and development process are to identify the relevant taste receptors and to develop proprietary assays based on the identified receptors. Our assays are tests that measure interactions between the taste receptors and potential flavor ingredients or natural HIS. To date, we have developed assays to test for compounds that interact with receptors associated with savory, sweet, bitter and cooling tastes.
- *High-Throughput Screening and Identification of Potential HIS and Flavor Ingredients.* The next step in our discovery and development process is to use our proprietary taste receptor-based assays to identify compounds that bind to taste receptors, known as hits. We use automated high-throughput screening to rapidly evaluate our diverse natural and artificial libraries. The libraries are primarily comprised of compounds we have purchased from third party vendors, compounds we have developed in-house and plant sources we have acquired and fractionated into smaller components. A panel of taste testers then evaluates the taste effect of the most potent hits. Based on this evaluation, we designate hits that exhibit a positive taste effect as proof-of-concept compounds. We then select the most promising of those proof-of-concept compounds, which we call lead compounds, for optimization.
- *Optimization of Lead Compounds and Selection of Product Candidates.* The next step in our discovery and development process is to modify our lead compounds to allow lower amounts of the compound to be used in the finished product and/or improve the activity to meet the taste attribute goals of our collaborators. Optimization may also be required to improve the physical properties of a compound so that it is stable under manufacturing, storage and food preparation conditions. We refer to optimized compounds that provide desirable attributes in product prototypes as product candidates. When screening libraries from natural sources, optimization involves selecting the appropriate source and developing the most efficient process, such as fermentation, to obtain the active compound.
- *Safety Studies and Regulatory Approval of Product Candidates.* The next step in our discovery and development process is to select one or more product candidates for development and potential commercialization. We then evaluate the selected product candidate for safety in accordance with industry standards, including preliminary in-vitro evaluation and additional in-vivo studies to confirm an acceptable safety profile. Following this evaluation, we submit the safety data along with the physical and chemical properties of the flavor ingredient product candidate and a description of manufacturing and conditions of intended use to FEMA for review. The FEMA review is conducted by an independent Expert Panel identified and convened by FEMA. If the Expert Panel determines the product candidate to be GRAS, data from the safety studies supporting the GRAS determination are provided to the U.S. Food and Drug Administration, or FDA, and published in the journal Food Technology. The FEMA GRAS determination allows the flavor ingredients to be commercialized in the United States and several other countries and regions. The FEMA GRAS determination also facilitates regulatory determinations in a number of additional countries.

Sixteen flavor ingredients developed as part of our savory, sweet, bitter and cool programs have received FEMA GRAS determinations. In our experience, the process from selection for development until receipt of that determination has historically ranged from 12 to 18 months. Costs associated with the FEMA GRAS process, including external third-party safety studies and preparation of the application, have been approximately \$1.5 million per flavor ingredient. Product candidates that we develop in the future may require a similar amount of time and cost. However, the length of time and cost may vary depending on the properties of the product candidate. In addition, regulatory approval of the product candidates in other jurisdictions may require that we conduct additional studies or incur additional expenses. Furthermore, the United States regulatory approval of natural HIS will likely require submission through the Food Additive Petition or FDA GRAS notification process, as described further under *Regulatory Process* below.

The goal of the natural HIS component of our sweet taste program is to discover and develop novel no- or low-calorie natural HIS. We continue to make progress in our efforts to discover and develop natural HIS, including the discovery of nearly 300 natural sweeteners since 2010 through our proprietary taste science technologies. After conducting a comprehensive analysis of the taste and physical properties, we have advanced our lead novel sweetener, siratose, into the development phase. Siratose has demonstrated greater potency and a better taste profile than rebaudioside-A, the most used sweetener from stevia plants, in sensory evaluations. In addition, siratose has shown improved stability in low pH products, such as carbonated beverages, and increased solubility, making it easier to work with compared to all known stevia plant based sweeteners. Importantly, siratose has also demonstrated potency and overall taste quality superior to existing monk fruit sweeteners and superior to over 50 other minor sweetener components found in both monk fruit and the monk fruit plant that we have evaluated.

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The goal of the sweet taste modifier component of our sweet taste program is to restore the desired taste profile of products in which natural and artificial sweeteners have been reduced. We completed development activities and received FEMA GRAS determination for sucrose and high fructose corn syrup sweet taste modifier *Sweetmyx*[®] FS22 during 2017. We continue our efforts to discover and develop natural sweet taste modifiers, and we have achieved a taste proof-of-concept for a natural sweet taste modifier. The next step is the identification of a natural sweet taste modifier which meets the potency and physical property requirements to be commercially viable.

The goal of our savory taste program is to discover and develop novel savory flavor ingredients that mimic the taste of naturally occurring glutamate to enable the reduction or replacement of added monosodium glutamate, or MSG, and to provide new savory tastes to foods by combining our savory flavor ingredients with other ingredients to create unique new flavors. Our efforts are focused on the discovery and development of natural savory flavor ingredients to optimize the value of our large natural sample library.

The goal of our bitter blocker program is to discover and develop novel bitter blockers that reduce or block bitter taste ingredients found in many products thereby improving the overall taste characteristics. Our efforts are focused on bitter blockers for over the counter, or OTC, health care products and pharmaceutical products since these products typically do not desire a natural flavor solution.

The goal of our cooling taste program is to support the commercialization of novel cooling flavor ingredients that have advantages over currently available flavor ingredients for a variety of applications. Our efforts are focused on screening samples from our proprietary library to discover novel cooling taste ingredients intended to improve upon the properties of existing cooling ingredients such as menthol with benefits which may include reduced odor, greater potency or improved temporal sensory profiles.

The goal of the salt taste program is to identify flavor ingredients that allow a significant reduction of sodium in foods and beverages yet maintain the salty taste desirable to consumers. We are using analytical approaches to evaluate a large proprietary database of proteins found in taste buds in order to prioritize and find the specific protein or group of proteins that function to detect salt in foods. We are currently screening target proteins with a goal of validating the protein(s) that function in human salty taste perception, supporting our use of the protein(s) as research targets to discover new salt flavor modifiers using our novel flavor technology. Our current efforts include optimizing our assay hits to improve the potency and solubility for further sensory evaluations.

Regulatory Process

In the United States, flavoring substances, including flavor ingredients intended for use in foods and beverages, and HIS are regulated under provisions of the FD&C Act. Flavor ingredients sold in countries and regions outside of the United States are also subject to regulations imposed by national governments or regional regulatory authorities, as is the case in the European Union. These regulations are subject to frequent revisions and interpretation.

Regulation of Flavor Ingredients and Natural HIS in the United States. In the United States, flavor ingredients and natural HIS may be regulated as approved food additives, but more typically as GRAS substances under the FD&C Act. The Food Additive Amendments of 1958 prompted the flavor industry to establish in 1960 the FEMA Expert Panel. FEMA has administered a GRAS program for flavor ingredients on behalf of the industry for nearly 60 years. Several countries outside of the United States, including Canada, Brazil, Argentina and the Philippines, allow flavor use in food based on GRAS determination by the FEMA Expert Panel. Several other countries either add new FEMA GRAS ingredients to their positive lists of approved flavoring agents or add the new FEMA GRAS lists to their flavor regulations by specific reference. The other possible route for approval of a flavor-modifying ingredient is a GRAS self-determination (independent of FEMA) with or without FDA notification. Our goal is that the flavor ingredients we discover will achieve GRAS determination by the independent FEMA Expert Panel.

GRAS Review Process. Flavor ingredients that qualify for the GRAS review process are generally intended to be consumed in small quantities and have data supporting their safety under conditions of intended use. An independent Expert Panel, convened to undertake a GRAS review, determines whether an ingredient is generally recognized as safe under the conditions of its intended use. These experts are qualified by scientific training and experience to evaluate the safety of certain new ingredients used in food. Under the GRAS process, manufacturers are required to obtain safety data from the scientific literature or through the conduct of safety studies, determine the estimated daily intake of the flavor ingredient per person and submit a report to the GRAS review panel describing the physical, structural, safety, and metabolic properties of the flavor ingredient.

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The most common types of GRAS reviews are:

- *FEMA Expert Panel.* The FEMA Expert Panel is an independent panel of experts for which FEMA provides administrative assistance. The FEMA Expert Panel, which may be used by FEMA members and certain other parties, meets up to three times per year. If the FEMA Expert Panel determines a flavor ingredient to be GRAS, information about the GRAS determination is published in the journal Food Technology and all of the data is provided to the FDA. To our knowledge, the FDA has not challenged the FEMA Expert Panel's conclusion that the use of a flavoring substance is GRAS. Sixteen of our flavor ingredients have been determined to be GRAS by the FEMA Expert Panel.
- *Specifically Convened Independent Panel.* An independent, qualified panel of experts in pertinent scientific disciplines may be formed by the manufacturer to evaluate the safety of a specific ingredient for GRAS status. This process is known as "self-determination of GRAS status." The basis for the GRAS self-determination is not required to be submitted to the FDA. However, the FDA may request information on ingredients that have been self-determined to be GRAS.

United States FDA GRAS Notification Process. With respect to certain natural HIS, a summary of the GRAS determination may be submitted to the FDA for evaluation. If the FDA is satisfied with the data, it may issue a "letter of no objection". The current commercialized forms of Stevia have gone through this process. Our goal is to attain regulatory approval through this FDA GRAS notification process for our lead novel sweetener, siratose, a minor component of Luo Han Guo (also known as monk fruit) and any future natural HIS candidates that we discover.

Food Additive Petition Process. Food ingredients may be evaluated through a food additive petition. If there is insufficient general knowledge or for a variety of other reasons, including unusual conditions of intended use, it may be necessary to file a food additive petition with the FDA. Food additive petitions contain information on the structural nature of the ingredient, the manufacturing process, information on use in food, estimates of human exposure from use of the ingredient in food and all known information related to the safety of the ingredient. The FDA reviews the petition content, requests additional information if necessary, publishes a proposed rule for use in food, reviews comments on the proposed rule and publishes a final rule, if the use is determined to be acceptable. The safety data requirements for food additives are the same as for GRAS substances, although high use substances may require additional safety data. We estimate that a food additive petition could cost up to \$10 million and may take up to four years to complete for submission. Furthermore, additional studies adding cost and time to approval may be required depending on the results of the initial safety studies. Examples of ingredients that have gone through a food additive petition process include the artificial sweeteners aspartame, acesulfame K and sucralose. It may be necessary for certain natural HIS that we may discover or develop to follow this regulatory route.

Regulation of Flavor Ingredients and Natural HIS outside of the United States. Outside of the United States, flavor approvals vary by country. There is, however, some commonality in approach in many countries. As explained above, several countries either accept GRAS determination by the FEMA Expert Panel as the basis for approval or GRAS determination facilitates country approval. Many countries, particularly developing countries in Latin America, Asia and Africa, accept favorable review by the WHO/FAO Joint Expert Committee on Food Additives, or JECFA, as the basis for approval or to facilitate approval. The International Organization of the Flavour Industry (IOFI) automatically submits new GRAS ingredients to the Codex Alimentarius through the FDA for JECFA review. Some other countries have their own unique approval processes. The European Union, or EU, has established EU-wide regulations for flavor ingredient use based on safety evaluations by the European Food Safety Authority (EFSA), and risk management (i.e., regulation development) by the Directorate General for Health (DG Sante). A number of countries in eastern Europe or in Africa accept EU approval as the basis for approved use. China, Japan and Indonesia also have independent regulatory review processes for flavors. We have received regulatory approvals for several of our flavor ingredients from JECFA, EFSA, the Chinese Ministry of Health and other authorities outside of the United States.

Patents and Proprietary Rights

Our policy is to file patent applications and to protect technologies, inventions and improvements to inventions that are commercially important to the development of our business. For example, we may seek patent protection for receptors and nucleic acid sequences encoding receptors that are involved in taste and the use of such receptors to identify ingredients that modulate taste. As of December 31, 2017 we are the owner or the exclusive licensee of 233 issued United States patents, 35 pending United States patent applications, 422 issued foreign patents and 187 pending foreign applications covering various aspects of our proprietary technology. Our issued patents have terms that expire between 2019 and 2036. The earliest patent expiration for our approved flavor ingredients is in 2024 for certain savory flavor ingredients. We also rely on trademarks to protect our proprietary technology. Generally, United States patents have a term of 17 years from the date of issue or 20 years from the earliest claimed priority date, whichever is later, for patents issued from applications filed with the United States Patent and Trademark Office prior to June 8, 1995 or 20 years from the application filing date or earlier claimed priority date in the case of patents issued from applications filed on or after June 8, 1995. Patents in most other countries have a term of 20 years from the date of filing the patent application. We intend to continue to file patent applications as we discover and develop new flavor ingredients, HIS and technologies.

Commercialization

Following regulatory approval in a given country, foods and beverages containing our proprietary flavor ingredients can be commercialized immediately. Our collaborators and direct sales customers have ultimate responsibility for the commercialization of our flavor ingredients in their end product and flavor system offerings, respectively. Prior to commercialization, collaborators and customers complete extensive product formulation work on their targeted product and flavor system offerings. Food and beverage manufacturers may validate final formulations for products through in-house sensory evaluation as well as external taste tests by target consumers. Upon confirming consumer acceptance of new or reformulated products that include a Senomyx ingredient, the companies complete activities such as the development of packaging and sales materials, and initial manufacturing scale-up of the products, enabling their market launch.

Market Overview

Each of our programs focuses on flavor ingredients that address large, potentially overlapping markets. Our sweet taste program is aimed at discovering and developing natural HIS or flavor ingredients that could be used in product categories such as beverages, dairy products and baked goods. Our savory flavor program is aimed at commercialization of flavor ingredients that could be used in product categories such as ready-to-eat meals, sauces, soups, pastas, dried foods and snack foods. Our bitter blocker program is focused on commercialization of flavor ingredients that could be used in food and beverage products that contain bitter tasting ingredients, such as rebaudioside A, hydrolyzed whey and soy proteins, caffeine and menthol. Our cooling taste program is aimed at commercialization of flavor ingredients that could be used in products that incorporate cooling agents, such as cough medicines, confectionaries and OTC oral hygiene products. Our salt taste program is aimed at developing flavor ingredients that could be used in virtually all food product categories.

Our commercial revenues to date are primarily based on royalties under a retail or ingredient supply based collaboration agreements and direct sales to flavor houses. In our retail-based agreements, royalties are calculated as a percentage of the net sales price of a manufacturer's finished products or are based on the volume of a manufacturer's finished product that it sells. In our ingredient supply-based agreements, royalties are calculated as a percentage of the sales price of either our flavor ingredient itself or the flavor system in which our flavor ingredient is contained or are based on the volume of the flavor ingredient itself used by a manufacturer in a finished product. We also sell certain novel flavor ingredients to targeted flavor companies for their use in proprietary flavor systems.

The market potential, partners and licenses for our key programs are described below.

Sweet Taste Program

Current products from our sweet taste program are intended to maintain or improve the sweet taste of consumer products that have reduced levels of certain sweeteners such as sucralose, sucrose and high fructose corn syrup. To-date, we have four commercialized products: S2383, a novel sucralose modifier; S6973 (SR69) and S9632 (SR96), two novel sucrose modifiers; and S617, a sucrose and HFCS modifier.

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The annual worldwide consumption of sucrose, fructose and high fructose corn syrup is estimated to be \$92 billion at a volume of 193 million metric tons. The annual sucralose market is approximately \$433 million at a commercial basis volume of 6,436 metric tons. These estimates are based on 2016 data from LMC International, *Milling & Baking News* and the USDA Economic Research Service.

The most compelling product category for products from our sweet taste program is the non-alcoholic beverage market. According to Beverage Digest, 2016 global volume exceeded 142 billion unit cases (each unit case is 192 ounces). The second largest segment of this market is carbonated soft drinks with global volume of just over 36 billion unit cases. The following table provides additional detail for 2016 on the key segments of the global non-alcoholic beverage market.

<u>Beverage Type</u>	<u>Unit Cases (billions & %)</u>		<u>Vol. +/-</u>
Bottled Water	67.2	47.3%	6.4%
Carbonated Soft Drinks	36.1	25.4%	0.2%
Juice	13.8	9.7%	0.9%
RTD Tea	6.5	4.6%	5.0%
Sports Drinks	2.6	1.9%	3.3%
Energy Drinks	1.5	1%	6.0%
RTD Coffee	0.9	0.6%	4.0%
Other ¹	13.4	9.5%	2.1%
Totals	142.1	100%	3.7%

We have two collaborations for our sweet taste program in the commercialization phase. PepsiCo has been licensed rights in the non-alcoholic beverage product categories on a worldwide basis. PepsiCo selected *Sweetmyx S617* during the research funding collaborative period and will pay Senomyx royalties for the use of this fructose/sucrose modifier in PepsiCo products during the life of the patent. We have no control over our collaborators' commercialization decisions regarding new or reformulated products incorporating our flavor ingredients.

In addition, Firmenich has rights to use four sweet taste modifiers in food and alcoholic beverage product categories on a worldwide basis. Firmenich has been granted a limited period of exclusivity for three to four years, as determined by the agreement, for selected artificial sweet taste modifiers. Firmenich has selected sucrose modifiers S6973 and S9632 and sucrose/fructose modifier *Sweetmyx S617* during the research funding period of our collaboration and they will pay us royalties for the use of these modifiers in Firmenich products during the life of the applicable patents. Additionally, Firmenich has exclusive rights to Sucralose modifier S2383 for use in all product categories. We have no control over our collaborators' commercialization decisions regarding new or reformulated products incorporating our flavor ingredients.

Following the period of exclusivity, we may add sweet taste modifiers to our direct sales portfolio. Because the period of exclusivity has expired for S6973 and S9632, we have added both products to our direct sales portfolio and are currently marketing these sucrose modifiers as *Sweetmyx SR69* and *Sweetmyx SR96* respectively.

Savory Flavor Program

Products from our savory flavor program are designed to enable the reduction or removal of added MSG and/or provide new savory tastes to foods by combining our savory flavor ingredients with other ingredients to create unique new flavors. We have received FEMA GRAS determinations for several of our savory flavor ingredients, including S336 and S807. The Chinese Ministry of Health has granted official regulatory approval in China for S336 and S807, and these flavor ingredients have also received positive reviews by JECFA and regulatory approval in the EU.

¹ "Other" includes dilutables, other functional beverages and other still beverages.

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Our savory flavor program is aimed at flavor ingredients that address a worldwide market for monosodium glutamate (MSG) with a value of \$5.1 billion and estimated global demand of 3.16 million metric tons, based on 2016 data. Additionally, these flavor ingredients may be used to create unique savory flavor systems. The incremental opportunity for the entire savory flavors market segment is projected at \$2.4 billion in 2017 global sales. These estimates are based on data from Foodtrending and Ajinomoto Co.

We currently have one partner for this program with exclusive rights to our S336 flavor ingredient for virtually all product categories in Asia (except Japan), operating under a retail and ingredient supply-based agreement. This partner also has non-exclusive rights to our S807 flavor ingredient for all food and beverage categories in Asia (except Japan). Outside of the rights exclusively licensed to this partner, we retain the rights for direct sales of all savory flavor ingredients for use in all product categories worldwide.

Bitter Blocker Program

Our bitter taste blockers are intended to reduce the bitterness associated with certain bitter tastants such as those associated with certain HIS, hydrolyzed proteins, cocoa, caffeine and menthol. These bitter taste blockers may be used in a wide variety of products including tea, nutritional beverages, protein bars, confectionary, ice cream, yogurt, desserts and baked goods. One of our bitter blockers, S6821, has received FEMA GRAS determination and is being commercialized through our direct sales efforts. S6821 has demonstrated activity against bitter tasting foods and beverages that include soy and whey proteins, menthol, caffeine, cocoa, rebaudioside A (component of Stevia) and select actives used in various OTC products.

Cooling Taste Program

Our cooling taste agents are intended to improve upon the properties of existing cooling agents with benefits which may include odorless compared to menthol, greater potency or improved temporal sensory profiles. Existing cooling agents include menthol, WS-3, Frescolat ML & MGA, Cooler 1 & 2, and Evercool. These cooling agents may be used in a wide variety of products including tea, flavored waters, confectionary products such as chewing gum and mints, toothpaste and mouthwash. Two cooling ingredients, S2227 and *Coolmyx*[®]CL19, have received GRAS determination by the FEMA Expert Panel. We currently have one exclusive partner, Firmenich, operating under an ingredient supply-based agreement with certain royalty payments based on their flavor system sales incorporating these cool flavor ingredients.

Salt Taste Program

Our salt taste modifier program is intended to reduce the level of salt contained in packaged food and beverage products. High salt levels are used in a wide variety of products including ready meals, sauces, soups, snack foods, frozen foods, canned foods, dried foods, processed meats and certain baked goods. The cost of salt (sodium chloride) is extremely low but the annual usage of salt in consumer products segment is estimated at 1.6 million metric tons (per K+S Group Financial Report 2016).

We have identified a small group of proteins that meet certain criteria for potentially being involved in salt taste, and we have begun more advanced tests to determine if they function to detect salt. We are currently working with protein candidate targets which are being further evaluated to see if either protein modulates salty taste, which would provide a taste proof-of-concept.

Commercialization Status

Through December 31, 2017, eight of our flavor ingredients have been commercialized through one of our collaborators or direct sales customers. This total includes two of our savory flavors, four products from our sweet taste program and a bitter blocker that have been incorporated into packaged food or beverage products. Additionally, a cooling agent has been commercialized in an oral care product. Precise information is limited, primarily due to confidentiality agreements. Based on market intelligence, including the royalty reports we receive from our collaborators and the estimated use level of our flavor ingredients, we estimate that finished products of 26.4 billion eight fluid ounce servings or 1.1 million unit cases of beverages, and 10.2 million metric tons of food products, have been manufactured or prepared using Senomyx's novel flavor ingredients since inception of commercialization. Our estimates are based on the volume or weight of finished products, which include ready-to-drink beverages and ready-to-eat food products along with the volume of finished beverages and weight of food products which are sold as concentrates and require reconstitution prior to consumption. Historically, these products have been marketed in North America, Latin America, Asia, Europe, Africa, Australia and the Middle East.

Royalty-based Collaborations

Our collaborators have commercialized products containing flavor ingredients from four of our programs: sweet taste, savory taste, bitter blocker and cooling taste.

Firmenich has exclusive worldwide rights to market S2383, our sucralose modifier, in all food and beverage product categories. Retail products incorporating S2383 are currently being marketed in North America, Latin America, Asia and Europe. Firmenich continues to work with other clients evaluating S2383 in a variety of products.

Firmenich has non-exclusive worldwide rights to commercialize our S6973 sucrose modifier for virtually all food and specified beverage categories. Retail products incorporating S6973 are being marketed in the United States, Latin America, Asia, Australia and Africa. These products span a variety of categories including ready-to-drink and powdered beverages, dairy products and baked goods.

Firmenich has non-exclusive worldwide rights to commercialize our S9632 sucrose modifier in virtually all food categories and alcoholic beverages. Firmenich has not commercialized S9632 and future commercialization of this sucrose modifier is unlikely based on their focus on other Senomyx sweet taste modifiers

Firmenich also has exclusive worldwide rights for a specified period to commercialize our Sweetmyx S617 sucrose and high fructose corn syrup sweet taste modifier in virtually all food categories and alcoholic beverages. Effective in the first quarter of 2018, Firmenich rights to Sweetmyx S617 will become non-exclusive. Firmenich will maintain rights to commercialize the product and will have an obligation to pay royalties for use of the product through the life of the patents.

PepsiCo has exclusive worldwide rights to commercialize *Sweetmyx S617* in non-alcoholic beverages during specified periods of time. Effective in the first quarter of 2018, PepsiCo rights to *Sweetmyx S617* will become non-exclusive. PepsiCo will maintain rights to commercialize the product and will have an obligation to pay royalties for use of the product through the life of the patents.

Ajinomoto has been introducing products that contain one of our flavor ingredients in several Asian countries including China. Ajinomoto has continued to explore additional opportunities to expand their customer base and the number of product offerings within Asia.

Firmenich has exclusive, worldwide rights to S2227 and *Coolmyx* CL19, our novel cooling ingredients, for use in all product categories. Firmenich has commercialized S2227 in oral care products.

Sales and Marketing under Royalty-based Collaborations

Under our current collaboration agreements, our collaborators are responsible for sales, marketing, and distribution of any packaged food or beverage product incorporating our flavor ingredients for their own use. As a result, in the past, our flavor ingredients were commercialized without our incurring significant sales, marketing and distribution costs and we expect our collaborators to continue to assume those same responsibilities for the use of any flavor ingredients in fields of use that they have licensed from us. Our current collaborators, Ajinomoto, Firmenich and PepsiCo, are recognized leaders in the sales, marketing and distribution of packaged food, beverage and ingredient products.

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Manufacturing under Royalty-based Collaborations

Under the majority of our existing collaborative agreements, our collaborator may, in its sole discretion, manufacture directly or through a third party manufacturer the flavor ingredients it licenses from us.

Direct Sales to Flavor Companies

Rather than relying solely on royalty-based collaborations for commercialization, we also have a direct sales program to sell certain of our flavor ingredients to flavor companies for their use in the development of proprietary flavor systems for their customers. We also have the ability to sell certain of our flavor ingredients directly to food, beverage, consumer product and pharmaceutical customers. We are marketing these flavor ingredients under the *Complimyx*[®] umbrella brand, which we selected to connote the benefits of using these offerings to add value to flavor systems. Additionally, we have developed sub-brands to identify each taste area separately, such as *Sweetmyx* for our sweet taste modifiers, *Savorymyx*[®] for our savory flavors and *Bittermyx*[®] for our bitter blocker. Specific ingredients within a taste category are referenced using a category code, such as *Sweetmyx SR69* which is also known as the sucrose modifier S6973.

Our *Complimyx* product portfolio currently includes five flavor ingredients, all of which are currently being evaluated and sampled to consumer products companies. All five ingredients have been purchased by our flavor company customers for use in consumer products currently on the market.

Sweetmyx SR69 (S6973) and *Sweetmyx SR96*, sucrose modifiers, amplify the sweetness of sugar-reduced foods and beverage products. . According to Euromonitor, global use of sucrose across all food categories is approximately 28.6 million metric tons on an annual basis. Key targeted food categories for using *Sweetmyx SR69*, including baked goods, confectionary, dairy products and sweet sauces and condiments, represent around 65% of this volume. The average sucrose content of targeted food products, anticipated use level of *Sweetmyx SR69* and the potential sucrose reduction level vary considerably by product category, making it difficult to calculate a generalized dollar value of direct sales revenue for each global market share point achieved. We estimate that our current regulatory approvals allow for the commercialization of *Sweetmyx SR69* in over 90% of the target market opportunity.

Primary market potential for *Sweetmyx SR96* includes a number of targeted non-alcoholic beverage product categories, including ready-to-drink and powdered forms of coffee and tea, powdered soft drinks, flavored milk and dairy beverages. According to Euromonitor, these target product categories utilize over 5.0 million metric tons of sucrose on an annual basis. Based on our assumptions for average sucrose content of the targeted beverages, the anticipated use level of *Sweetmyx SR96* and our anticipated selling price to flavor companies, we estimate that each global market share point is worth over \$7.7 million to us in direct sales revenues. Furthermore, based on Euromonitor data, we estimate that our current regulatory approvals allow for the commercialization of *Sweetmyx SR96* in approximately 77% of the target market opportunity at this time.

Sweetmyx FS22, a fructose and sucrose modifier, allows for a significant reduction of both sucrose and high fructose corn syrup while still maintaining great taste. In addition, it has improved physical properties over our existing sweet taste boosters, making it easier to use in end consumer products. *Sweetmyx FS22* received FEMA GRAS determination in 2017, enabling commercialization in the U.S. and a number of other countries. Third parties are currently evaluating this novel flavor for potential use in non-alcoholic beverages and other product categories.

Savorymyx UM80 (S807) provides a well-rounded, clean upfront umami or savory note and has been incorporated into a variety of products including sauces, snack foods, soups, frozen foods and beverages. *Savorymyx UM33* (S336), a flavor that offers intense slightly delayed savory taste while heightening peppery and earthy notes, is included in our direct sales portfolio for sales outside of Asia (except Japan).

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We estimate the direct sales potential of *Savorymyx UM80* based on the global MSG market. According to Ajinomoto Co. estimates, 2016 MSG global demand was 3.16 million metric tons. Based on our assumptions for average MSG content, the anticipated use level of *Savorymyx UM80* and our anticipated selling price to flavor companies, we estimate that each global market share point is worth over \$2.5 million to us in direct sales revenues. Our estimate does not include direct sales revenues from the \$2.4 billion global savory flavors market. We estimate that our current regulatory approvals allow for the commercialization of *Savorymyx UM80* in over 90% of the target market opportunity.

Bittermyx BB68 (S6821), a bitter blocker, reduces or blocks bitter taste of numerous ingredients such as hydrolyzed soy and whey proteins, menthol, caffeine, cocoa, and rebaudioside A (component of Stevia) and can improve the overall flavor of foods and beverages. Product applications for *Bittermyx BB68* include various food and beverages, over-the-counter medications, pharmaceuticals and oral care products.

Sales and Marketing under Direct Sales Program

We have developed sales and marketing capabilities within our internal organization to support our direct sales program. Our initial focus is directed toward global flavor companies with operations in the United States and other U.S. based flavor companies. Flavor companies commercialize our flavor ingredients in the United States. Additionally, global flavor companies commercialize our flavor ingredients outside the United States in geographies where we have appropriate regulatory authorization, and in the future we may also market our flavor ingredients directly to more region specific flavor companies outside the United States. In 2017, we established an agreement with a third party to market and sell certain of our flavor ingredients to flavor companies in the Asia Pacific region.

Manufacturing under Direct Sales Program

We utilize third party manufacturers to produce our flavor ingredients. These third parties are responsible for the purchase of raw materials and manufacture of finished products. We may also utilize third parties to provide inventory warehousing, distribution, importation, and other supply chain support.

Our Collaborative Agreements

We have established collaborations with leaders in the packaged food, beverage and ingredient supply markets. Under each of our current collaborative agreements, we have agreed to conduct research and develop flavor ingredients in one or more specified taste areas, such as sweet, savory, bitter, cool or salt. These collaborations are generally focused on one or more specific product categories, such as non-alcoholic beverages, confectionary products or frozen foods. We currently have collaborative agreements with Ajinomoto, Firmenich and PepsiCo.

Our current collaboration agreements generally provide for royalty payments in the event the collaborator commercializes a product incorporating our flavor ingredients. The specific type of royalty and method for calculating royalty payments varies by agreement and many factors may affect the potential royalty payments under our agreements. In addition, royalty rates under some of our agreements may vary from period to period. Accordingly, any estimates of future royalties are uncertain and difficult to predict. We generally describe our collaborative agreements as retail-based agreements or ingredient supply-based agreements. Under our retail-based royalty agreements, any potential royalty payable to us is calculated as a percentage of the net sales price of a manufacturer's finished products at the distribution level or is based on the volume of a manufacturer's finished product that it sells. Our retail-based royalty agreements generally provide for an effective royalty of up to 4%. Our agreements with PepsiCo (Sweet) and Ajinomoto are partially retail-based royalty agreements. Under our ingredient supply-based agreements, any potential royalty payable to us is calculated as a percentage of the sales price of either our flavor ingredient itself or the flavor system in which our flavor ingredient is contained or is based on the volume of the flavor ingredient itself used by a manufacturer in a finished product. Our ingredient supply royalty agreements specify royalty rates that are typically greater than the rates specified by our retail-based agreements. Our agreements with Ajinomoto, Firmenich and PepsiCo (Sweet) are either exclusively or partially ingredient supply-based royalty agreements.

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Most of our collaboration agreements provide for research and development funding, milestone payments upon achievement of pre-defined research or development targets and cost reimbursement. Certain of our collaboration agreements also provided for license fees and minimum periodic royalties. The research and development funding under each of these agreements is typically paid according to a fixed payment schedule, but may vary from period to period upon mutual agreement of the parties. Each of these collaborations provides us with a portion of the funding we require to pursue the discovery and development of flavor ingredients for the applicable program. Under each of these agreements, we are primarily responsible for the discovery and development phases and any associated expenses, while our collaborator is primarily responsible for selecting the products that may incorporate our flavor ingredients. Under most of our agreements, our collaborator is also responsible for manufacturing, marketing, selling and distributing any of these products for their own use, and any associated expenses. Under our agreements, we are primarily responsible for the development and regulatory approval phase for flavor ingredients, as well as the prosecution and maintenance of the underlying intellectual property for our flavor ingredients, and a portion of the associated expenses for all of those activities.

We believe our collaborations will allow us to benefit from our collaborators' well-established brand recognition, global market presence, established sales and distribution channels and other industry-specific expertise. Each of our collaborations is governed by a joint steering committee, consisting of an equal number of representatives of the collaborator and us. The steering committees provide strategic direction and establish performance criteria for the research, development and commercialization of our flavor ingredients. In most instances, decisions of the steering committees must be unanimous.

Our current collaborative agreements provide that we will conduct research and development relating to HIS and/or flavor ingredients for use within clearly defined packaged food, beverage and ingredient product fields, historically on an exclusive or co-exclusive basis for the collaborator during the collaborative period specified in each of the agreements. Collaborations we have established since 2013 have been for non-exclusive rights or with a first mover advantage which provides the collaborator with a limited period of exclusivity. We anticipate that future collaborative agreements we establish will be on a non-exclusive or limited first mover advantage basis. Our current product discovery and development collaborators are not prohibited from entering into research and development collaboration agreements with third parties in any product field. Under the terms of each agreement, we will retain rights to flavor ingredients that we discover during the collaboration for use with the collaborator, or for our use with other collaborators and direct sales customers outside of the defined product fields of that agreement. We will also generally retain rights to any flavor ingredients that we discover after the respective collaborative period. However, in some instances we have agreed to arrangements where we would not launch competing products that one of our collaborators has selected for development and commercialization. We have also agreed under the terms of two of our collaboration agreements that we would not license similar flavor ingredients to the collaborator's competitor for the same intended uses and product categories that we have licensed to our collaborator. In addition to the collaborative agreements, we have a commercialization and license agreement with Firmenich regarding our S2383 sucralose modifier. In the case of certain of our agreements, if the collaborator terminates the agreement or fails after a reasonable time following regulatory authorization or FEMA GRAS determination to incorporate one or more of our flavor ingredients into a product, such collaborator will no longer be entitled to use the flavor ingredient and we will have the right to sell or license the flavor ingredient to other packaged food, beverage and ingredient companies for use in any product field covered in the agreement.

Most of our agreements expire when we are no longer entitled to royalty payments under the agreement. We are typically entitled to royalty payments during the patent life associated with our product. In addition, each agreement may be terminated earlier by mutual agreement or by either party in the event of a breach by the other party of its obligations under the agreement. Furthermore, following the collaborative research period under a given agreement, our collaborators may elect to discontinue the commercialization of one of our flavor ingredients and unilaterally terminate the agreement. In the event of termination of an agreement prior to expiration, rights to sell or license flavor ingredients generally revert to us.

Key Collaborative Agreements

Firmenich (Sweet)

In July 2009, we entered into a collaboration agreement with Firmenich to work for a minimum two-year collaborative period to discover novel flavor ingredients intended to modify the sweet taste of sucrose, fructose, or various forms of rebaudioside (components of Stevia). The agreement included three consecutive options to extend the collaborative research funding period by one year each. Under the agreement, Firmenich agreed to pay a license fee in three installments, research and development fees, cost reimbursements and specified payments upon the achievement of milestones. In January 2010, Firmenich elected to proceed with commercial development of S6973. In October 2010, we amended the agreement with Firmenich to include commercial development of S6973 for specific beverage applications in exchange for an incremental license fee, additional milestones and minimum annual royalties, in addition to royalties on sales of products containing S6973. In February 2011, Firmenich elected to exercise their first one-year option to extend the collaborative research funding period through July 2012. In April 2012, Firmenich elected to exercise their second one-year option to extend the collaborative research funding period through July 2013. In April 2013, we amended and restated the collaboration agreement with Firmenich to extend the collaborative research period through July 2016. Firmenich agreed to pay an additional non-refundable license fee of \$5 million, of which \$4 million was paid in 2013 and \$1 million was paid in 2016.

Under this agreement, through December 31, 2017, we have received \$58.6 million in license fees, research and development funding, cost reimbursements and milestones. We are entitled to receive royalties on future net sales of products containing a discovered flavor ingredient from the date of introduction of each product in each country until the expiration of relevant patents. Any future royalties under this collaboration are uncertain and difficult to predict.

PepsiCo (Sweet)

In August 2010, we entered into a collaboration agreement with PepsiCo. The agreement relates to a four-year research program to discover and develop (i) novel natural and artificial flavor ingredients intended to modify the sweet taste of sucrose and fructose, including high fructose corn syrup, and (ii) natural HIS, in each case for use in non-alcoholic beverage product categories on a worldwide basis. Under the agreement, we received an upfront payment of \$30.0 million from PepsiCo, \$7.5 million of which was paid in the second quarter of 2010 in connection with the signing of a letter agreement between the parties and \$22.5 million of which was paid in the third quarter of 2010. We received \$32.0 million in research and development payments over the initial four-year research period, which ended in August 2014. In May 2014, PepsiCo exercised its option to extend the research period for an additional two years through August 2016. We received \$17.6 million in research and development payments over the two-year research period extension.

In August 2015, we announced that the first commercialization of our flavor ingredient *Sweetmyx* S617 was achieved, triggering a \$1.5 million commercial milestone under our collaboration with PepsiCo. Following commercialization, we are entitled to receive minimum annual royalties into the first quarter of 2018 and/or royalty payments on products that incorporate selected flavor ingredients and/or natural HIS. Royalties on products sold by PepsiCo or its affiliates that incorporate a selected flavor ingredient will be equal to a base amount plus a portion of the cost savings, if any, derived from the use of the flavor ingredient in the applicable product. PepsiCo or its affiliates will also pay royalties on products which incorporate a selected natural HIS. PepsiCo has the unilateral right to terminate the agreement in the event that a direct competitor of PepsiCo acquires more than 30% of our outstanding voting securities.

In July 2016, the research period under the agreement was extended by mutual consent for an additional 45 days through September 2016 at the then-current research funding rate, whereby we received \$1.1 million in research and development payments.

In September 2016, we announced that we entered into an Amended and Restated Collaborative Research, Development, Commercialization and License Agreement with PepsiCo, Inc. effective as of September 30, 2016. The agreement extends PepsiCo's research funding for our natural sweet taste program for an additional three years, through September 2019. The research program has been broadened to include the screening and evaluation of plant extracts and plant fractionations owned by PepsiCo in addition to our own natural botanical library.

Research and Development Funding: Under the agreement, we will receive \$18.0 million in research and development payments, payable in equal quarterly installments over the three year research period. In addition, PepsiCo has also agreed to reimburse us for certain specified out-of-pocket expenses that we may incur during the course of the research program.

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Extension Option and Termination Rights: PepsiCo has the option to extend the natural sweet taste research program for two additional years, which would result in additional research funding commitments and payments during the extension of the research program. Quarterly research and development funding will increase by 10% during the period of extension. Both parties have the right to terminate the agreement in the event of the other party's uncured material breach and PepsiCo also has the unilateral right to terminate the agreement in the event that a direct competitor of PepsiCo acquires more than 30% of our outstanding voting securities.

Rights: PepsiCo will have non-exclusive rights for commercial development of natural sweeteners and natural sweet enhancers discovered, developed and selected under the collaboration for use in all non-alcoholic beverage categories on a worldwide basis. We will have the right to collaborate with any third party concerning the research, development and commercialization of its natural sweet taste program, except with respect to a key competitor of PepsiCo. We may also not license any selected natural sweet enhancer or natural sweeteners to such key competitor for a period of two years following the receipt of U.S. regulatory approval. We have immediate rights to collaborate with any third party concerning the research, development and commercialization of its synthetic sweet taste program. PepsiCo will maintain their existing rights to any sweet enhancer selected prior to the Amended and Restated Collaborative Agreement effective date.

Milestones/Royalties: We will also be eligible for milestone payments based on the achievement of predetermined goals as well as royalty payments upon the sale of products containing natural sweeteners or natural sweet enhancers selected under the collaboration. If a selected natural sweetener or natural sweet enhancer is discovered solely through PepsiCo's natural library, PepsiCo will be entitled to a reduction in the royalty payable to us and to receive a royalty on our commercial revenues generated by such selected ingredient.

Under this agreement, through December 31, 2017, we have received \$95.7 million in upfront fees, research and development funding, cost reimbursements and milestones. We are entitled to receive an additional \$10.5 million for the remaining research and development funding under the agreement. There is no guarantee that we will receive any additional milestone payments under this collaboration. We are entitled to receive royalties on future net sales of products containing a discovered flavor ingredient from the date of introduction of each product in each country until the expiration of relevant patents. Any future royalties under this collaboration are uncertain and difficult to predict. If our collaborative agreement with PepsiCo were to terminate earlier than currently anticipated, we may experience a material decline in our revenues.

Firmenich (Cool)

In December 2007, we entered into a collaboration agreement with Firmenich to work for a three-year collaborative period to discover and develop novel flavor ingredients that may be used by Firmenich on an exclusive basis worldwide to impart a cool taste in flavor systems. In November 2010, we amended the agreement to extend the collaborative period until December 2012. In December 2012, we amended the agreement to extend the collaborative period until June 2013, which marked the end of the collaborative period. Under the agreement, Firmenich agreed to pay research fees and specified payments upon the achievement of milestones. Firmenich also agreed to reimburse us for a portion of the costs associated with the development and regulatory approval process of flavor ingredients that it selects for development, as well as a portion of certain expenses that we incur related to the research program. In addition, based on the regulatory approval in 2014 of a discovered flavor ingredient, we are entitled to minimum periodic royalties and royalties on sales of products containing the discovered flavor ingredient until the expiration of relevant patents. In November 2017, we amended the agreement to grant Firmenich an exclusive license to an additional approved flavor ingredient (*Coolmyx* CL19) and related analogs, as well as an expansion of product categories to include all applications in the flavor, oral care and consumer product markets. In addition, Firmenich's royalty obligations were suspended from 2018 through 2020 and will resume on January 1, 2021. In exchange for the exclusive license, expansion of rights and suspension of royalty obligations, we received a cash payment of \$10.0 million.

Under this agreement, through December 31, 2017, we have received \$19.5 million in research and development funding, cost reimbursements, milestones, license fees and royalty pre-payments. We are entitled to receive royalties on future net sales of products containing a discovered flavor ingredient beginning in 2021 until the expiration of relevant patents. Any future royalties under this collaboration are uncertain and difficult to predict.

***Other Collaborative Agreements
Ajinomoto***

In March 2006, we entered into a collaborative research, development, commercialization and license agreement with Ajinomoto for the discovery and commercialization of novel flavor ingredients on an exclusive basis in the soup, sauce and culinary aids, and noodle product categories, and on a co-exclusive basis in the bouillon product category within certain Asian markets. Under the terms of the initial collaboration, Ajinomoto agreed to pay us an upfront license fee and research and development funding for up to three years. In addition, we are eligible to receive milestone payments upon achievement of specific product discovery and development goals and reimbursement for certain expenses that we incur. In April 2007, we amended the agreement to expand Ajinomoto's rights into North America. In August 2007, we further amended the agreement to expand Ajinomoto's rights into additional product categories and geographies that were not previously licensed by us. In January 2013, Ajinomoto relinquished and returned to us the rights to the previously licensed flavor ingredients in North America and in the other geographies granted in the August 2007 amendment. Ajinomoto is continuing to commercialize products that include one of our flavor ingredients in Asia. We received research and development funding through March 2010. In addition, we have received milestone payments, cost reimbursements and minimum periodic royalty payments from Ajinomoto. Any future royalties under this collaboration are uncertain and difficult to predict.

Firmenich (Sucralose)

In November 2008, we entered into a second collaboration agreement with Firmenich for S2383, our novel modifier of the high intensity sweetener sucralose. Under the agreement, Firmenich has agreed to pay to us royalty payments based on sales of S2383 when it is sold on either a stand-alone basis or within a flavor system. We have received royalty payments under this collaboration. Any future royalties under this collaboration are uncertain and difficult to predict.

Competition

Our goal is to be the leader in discovering novel flavor ingredients for use in a wide range of packaged food, beverage and ingredient products. Other companies are possibly pursuing similar technologies and the commercialization of products and services relevant to flavor ingredients. Although we are not aware of any other companies that have the scope of proprietary technologies and processes that we have developed in our field, there are a number of competitors who possess capabilities relevant to the flavor ingredient field.

In particular, we face substantial competition from companies pursuing the commercialization of products and services relevant to taste using more traditional methods for the discovery of flavor ingredients, or for the reduction of salt, sugar, monosodium glutamate, or MSG, or bitter taste. These competitors include leading flavor companies, such as Firmenich, Givaudan SA, International Flavors & Fragrances Inc., Symrise and Takasago. These companies provide flavors and other products, such as oils, extracts and distillates, to consumer products companies for use in a wide variety of products including foods, beverages, confectionaries, dairy products and pharmaceuticals. Competitors currently developing or marketing HIS include Ajinomoto, BRAIN, AnalytiCon and Roquette: consortium Dolce AG, Cargill, DSM, Evolva, GLG Life Tech, Natur Research Ingredients, Nutrasweet, Nutrinova GMBH, PureCircle Limited, Symrise and Tate & Lyle. Competitors currently developing or marketing menthol or cooling agents include International Flavors and Fragrances, Givaudan, Jindal Drugs, Mentha & Allied, Sharp Menthol, Symrise, Takasago and BASF. We will continue to compete in the future with these companies in collaborating with and selling flavor ingredients and technologies to manufacturers of food, beverage and ingredient products. Many of these companies have substantially greater capital resources, research and development resources and experience, manufacturing capabilities, regulatory expertise, sales and marketing resources, and more established relationships with consumer products companies than we do.

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We may in the future face competition from life sciences and other technology companies and other commercial enterprises. These entities engage as we do in biotechnology, biology or chemistry and could apply this technology to the discovery and development of flavor ingredients. We are aware of another company, Chromocell, Inc., that is involved in research for the discovery and development of sweet enhancers and salt substitutes. Products developed as a result of our competitors' existing or future collaborations may compete with our flavor ingredients.

Universities and public and private research institutions are also potential competitors. While these organizations primarily have educational objectives, they may develop proprietary technologies related to the sense of taste or secure patent protection that we may need for the development of our technologies and products. We may attempt to license these proprietary technologies, but these licenses may not be available to us on acceptable terms, if at all.

Methods for reducing sodium include the use of potassium chloride in combination with flavors and masking agents. Although savory flavor enhancers are commercially available, they are not very potent, are not patent protected and are sold as a commodity. The blocking of bitter taste is typically accomplished by attempting to mask the bitter taste with a sweetener or another flavor ingredient. Existing cooling agents, such as menthol and WS-3, are currently in use. However, our competitors, either alone or with their collaborative partners, may succeed in developing technologies or discovering flavor ingredients that are similar or preferable in the areas of, among others, effectiveness, safety, cost and ease of commercialization, and our competitors may obtain intellectual property protection or commercialize such products sooner than we do. Developments by others may render our product candidates or our technologies obsolete. In addition, our current product discovery and development collaborators are not prohibited from entering into research and development agreements with third parties in any particular field.

Employees

As of December 31, 2017, we had 56 full-time employees, including 9 with Ph.D. degrees. Of our full-time workforce, 35 employees are engaged in research and development and 21 are engaged in sales, marketing, intellectual property management, finance and administration. We also retain outside consultants. None of our employees are covered by collective bargaining arrangements, and our management considers its relationships with our employees to be good.

ITEM 1A. RISK FACTORS

You should consider carefully the risks described below, together with the other information contained in this annual report on Form 10-K and in our other public filings, in evaluating our business. If any of the following risks actually occurs, our business, financial condition, results of operations and future growth prospects would likely be materially and adversely affected. In these circumstances, the market price of our common stock would likely decline.

Risks Related To Our Business

Even if we or our collaborators receive regulatory approval and incorporate our flavor ingredients or HIS into products, those products may never be commercially successful.

Even if we discover and develop flavor ingredients with appropriate attributes required for use in commercial products and we obtain the necessary regulatory authorizations through the Flavor and Extract Manufacturers Association (FEMA) Expert Panel's review and determination of our flavor ingredients as Generally Recognized as Safe (GRAS) or other regulatory approvals and receive the appropriate regulatory authorization to commercialize a natural HIS, the commercial utility for a novel flavor ingredient or HIS that we develop may ultimately be more limited than we expect. Our success depends to a significant degree upon successful commercial launches of food, beverage and ingredient products incorporating our flavor ingredients or HIS. If these products fail to achieve or subsequently maintain market acceptance or commercial viability, our business would be significantly harmed because our commercial revenues are dependent upon consumer sales of these products. In addition, we may be unable to maintain our existing collaborations or attract new product discovery and development collaborators or new customers for our direct sales program. Many factors may affect the willingness of food and beverage companies to launch new or reformulated products incorporating our flavor ingredients and HIS and the market acceptance and commercial success of any potential products incorporating flavor ingredients, including:

- whether our collaborators devote sufficient financial and other resources to promote our flavor ingredients or HIS;
- health concerns, whether actual or perceived, regarding our flavor ingredients, HIS, or those of our competitors;
- unfavorable publicity regarding our flavor ingredients, HIS, or our research methods;
- the timing of market entry as compared to competitive products;
- the cost of our flavor ingredients or HIS relative to other competing products;
- the pricing of products that contain our flavor ingredients and HIS relative to other competing products;
- the costs and market risks of reformulating existing products;
- the rate of adoption of products by our collaborators and other companies in the flavor industry; and
- any product labeling that may be required by United States or foreign regulatory agencies for products incorporating our flavor ingredients or HIS.

We are substantially dependent on our current and any future product discovery and development collaborators to develop and commercialize any flavor ingredient and natural high intensity sweeteners we may discover.

We are substantially dependent on our current and any other possible future collaborators to commercialize any flavor ingredients and natural high intensity sweeteners, or HIS, that we successfully develop and to provide the sales, marketing and distribution capabilities required for the success of our business. We have no control over the amount and timing of resources that our current or any future collaborators may devote to our programs or potential products. Our collaborators may decide not to devote the necessary resources to the commercialization of our ingredients and may choose not to incorporate our ingredients into any or all of their products within their licensed product fields on a timely basis or at all. Although our collaboration agreements vary, in some situations a collaborator may have the ability to return rights to one or more of our licensed flavor ingredients in some or all product categories or licensed territories and discontinue any associated minimum annual royalty obligations for those flavor ingredients, product categories or territories, as the case may be. A collaborator may elect to take any of these actions for any number of reasons, including as a result of unfavorable publicity regarding our flavor ingredients or our research methods, or if our flavor ingredients do not have the characteristics desired by the collaborator. These characteristics include, among other things, modifying properties, stability under various manufacturing and use conditions, solubility, taste, cost and an adequate safety profile. If these collaborators fail to conduct their commercialization, sales and marketing or distribution activities successfully and in a timely manner, or if our existing collaborators terminate their collaboration agreements with us prior to the expiration of the agreements, it will delay our ability to commercialize our flavor ingredients and HIS, we will earn little or no royalty revenues from our flavor ingredients and we will not be able to achieve our objectives or build a sustainable or profitable business.

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We are dependent on our current and any future product discovery and development collaborators for our research and development funding.

A key element of our current strategy is to commercialize our ingredients through collaboration agreements. To date, substantially all of our research and development funding has been derived solely from research and development payments, license fees, milestone payments and cost reimbursement payments received under our collaborations. Substantially all of our research and development funding in the foreseeable future will result from these types of payments from these collaborations until such time, if ever, that we earn more significant royalties on future sales of consumer products incorporating our flavor ingredients or begin to generate meaningful revenues from our direct sales program.

We may not be able to enter into additional collaboration agreements with third parties due to the cost, licensing requirement and risks of our current product discovery and development collaborations. Each of our current collaboration agreements provides for the use of our ingredients within one or more defined food, beverage and ingredient product fields on an exclusive, co-exclusive or non-exclusive basis for the respective collaborator during the collaboration period specified in the agreement. In the case of exclusive agreements, or co-exclusive agreements where all fields and geographies are granted, we will not be able to enter into additional collaborations with any other food, beverage and ingredient company covering the same product field during the applicable collaboration period.

In addition, our collaborators' competitors may not wish to do business with us at all due to our relationship with our collaborators and under some agreements we have agreed to arrangements where we would not launch competing products or collaborate with a collaborator's competitor for a limited period of time even after the conclusion of the applicable collaboration period. Consolidation in our target markets may also limit the number of potential collaborators. If any or all of our current material agreements with our collaborators expire, are amended, or are terminated, or if we are unable to, or elect not to, renew or enter into new collaboration agreements, our research and development funding could significantly decline or be substantially eliminated, which would have a material adverse effect on our business, financial condition and results of operations.

We may be unsuccessful in our efforts to discover, develop and commercialize natural sweet taste ingredients.

We are currently expending significant resources attempting to discover, develop and commercialize novel no- or low-calorie natural HIS and natural sweet taste modifiers. While we have been successful in the past discovering, developing and commercializing artificial flavor ingredients, we have never commercialized a flavor ingredient derived from our library of natural compounds, and our success commercializing artificial flavor ingredients in the past does not ensure that we will have similar success discovering, developing and commercializing natural HIS and sweet taste modifiers.

The discovery of natural sweet taste flavor ingredients requires significant time and resources in order to screen our library of natural compounds to identify potent natural sweet taste modifiers and/or HIS. Following the discovery of any natural sweet taste flavor ingredient, we must also expend significant resources attempting to optimize the applicable natural compound before being able to select potential product candidates. Conducting this research is a time-consuming, expensive and uncertain process that may take years to complete, and we may never generate a viable natural sweet taste modifier and/or HIS as a result.

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Even if we are able to generate a viable natural HIS, we do not believe that any natural HIS would qualify for a FEMA GRAS determination for its use as a sweetener, and therefore would likely require a different approval process, including submission through the FDA GRAS notification process or under a Food Additive Petition, which may be significantly more expensive and time-consuming to complete. There can be no assurance that any natural HIS that we generate will satisfy the specific regulatory processes, including any applicable foreign regulatory approval requirements, which may limit or prevent collaborators from selling products containing any natural HIS that we may create.

Even if we successfully develop natural sweet taste modifier and/or HIS with appropriate attributes required for use in commercial products, our ability to scale up the manufacturing of our natural ingredients to enable their market launch will be dependent upon third parties being able to ferment or biosynthesize/manufacture such ingredients as we do not have the ability or expertise to do in-house. The fermentation or biosynthesis of a natural compound is very challenging and can be done only by a limited number of companies. If we are unable to successfully identify and collaborate with a third party capable of fermenting or biosynthesizing any natural ingredient that we are able to develop, we will not be able to scale up the manufacturing of such product to enable its market launch and our ability to successfully commercialize such product would be prohibited. Even if we are able to successfully collaborate with a third party capable of fermenting or biosynthesizing our natural ingredients, such third party may encounter difficulties developing a fermentation or biosynthesis manufacturing process which could result in delays in obtaining the necessary regulatory approvals and ultimately delay the commercialization of our natural ingredients. Even if a third party collaborator can ferment or biosynthesize our natural ingredients, such process may not meet the cost requirements which could delay or prevent the commercialization of our natural ingredients. Even if we obtain the necessary regulatory approvals, we will have limited or no control over these third parties, and because we could not ensure the actual fermentation or biosynthesis of our natural HIS or the ability of our suppliers to comply with applicable legal and regulatory requirements, our ability to successfully commercialize natural ingredients may be delayed or limited.

Furthermore, due to ongoing uncertainty and changes to applicable laws and standards, there is a possibility that any HIS or flavor ingredient derived from our library of natural compounds produced through fermentation could ultimately be categorized as an artificial, not natural, ingredient even if it is found in nature. If this were to occur, it would likely have a negative impact on the consumer appeal of any sweet taste modifier or HIS we develop from our library of natural compounds, and could deter food, beverage and ingredient products from incorporating the HIS or flavor ingredients. If this were to occur, our ability to successfully commercialize these ingredients would be limited and it could have a material adverse effect on our business, financial condition and results of operations.

We may not be able to commercialize the flavor ingredients in our portfolio that we currently control, which could negatively impact our results of operations and market share.

We have several flavor ingredients in our portfolio that we have discovered and developed but that are not currently exclusively licensed to a third party collaborator for one or more product categories and/or geographies, including, but not limited to, our *Savorymyx*[®] *UM80* (S807), *Sweetmyx*[®] *SR96* (S9632), *Sweetmyx SR69* (S6973) and *Bittermyx*[®] *BB68* (S6821) flavor ingredients for which we have worldwide rights in all products, and *Savorymyx UM33* (S336), for which we have certain rights in Japan and worldwide rights, outside of Asia, in all products. We currently intend to commercialize these and potentially other flavor ingredients under our direct sales program; however, we also retain the flexibility to consider licensing the rights to any flavor ingredients that we control to a third party collaborator.

There can be no assurance that our direct sales program will be successful or that we will enter into any new business arrangements for any of our flavor ingredients that are not currently exclusively licensed to a third party collaborator. We may encounter difficulties in growing our direct sales program or entering into any new business arrangements that we elect to pursue. The direct sales selling cycle may take longer than we anticipate or may be at a slow rate. Any of these events could also delay our anticipated timelines, prevent the successful commercialization of our flavor ingredients, negatively impact our financial results, and delay or prevent us from ever achieving or sustaining profitability.

We may seek additional capital to fund our operations.

If we are unable to successfully commercialize our flavor ingredients through royalty-based collaborations or direct sales, or enter into new product discovery and development collaborations with third parties, we will likely need to obtain additional capital, reduce our ongoing expenses and/or modify our strategy to continue our operations. In addition, our business and operations may change in a manner that would consume available resources at a greater rate than anticipated, or we may decide that for other reasons it is in our best interests to seek additional capital. In such an event, we may need to raise substantial additional capital to, among other things:

- fund research, discovery or development programs;
- advance product candidates into and through the safety evaluation and regulatory approval process;
- fund the strain development, optimization and fermentation process of our natural ingredients;
- acquire rights to products or product candidates, technologies or businesses;
- support the commercialization of our flavor ingredients; and
- prosecute, maintain and enforce our intellectual property rights.

If we pursue additional capital to continue our operations, we cannot assure you that additional financing will be available on terms acceptable to us, or at all. If adequate funds are not available or are not available on acceptable terms, our ability to fund our operations, take advantage of opportunities, identify and develop flavor ingredients and natural HIS, develop technologies or otherwise respond to competitive pressures could be significantly limited. In addition, if financing is not available, we may need to alter our strategies, reduce our ongoing expenses or cease operations. In addition, issuances of debt or additional equity could impact the rights of the holders of our common stock, may dilute our stockholders' ownership and may impose restrictions on our operations. These restrictions could include limitations on additional borrowing, specific restrictions on the use of our assets as well as prohibitions on our ability to create liens, pay dividends, redeem our stock or make investments. Even assuming the Company is successful in securing additional sources of financing to fund continued operations, there can be no assurance that the proceeds of such financing will be sufficient to fund operations until such time, if at all, that the Company generates sufficient revenue from our products to sustain and grow our operations.

We must secure and maintain regulatory approvals of our flavor ingredients and HIS through various governmental bodies outside the United States. The applicable regulations are complex and subject to change, which may adversely impact our ability to commercialize our flavor ingredients internationally.

Sales of our flavor ingredients outside of the United States will be subject to foreign regulatory requirements, which are determined by multiple bodies, such as the Joint FAO/WHO Expert Committee on Food Additives, or JECFA, and the European Food Safety Authority, or EFSA, and in some instances individual countries, such as China, Indonesia and Japan. These foreign regulatory requirements are complex and constantly changing, sometimes quite unpredictably, due, in part, to changes in agendas of political, business and social activist groups as well as government priorities. We may be required to incur substantial costs to comply with current or future laws and regulations, or new interpretations of existing laws and regulations, and our operations, business or financial condition could be adversely affected by such future requirements or interpretations of existing requirements.

A Generally Recognized as Safe, or GRAS, determination in the United States does not ensure approval in other jurisdictions because the requirements from jurisdiction to jurisdiction may vary widely and may change over time. In most cases, whether or not a GRAS determination has been obtained in the United States, approval of a product by the applicable regulatory authorities for a foreign country must still be obtained prior to manufacturing or marketing the product in that country. For example, we are aware of ongoing activities that are intended to clarify the regulatory approval process for flavor ingredients within the EU. Because of the inherent uncertainty associated with the regulatory approval process outside the United States, predicting the outcome or timing of review of any of our submissions to foreign regulatory authorities, present or in the future, is difficult. Accordingly, our estimates and forecasts for those submissions and potential approvals may not be accurate. The process of obtaining foreign approvals could result in significant delays, difficulties and costs for us and require additional safety studies and additional expenses. If we experience delays or if we fail to comply with these regulatory requirements or to obtain and maintain required approvals, our ability to generate revenue will be diminished.

We and our collaborators may not be successful in overcoming these regulatory hurdles, which could result in product launch delays, unanticipated expenses, termination of collaborations and flavor ingredients not being approved for incorporation into consumer products in one or more geographies. In addition, even after regulatory approval of our ingredients, we may become aware of new information that suggests our ingredients are unsuitable for consumer use, in which case our regulatory approvals may be revoked or we may elect to voluntarily cease the commercialization of those ingredients. These consequences would have a material adverse effect on our business financial condition and results of operations.

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If we or our collaborators are unable to obtain and maintain the GRAS determination by FEMA or other regulatory approval with respect to our ingredients required before certain of our ingredients can be incorporated into products that are sold, we would be unable to commercialize our ingredients and our business would be adversely affected.

In the United States, flavor ingredients and HIS are regulated under the Food, Drug and Cosmetic Act, or FD&C Act. Flavor ingredients that qualify for the GRAS review process are generally intended to be consumed in small quantities and have data supporting their safety under conditions of intended use. The Food Additive Amendments of 1958 prompted the flavor industry to establish in 1960 the FEMA Expert Panel whose purpose is to administer the FEMA GRAS review program for flavor ingredients.

Flavor Ingredients

Depending on the amount or intended use of a particular flavor ingredient added to a product and the number of product categories in which the flavor ingredient will be incorporated, specific safety assessment protocols and regulatory processes must be satisfied before we or our collaborators can commercially market and sell products containing any flavor ingredients that we may discover. A key element of our strategy is to develop flavor ingredients that may be subject to review under the FEMA GRAS process. Obtaining and maintaining a GRAS determination or other regulatory approval can be costly and take many years.

In our experiences with the savory, sweet, bitter and cool programs, safety studies, preparation and FEMA GRAS review has historically ranged from 12 to 18 months and cost up to approximately \$1.5 million per flavor ingredient. This experience may not be representative of the timing and cost for current and future programs. The FEMA GRAS process may take longer than 12 to 18 months and cost more than \$1.5 million depending on the properties of the flavor ingredient, and if we elect to perform additional safety studies or if additional safety studies are requested by the FEMA Expert Panel or one of our collaborators or are necessary to explain unexpected safety study findings. There is a risk that one or more of our product candidates for which we seek FEMA GRAS determination may not qualify for a FEMA GRAS determination for specific categories or at all. This may occur for a variety of reasons, including the flavor ingredient's intended use, the amount of the flavor ingredient intended to be added to foods and beverages, the number of product categories in which the flavor ingredient will be incorporated, whether the flavor ingredient imparts sweetness, the safety profile of the flavor ingredient and the FEMA Expert Panel's interpretation of the safety data.

Even if we obtain a GRAS determination with respect to a flavor ingredient, the U.S. Food and Drug Administration, or FDA, has the ability to challenge such determination or one or more of our collaborators may insist on additional studies, which could materially adversely affect our ability to market products on schedule or at all. In the event that a particular flavor ingredient does not qualify for FEMA GRAS determination or if one or more of our collaborators requires additional studies, we could be required to pursue a longer and more expensive approval process or dedicate our development efforts to alternative ingredients, which would further delay commercialization. In addition, laws, regulations or FDA practice governing the regulatory approval process, the availability of the GRAS determination process or the manufacture or labeling of such products, may change in a manner that could adversely affect our ability to commercialize products on schedule or at all and may also harm our ability to maintain our existing collaboration agreements or enter into new collaborations.

High Intensity Sweeteners

A high intensity sweetener is regulated as a food additive by the FDA unless its use as a sweetener is generally recognized as safe, or GRAS, by qualified experts as safe under the conditions of intended use. The basis for a GRAS determination based on scientific procedures is that experts qualified by scientific training and experience to evaluate its safety conclude, based on publically available information, that the substance is safe under the conditions of its intended use and are thus exempt from the food additive approval process. Even if we are able to obtain regulatory approval through the FDA GRAS notification process for our HIS, this process will still be significantly more expensive and timely to complete than the FEMA GRAS review that we have historically undertaken for our flavor ingredients. If our HIS are not eligible as a GRAS substance, we will be required to submit a food additive petition to the FDA seeking approval of our HIS before it can be used in food. The safety studies, preparation and food additive petition review process ranges from two to five years. The additional safety studies required could cost up to approximately \$10 million per HIS.

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There can be no assurance that our natural HIS will be eligible for GRAS determination and we may be required to undertake additional lengthy and expensive safety studies and undergo a very lengthy review process to obtain regulatory approval, including any applicable foreign regulatory approval requirements, which may limit or prevent collaborators from selling products containing any natural HIS that we may discover.

We expect that our results of operations will fluctuate from period to period, and this fluctuation could cause our stock price to decline.

Our operating results have fluctuated in the past and are likely to vary significantly in the future based upon a number of factors, many of which we have little or no control over. We operate in a highly dynamic industry and future results could be subject to significant fluctuations. These fluctuations could cause us to fail to meet or exceed our published guidance or financial expectations of securities analysts or investors, which could cause our stock price to decline rapidly and significantly. Revenue and expenses in future periods may be greater or less than revenue and expenses in the immediately preceding period or in the comparable period of the prior year. Therefore, period-to-period comparisons of our operating results are not necessarily a good indication of our future performance. Some of the factors that could cause our operating results to fluctuate include:

- the ability and willingness of our product discovery, development and commercialization collaborators to commercialize products incorporating our flavor ingredients into food, beverage and ingredient products, on expected timelines, if at all;
- our ability to enter into new product discovery and development collaborations and technology collaborations or to extend the terms of our existing collaboration agreements and our payment obligations, expected revenue and other terms of any of our agreements;
- our ability to discover, develop and commercialize natural sweet taste ingredients;
- our ability to develop a strain and optimize the fermentation process of our natural ingredients;
- the termination, expiration or amendment of any of our product discovery and development collaboration agreements;
- our ability to grow our direct sales program;
- the demand for our collaborators' and other customers' products containing our flavor ingredients;
- our receipt of milestone payments in any particular period;
- our ability, or our collaborators' ability, to successfully satisfy all pertinent regulatory requirements, including any product labeling that may be required by United States or foreign regulatory agencies for products incorporating our flavor ingredients or HIS; and
- general and industry specific economic conditions which may affect our collaborators' research and development expenditures and commercialization efforts.

We have a history of operating losses and we may not achieve or maintain profitability.

We have not been profitable and have generated substantial operating losses since we were incorporated in September 1998. We expect to incur additional losses in the future. The extent and duration of our future losses will depend, in part, on the rate of increase in our operating expenses and the rate of growth, if any, in our revenues from our existing and any future product discovery and development collaborations as well as from our direct sales program and other sources that may become available to us in the future. To date, substantially all of our revenues have come from research and development funding, license fees, cost reimbursement and milestone payments under our product discovery and development collaborations. In order for us to generate further royalty revenues and become profitable, we must successfully enter into new product discovery and development collaborations and our collaborators must further commercialize products incorporating one or more of our flavor ingredients, from which we can derive additional royalty revenues, or we must successfully grow our direct sales program or alternative strategies where we receive revenues from other sources. Our ability to generate commercial revenue is uncertain and will depend upon, among other things, our ability to meet particular commercialization, research and development objectives.

If we lose our key personnel or are unable to attract and retain qualified personnel, it could adversely affect our business.

Our success depends to a significant degree upon the continued contributions of our executive officers, management and scientific staff. We have entered into employment letter agreements with each of our executive officers; however, all of our employees are at-will employees, which means that either we or the employee may terminate their employment at any time. In addition, we currently have no key person insurance. If we are not able to attract and retain the necessary personnel to accomplish all of our business objectives, we may experience constraints that will adversely affect our ability to meet the demands of our current or any future product discovery and development collaborators in a timely fashion, to support our independent discovery and development programs or to pursue our direct sales program. In addition, we may be delayed or unable to develop new product candidates, commercialize our existing product candidates or achieve our other business objectives as a result of any future loss of our other executive officers or key members of our management or scientific staff, which could cause our stock price to decline. Moreover, the loss of the services of one or more of our executive officers or key members of our management or scientific staff could negatively impact the relationships we have with our collaborators.

Our business and operating results may be adversely affected by unfavorable economic and market conditions.

A significant portion of our current business model depends on our ability to maintain and enter into new collaborative research, development and commercialization agreements with leading food, beverage and ingredient companies. Our collaboration agreements typically require our collaborators to make a significant commitment of capital and other resources. In most instances these investments are discretionary on the part of our collaborators. The current weak global economic conditions may reduce the amount of discretionary investment that our current and prospective collaborators may be willing to make in our programs as well as the demand for our flavor ingredients in general. In some instances the result may be that companies elect to defer or delay entering into a collaboration agreement with us, or existing collaborators may amend, terminate or not renew an existing program when it expires. Therefore, weak economic conditions, or a reduction in research and development funding, even if economic conditions improve, would likely adversely impact our business, operating results and financial condition in a number of ways, including longer business development cycles, unfavorable financial or other commercial terms, and longer development timelines.

Disagreements or disputes with a collaborator or customer of our direct sales program could adversely impact our business operations and prospects.

From time to time we have disagreements or disputes with our collaborators regarding various subject matters, such as the interpretation of contractual rights and obligations under our agreements, the design of development studies for our ingredients and intellectual property matters. Because we depend on our collaborators to fund our research and development programs and commercialize our ingredients, any disputes or disagreements with our collaborators could disrupt our business operations and adversely impact our ability to maintain existing collaborations or secure new collaborations. We may also have disagreements or disputes with customers of our direct sales program regarding various subject matters such as the interpretation of contractual rights and obligations under our terms and conditions of sale. Whenever we become involved in a dispute or litigation with any collaborator or customer, we might have to spend significant amounts of money, time and effort to defend our position and we may not be successful. Even if we are successful, any dispute could divert management attention and resources from other strategic, commercial and research priorities.

We may encounter difficulties managing growth, which could adversely affect our business.

Our strategy includes entering into and working on simultaneous flavor ingredient and natural HIS discovery and development programs across multiple markets. We may choose to increase headcount in the future in order to meet our strategic objectives, which may place a strain on us, our management and our resources. Our ability to effectively manage our operations, growth and various projects requires us to continue to improve our operational, financial and management controls, reporting systems and procedures and to attract and retain sufficient numbers of talented employees. We may not be able to successfully implement these tasks on a larger scale and, accordingly, we may not achieve our research, development and commercialization goals. If we fail to improve our operational, financial and management information systems, or fail to effectively monitor or manage our new and future employees or our growth, our business would suffer significantly. In addition, no assurance can be made that we will be able to maintain adequate facilities to house our staff, conduct our research or achieve our business objectives.

If we acquire products, technologies or other businesses, we will incur a variety of costs, may have integration difficulties and may experience numerous other risks that could adversely affect our business.

If appropriate opportunities become available, we may consider acquiring businesses, technologies or products that we believe are a strategic fit with our business. We may also consider reacquiring rights to flavor ingredients that are currently licensed to one or more of our collaborators. We have limited, if any, experience in identifying acquisition targets, successfully acquiring them and integrating them into our current infrastructure. We may not be able to successfully integrate any businesses, products, technologies or personnel that we might acquire in the future without a significant expenditure of operating, financial and management resources, if at all. In addition, future acquisitions might be funded by issuances of debt or additional equity, which could impact your rights as a holder of our common stock and may dilute your ownership percentage. Any of the foregoing could have a significant adverse effect on our business, financial condition and results of operations.

Risks Related To Production and Supply

We currently expect to rely on third parties to develop a fermentation or biosynthesis manufacturing process and manufacture and supply our natural HIS.

Even if we successfully develop natural sweet taste modifier and/or HIS with appropriate attributes required for use in commercial products, our ability to scale up the manufacturing of our natural ingredients to enable their market launch will be dependent upon third parties being able to ferment or biosynthesize/manufacture such ingredients as we do not have the ability or expertise to do so in-house. The fermentation or biosynthesis of a natural compound is very challenging and can be done only by a limited number of companies. If we are unable to successfully identify and collaborate with a third party capable of fermenting or biosynthesizing any natural ingredient that we are able to develop, we will not be able to scale up the manufacturing of such product to enable its market launch and our ability to successfully commercialize such product would be prohibited. Even if we are able to successfully collaborate with a third party capable of fermenting or biosynthesizing our natural ingredients, such third party may encounter difficulties developing a fermentation or biosynthesis manufacturing process which could result in delays in obtaining the necessary regulatory approvals and ultimately delay the commercialization of our natural ingredients. Even if a third party collaborator can ferment or biosynthesize our natural ingredients, such process may not meet the cost requirements which could delay or prevent the commercialization of our natural ingredients. Even if we obtain the necessary regulatory approvals, we will have limited or no control over these third parties, and because we could not ensure the actual fermentation or biosynthesis of our natural HIS or the ability of our suppliers to comply with applicable legal and regulatory requirements, our ability to successfully commercialize natural ingredients may be delayed or limited.

We currently expect to rely on outside suppliers for our flavor ingredients to support our direct sales program, including Firmenich as sole supplier of our sweet flavor ingredients. If Firmenich or other suppliers are unable to supply us with our required amounts of our flavor ingredients on a timely basis, our results of operations may be adversely affected.

We have agreed to utilize Firmenich as our exclusive manufacturer of any sweet flavor ingredient for our direct sales program that Firmenich has selected to develop under the terms of our collaboration agreement. We have also entered into supply agreements with manufacturers for our savory flavor ingredients and bitter blockers and may enter into additional manufacturing arrangements in the future. Because Firmenich and our other suppliers are third party manufacturers, we have only limited control over the timing and level of their production volumes. If Firmenich or our other suppliers fail to supply us with required amounts of our flavor ingredients under our agreements, we would not be able to meet our customers' demands unless we were able to utilize alternative sources of supply, which may be more costly and may not even be available on acceptable terms or within an acceptable timeframe. Accordingly, if Firmenich or our other suppliers are unable to supply us with our required amounts of flavor ingredients on a timely basis and with acceptable quality, it may have a material adverse effect on our results of operations.

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We rely on third parties to manufacture our flavor ingredients on a commercial scale.

We do not have experience in manufacturing nor do we have the resources or facilities to manufacture flavor ingredients on a commercial scale. Therefore, the commercialization of our flavor ingredients depends in part on our or our collaborators' ability to manufacture, or to contract with third-party manufacturers of our ingredients, on a large scale, at a competitive cost, with the specified quality and in accordance with relevant food, beverage and ingredient regulatory requirements. Any such collaborators or third-party manufacturers may encounter manufacturing difficulties at any time that could result in delays in the commercialization of potential flavor ingredients and natural HIS.

Our inability to find capable manufacturing capacity or to enter into agreements on acceptable terms with third party manufacturers could delay commercialization of any products we may develop and may harm our relationships with our existing and any future product discovery and development collaborators and our customers. Moreover, if we or our collaborators are required to change from one third-party manufacturer to another for any reason, the commercialization of our products may be delayed further. In addition, if any manufacturer of our flavor ingredients fail to comply with the FDA's good manufacturing practice regulations or similar regulations in other countries, then we or our collaborators may be subject to adverse regulatory action including product recalls, warning letters and withdrawal of our products, or our collaborators' or customers' products, from the market, any of which may harm our reputation and our business.

Further, because our flavor ingredients are regulated as food products under the FD&C Act, we and the third parties with which we collaborate or contract to manufacture, process, pack, import or otherwise handle our products or our product ingredients, may be required to comply with certain registration, prior notice submission, recordkeeping and other regulatory requirements. Failure of any party in the chain of distribution to comply with any applicable requirements under the FD&C Act or any new regulations implemented by the FDA, or similar regulations in other countries, may adversely affect the manufacture and/or distribution of our products in commerce.

We face risks associated with inventory. If our inventory cannot be sold, our results of operations and/or financial position may be adversely affected.

To ensure adequate inventory supply for our direct sales program, we must forecast inventory needs of certain of our flavor ingredients and place orders with our manufacturers before firm orders are placed by our customers. If we fail to accurately forecast customer demand, we may experience excess inventory levels or a shortage of product to deliver to our customers. We may also be required to purchase substantial amounts of flavor ingredients in order to establish manufacturing relationships with third parties or to give potential customers greater confidence in the reliability of our supply. Inventory levels in excess of customer demand may result in inventory write-downs or write-offs and the sale of excess inventory at discounted prices, which may have a material adverse effect on our results of operations and/or financial position.

Risks Related To Our Industry

Disputes concerning the infringement or misappropriation of our proprietary rights or the proprietary rights of others could be time consuming and extremely costly and could delay our research and development efforts.

Our commercial success, if any, will be significantly harmed if we infringe the patent rights of third parties or if we breach any license or other agreements that we have entered into with regard to our technology or business. Our success will also depend, in part, on our ability to prevent others from infringing our patent rights.

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We are aware of other companies and academic institutions that have been performing research in the areas of taste modulation and flavor ingredients. In particular, other companies, academic institutions and inventor applicants have announced that they have conducted taste-receptor or ion channel research and have published data on taste receptor sequence information and taste receptors or filed patent applications or obtained patent protection on taste modulation, taste modulating compounds or taste receptors and their uses, including Ajinomoto, Axxam S.p.A., Brain, A.G., California Institute of Technology, Cargill, Chromocell Corp., Colorado State University, Columbia University, Dendreon, Duke University, the German Institute of Human Nutrition, Givaudan SA, International Flavors & Fragrances Inc., Johannes Gutenberg University, Kyushu University, Monell Chemical Senses Corp., Mount Sinai School of Medicine, the National Institutes of Health, Nestlé, Novartis, NutraSweet, Nutrinova GMBH, Pfizer, Inc., Ogawa Flavors & Fragrances, Sloan Kettering, Symrise, Tate & Lyle, The Scripps Research Institute, Unilever, the University of California, the University of Miami, the University of Tokyo, the University of Wisconsin, Virginia Commonwealth University and Wiessenbach. To the extent any of these companies, academic institutions or inventor applicants currently have, or obtain in the future, broad patent claims, such patents could block our ability to use various aspects of our discovery and development process and might prevent us from developing or commercializing newly discovered flavor ingredients and HIS or otherwise conducting our business. In addition, it is possible that some of the flavor ingredients and HIS that are discovered using our technology may not be patentable or may be covered by intellectual property of third parties.

The life sciences and other technology industries are characterized by extensive litigation regarding patents and other intellectual property rights. Many life sciences and other technology companies have employed intellectual property litigation as a way to gain a competitive advantage. We may become involved in litigation, interference proceedings, derivation proceedings, oppositions, reexamination, protest, inter partes review, post grant review or other potentially adverse intellectual property proceedings as a result of alleged infringement by us of the rights of others or as a result of priority of invention disputes with third parties. Third parties may also challenge the validity of any of our issued patents in litigation or in opposition, reexamination, inter partes review, or post grant review proceedings. Similarly, we may initiate proceedings to enforce our patent rights and prevent others from infringing our or our licensed intellectual property rights. In any of these circumstances, we might have to spend significant amounts of money, time and effort defending our position and we may not be successful. In addition, any claims relating to the infringement of third-party proprietary rights or proprietary determinations, or validity determinations, even if not meritorious, could result in costly litigation, lengthy governmental proceedings, divert management's attention and resources, or require us to enter into royalty or license agreements that are not advantageous to us.

Should any person have filed patent applications or obtained patents that claim inventions also claimed by us, we may have to participate in an interference proceeding or derivation proceeding declared by the relevant patent regulatory agency to determine priority of invention or derivation and, thus, the right to a patent for these inventions in the United States. Such a proceeding could result in substantial cost to us even if the outcome is favorable. Even if successful on priority grounds, an interference action may result in loss of claims based on patentability grounds raised in the interference action. Litigation, interference proceedings, derivation proceedings, or other proceedings could divert management's time and efforts. Even unsuccessful claims could result in significant legal fees and other expenses, diversion of management's time and disruption in our business. Uncertainties resulting from initiation and continuation of any patent proceeding or related litigation could harm our ability to compete and could have a significant adverse effect on our business, financial condition and results of operations.

An adverse ruling arising out of any intellectual property dispute, including an adverse decision as to the priority of our inventions or invalidity of our patents, could undercut or invalidate our intellectual property position. An adverse ruling could also subject us to significant liability for damages, including possible treble damages, prevent us from using technologies or developing products, or require us to negotiate licenses to disputed rights from third parties. Although patent and intellectual property disputes in the technology area are often settled through licensing or similar arrangements, costs associated with these arrangements may be substantial and could include license fees and ongoing royalties. Furthermore, necessary licenses may not be available to us on satisfactory terms, if at all. Failure to obtain a license in such a case could have a significant adverse effect on our business, financial condition and results of operations.

Our ability to compete in the flavor ingredient and natural HIS market may decline if we do not adequately protect our proprietary technologies.

Our success depends in part on our ability to obtain and maintain intellectual property protection for our technologies flavor ingredients and natural HIS. Patent positions may be highly uncertain and may involve complex legal and factual questions, including the ability to establish patentability of sequences relating to taste receptors, proteins, chemical synthesis techniques, natural and synthetic compounds and methods for using them to modulate taste for which we seek patent protection. No consistent standard regarding the allowability or enforceability of claims in many of our pending patent applications has emerged to date. As a result, we cannot predict the breadth of claims that will ultimately be allowed in our patent applications, if any, including those we have in-licensed or the extent to which we may enforce these claims against our competitors. The degree of future protection for our proprietary rights is therefore highly uncertain and we cannot assure you that:

- we were or will be the first to file patent applications or to invent the subject matter claimed in patent applications relating to the technologies upon which we rely;
- our issued patent claims relating to our technologies will be sufficiently broad to protect our flavor ingredients and technologies and our customers' use of our flavor ingredients and technologies;
- others will not independently develop or duplicate similar or alternative flavor ingredients, sweeteners or technologies;
- our issued patent claims will not be challenged, potentially invalidated or potentially circumvented by third parties;
- our issued and future patent claims directed to naturally occurring materials will issue or continue to be valid in the U.S.;
- the use of our technologies and flavor ingredients will not infringe any third-party patent or intellectual property;
- any of our patent applications will result in issued patents, or if issued, that any of our existing and future patent claims will be held valid and enforceable against third-party infringement;
- any of our patent applications will not result in interferences, derivation proceedings or disputes with third parties regarding priority of invention or the validity of any issued patent;
- any patents that have issued or may be issued to us, our collaborators or our licensors will provide a basis for commercially viable products or will provide us with any competitive advantages or will not be challenged by third parties;
- the patents of others will not have an adverse effect on our ability to do business;
- others did not publicly disclose our claimed technology before we conceived the subject matter included in any of our patent applications; or
- new proprietary technologies from third parties, including existing licensors, will be available for licensing to us on reasonable commercial terms, if at all.

In addition, patent law outside the United States is uncertain and in many countries intellectual property laws are undergoing review and revision. The laws of some countries do not protect intellectual property rights to the same extent as domestic laws. It may be necessary or useful for us to participate in opposition or post-grant proceedings to determine the validity of our competitors' patents, litigation to enforce our or our licensed intellectual property against others or to defend the validity of any of our or our licensors' future patents, which could result in substantial costs and would divert our efforts and attention from other aspects of our business. We cannot be certain of the outcome of any such proceedings or litigation.

Technologies licensed to us by others, or in-licensed technologies, are important to our business. In particular, we depend on technology related to certain taste receptor sequences that we license from the University of California and others and technology related to compound libraries that we license from third parties. In addition, we may in the future acquire rights to additional technologies by licensing such rights from existing licensors or from third parties. Such in-licenses may be costly. Also, we generally do not control the patent prosecution, maintenance or enforcement of in-licensed technologies. Accordingly, we are unable to exercise the same degree of control over this intellectual property as we do over our internally developed technologies. Moreover, some of our academic institution licensors, collaborators and scientific advisors have rights to publish data and information to which we have rights. If we cannot maintain the confidentiality of our technologies and other confidential information in connection with our collaborations, our ability to protect our proprietary information or obtain patent protection in the future may be impaired, which could have a significant adverse effect on our business, financial condition and results of operations.

Many of the patent applications we and our licensors have filed have not yet been substantively examined and may not result in patents being issued.

Many of the patent applications filed by us and our licensors have not been substantively examined by the United States Patent and Trademark Office and in foreign patent offices and may result in granted patents with claims of narrow scope that may not sufficiently deter competitors or may not result in patents being issued. Some of these patent applications claim sequences that were identified from different publicly available sequence information sources such as the High-Throughput Genomic Sequences division of GenBank. It is difficult to predict whether all of our or our licensors' applications will ultimately be found to be patentable or, if so, to predict the scope of any allowed claims. In addition, the disclosure in our or our licensors' patent applications, particularly in respect of the utility of our claimed inventions, may not be sufficient to meet the statutory requirements for patentability in all cases. As a result, it is difficult to predict whether all of our or our licensors' applications will be allowed, or, if so, to predict the scope of any allowed claims or the enforceability of the patents. Even if enforceable, others may be able to design around any patents or develop similar technologies that are not within the scope of such patents. Our and our licensors' patent applications may not issue as patents that will provide us with any protection or competitive advantage, which may have a material adverse effect on our business.

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The Supreme Court determined in the Myriad decision that some isolated naturally occurring nucleic acids are ineligible for United States patent protection. This decision may raise concerns as to the validity of some or all of our granted claims, and those in our licensors' patents, and the patentability of our or our licensors' pending claims, which are directed to isolated, naturally occurring nucleic acids. Also, while the Supreme Court in the Myriad decision did not address the patentability of other isolated, naturally occurring materials (i.e., non-nucleic acids), it is possible that later courts may determine that other isolated naturally occurring materials are similarly ineligible for United States patent protection. This may raise concerns as to the validity of some or all of our granted claims, and those in our licensors' patents, which are directed to isolated naturally occurring materials such as isolated, naturally occurring taste receptor polypeptides or isolated, naturally occurring flavor ingredients. In recently issued interim guidance, the United States Patent and Trademark Office has interpreted the Myriad decision as applying to any isolated naturally occurring material including non-nucleic acids. Thus, pending patent applications filed by us or our licensors that are directed to isolated naturally occurring materials may not issue in the United States, which could have a significant adverse effect on our business, financial condition and results of operations.

Many potential competitors, including those who have greater resources and experience than we do, may develop products or technologies that make ours obsolete or noncompetitive.

The life sciences and other technology industries are characterized by rapid technological change, and the area of sensory or taste receptor research is a rapidly evolving field. Our future success will depend on our ability to maintain a competitive position with respect to technological advances. Technological developments by others may result in our flavor ingredients or natural HIS and technologies becoming obsolete.

In particular, we face substantial competition from companies pursuing the commercialization of products and services relevant to taste using more traditional methods for the discovery of flavor ingredients, or for the reduction of salt, sugar, monosodium glutamate, or MSG, or bitter taste. These competitors include leading flavor companies, such as Firmenich, Givaudan SA, International Flavors & Fragrances Inc., Symrise and Takasago. These companies provide flavors and other ingredients, such as essential oils, extracts and distillates, to consumer products companies for use in a wide variety of products including foods, beverages, confectionaries, dairy products and pharmaceuticals. Competitors currently developing or marketing HIS include Ajinomoto, BRAIN AG, or Biotechnology Research and Information Network AG, Cargill, DSM, Evolva, GLG Life Tech, Institute of Plant Sciences, Agricultural Research Organization–Volcani Center, Natur Research Ingredients, Nutrasweet, Nutrinova GMBH, PureCircle Limited, Tate & Lyle and The Coca Cola Company. Competitors currently developing or marketing menthol or cooling agents include International Flavors and Fragrances, Givaudan, Jindal Drugs, Mentha & Allied, Sharp Menthol, Symrise and Takasago. We currently compete and will continue to compete in the future with these companies in collaborating with and selling flavor ingredients for incorporation in food and beverage products. Many of these companies have substantially greater capital resources, research and development resources and experience, manufacturing capabilities, regulatory expertise, sales and marketing resources, established relationships with consumer products companies and production facilities.

Savory flavor ingredients, such as inosine monophosphate, or IMP, and natural HIS, such as Stevia, are commercially available, and we will compete with the companies that produce these ingredients. IMP and natural HIS, such as Stevia, are widely available and is a generally accepted by the food, beverage and ingredient industries. As a result, our existing and future collaborators may choose to incorporate IMP or similar savory flavor ingredients or Stevia or other natural HIS, into their food, beverage and ingredient products instead of our ingredients. We may compete with bitter masking or bitter blocking compounds, such as adenosine 5' monophosphate, or AMP. We may also compete with known methods for reducing sodium, such as the use of potassium chloride in combination with flavors and masking agents. In addition, we may compete with existing cooling agents, such as menthol and WS-3, which are currently in use.

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We may in the future face competition from life sciences and other technology companies and other commercial enterprises. These entities engage as we do in biotechnology, biology or chemistry research and could apply this technology to the discovery and development of flavor ingredients. We are aware of two companies, Brain AG and Chromocell Corp., which are involved in research for the discovery and development of sweet flavor modifiers, bitter blockers and salt substitutes. We cannot guarantee that products developed as a result of our competitors' existing or future collaborations will not compete with our flavor ingredients.

Universities and public and private research institutions are also potential competitors. While these organizations primarily have educational objectives, they may develop proprietary technologies related to the sense of taste or secure patent protection that we may need for the development of our technologies and products. We may attempt to license these proprietary technologies, but these licenses may not be available to us on acceptable terms, if at all.

Our competitors, either alone or with their collaborative partners, may succeed in developing technologies or discovering flavor ingredients that are more effective, more affordable or more easily commercialized than ours, and our competitors may obtain intellectual property protection or commercialize products sooner than we do. Developments by others may render our product candidates or our technologies obsolete. In addition, our current product discovery and development collaborators are not prohibited from entering into research and development collaboration agreements with third parties in any product field. Our failure to compete effectively would have a significant adverse effect on our business, financial condition and results of operations.

If we are unable to protect our trade secrets and other proprietary information, we could lose any competitive advantage we may have, which could adversely affect our business.

We rely in part on trade secret protection for our confidential and proprietary information, knowhow and processes. Our policy is to execute proprietary information and invention agreements with our employees and consultants upon the commencement of an employment or consulting relationship. These agreements generally require that all confidential information developed by the individual or made known to the individual by us during the course of the individual's relationship with us be kept confidential and not be disclosed to third parties. These agreements also generally provide that inventions conceived by the individual in the course of their employment shall be our exclusive property. Similarly, in the course of our collaborations or in the negotiation of potential collaborations we often disclose confidential and proprietary information under written agreements that obligate those third parties to keep our information confidential and to use our confidential information only for the purposes that we specify. There can be no assurance that we will be able to effectively enforce these agreements or that proprietary information is our exclusive property. There can be no assurance that the subject proprietary information will not be disclosed, that others will not independently develop substantially equivalent proprietary information and techniques or otherwise gain access to our trade secrets or that we can meaningfully protect our trade secrets. 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.

Risks Related to Quality and Safety

Concerns with safety and quality could cause customers to avoid products that contain our flavor ingredients.

Adverse publicity about the safety of certain foods due to the actual or potential existence of certain artificial flavors or other ingredients has heightened the sensitivities of many consumers. These safety and quality issues, whether real or perceived, may discourage customers from buying products containing or perceived to contain the ingredients which give rise to such concerns. We could be adversely affected if our customers or the ultimate consumers of our products lose confidence in the safety and quality of our flavor ingredients. Any negative perceptions about the safety and quality of our flavor ingredients could adversely affect our business and financial condition.

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We may be sued for product liability and exposed to other product safety-related risks, which could adversely affect our business and harm our reputation.

Because our business strategy involves the development and sale of commercial products incorporating our flavor ingredients, we may be sued for product liability and we may also be the subject of product recalls, product seizures and related adverse publicity. Product liability claims and recalls of products that contain any of our flavor ingredients could result from such things as contamination, spoilage, product misbranding or product tampering, whether real or perceived.

From time to time we receive reports of observed effects after individuals taste solutions or products that include novel flavor ingredients that we are testing or developing, including reports such as irritation of the mouth, tingling of the tongue, lips or gums, and modulation or loss of taste sensation. Our practice is to track reports of any observed effects and, in particular, to evaluate whether any adverse effect may be related to our novel flavor ingredient or whether another cause is determinable. In some instances, these effects may be observed only at higher levels of use or exposure, in which case we may elect to proceed with development, and subsequent commercialization, of a novel flavor ingredient at use levels that we believe are appropriate for only a subset of all potential applications. Nevertheless, we may be held liable if any flavor ingredient we test, develop or commercialize, or any product our collaborators test, develop or commercialize that incorporates any of our flavor ingredients, causes injury or illness or is found otherwise unsuitable during product testing, manufacturing, marketing, sale or consumer use. In addition, the safety studies we must perform and the regulatory approvals we must obtain prior to incorporating our flavor ingredients into a commercial product will not protect us from any such liability.

Any alleged illness or injury associated with any of our flavor ingredients, product defect, product liability judgment or product recall may negatively impact our financial results depending on the reaction of our collaborators, scope, competitive reaction, and consumer attitudes. Even if such an allegation or product liability claim lacks merit, cannot be substantiated, is unsuccessful or is not fully pursued, the negative publicity surrounding any assertion that our flavor ingredients or products that incorporate our flavor ingredients caused illness, injury or death could adversely affect our reputation with existing and potential collaborators and licensees and our corporate image and could cause a decline in our stock price.

Our product liability insurance may not be sufficient to cover our potential liabilities in the case of a product recall or other safety-related claims.

Our product liability insurance may not fully cover our potential liabilities associated with the sale of commercial products incorporating any of our flavor ingredients. Insurance coverage for such risks may be expensive and difficult to obtain, and we may be unable to obtain coverage in the future on acceptable terms, if at all. Our inability to obtain sufficient insurance coverage to protect against potential product liability claims could prevent or inhibit the commercialization of products developed by us or our product discovery and development collaborators. We may be obligated to indemnify our product discovery and development collaborators or customers of our direct sales program for product liability or other losses they incur as a result of our flavor ingredients. Any indemnification we receive from such collaborators or customers for product liability that does not arise from our flavor ingredients may not be sufficient to satisfy our liability to injured parties. If we are sued for any injury caused by our flavor ingredients or products incorporating our flavor ingredients, our liability could exceed our total assets.

We use hazardous materials. Any claims relating to improper handling, storage or disposal of these materials could be time consuming and costly.

Our discovery and development process requires our employees to routinely handle hazardous chemical, radioactive and biological materials. Our operations also produce hazardous waste products. Federal, state and local laws and regulations govern the use, manufacture, storage, handling and disposal of these materials. As a result of the increase in size of our operations, we are now classified as a large quantity generator of hazardous waste. This classification may result in increased scrutiny of our operations by the Environmental Protection Agency. Compliance with applicable environmental laws and regulations may be expensive, and current or future environmental regulations may impair our discovery and development efforts.

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In addition, we cannot entirely eliminate the risk of accidental contamination or discharge and any resultant injury from these materials. Our insurance policies have limited coverage for damages or cleanup costs related to hazardous waste disposal or contamination. We may be forced to curtail operations or be sued for any injury or contamination that results from our use or the use by others of these materials, and our liability may exceed our total assets.

Risks Related To Our Common Stock

The price of our common stock is volatile.

The market prices for securities of biotechnology companies historically have been highly volatile, and the market has from time to time experienced significant price and volume fluctuations that are unrelated to the operating performance of particular companies. Since our initial public offering in June 2004, the price of our common stock has ranged from approximately \$0.57 per share to approximately \$23 per share. The market price of our common stock may fluctuate in response to the factors described in this *Risk Factors* section, or other factors, some of which are beyond our control, such as:

- our product discovery, development and commercialization collaborators' decisions concerning the timing and extent of commercialization of our flavor ingredients;
- publications, articles or other media concerning our flavor ingredients and/or commercialization efforts;
- failure of any of our flavor ingredients, if approved, to achieve commercial success;
- developments concerning our collaboration agreements, including the ability to enter into new agreements;
- our ability to generate significant revenues from our direct sales program;
- fluctuations in our operating results;
- public concern as to the safety of our flavor ingredients or other unfavorable publicity regarding our flavor ingredients or our research methods;
- developments related to the United States and international regulatory approval of our products;
- results of safety evaluation of our flavor ingredients;
- government regulation;
- the discovery of a product defect or the commencement of a product recall;
- an allegation of illness or injury relating to our flavor ingredients, whether meritorious or not, or any product liability judgment;
- developments in patent or other proprietary rights;
- announcements of technological innovations by us or others;
- changes in our management, key personnel or members of our Board of Directors;
- future sales of our common stock by existing stockholders, officers or directors;
- comments by securities analysts; and
- general market conditions.

Some companies that have experienced volatility and sustained declines in the market price of their stock have become subject to securities class action and derivative action litigation, and we may be the target of similar litigation in the future. Securities litigation against us could result in substantial costs and divert our management's attention from other business concerns, which could seriously harm our business.

Our business could be impacted as a result of actions by activist stockholders or others.

We may be subject, from time to time, to legal and business challenges in the operation of our company due to actions instituted by activist stockholders or others. Responding to such actions could be costly and time-consuming, may not align with our business strategies and could divert the attention of our Board of Directors and senior management from the pursuit of our business strategies. Perceived uncertainties as to our future direction as a result of shareholder activism may lead to the perception of a change in the direction of the business or other instability and may affect our relationships with collaborators, customers, prospective and current employees and others.

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Anti-takeover provisions in our charter documents and under Delaware law may make an acquisition of us more complicated and the removal and replacement of our directors and management more difficult.

Provisions of our amended and restated certificate of incorporation and bylaws, as well as provisions of Delaware law, could make it more difficult for a third party to acquire us, even if doing so would benefit our stockholders. These provisions may also make it difficult for stockholders to remove and replace our board of directors and management. These provisions:

- authorize the issuance of “blank check” preferred stock by our board of directors, without stockholder approval, which could increase the number of outstanding shares and prevent or delay a takeover attempt;
- limit who may call a special meeting of stockholders;
- prohibit stockholder action by written consent, thereby requiring all stockholder actions to be taken at a meeting of our stockholders; and
- establish advance notice requirements for nominations for election to the board of directors or for proposing matters that can be acted upon at stockholder meetings.

In addition, the requirements of Section 203 of the Delaware General Corporation Law may discourage, delay or prevent a third party from acquiring us.

We have never paid cash dividends on our capital stock and we do not anticipate paying dividends in the foreseeable future.

We have paid no cash dividends on any of our classes of capital stock to date, and we currently intend to retain our future earnings, if any, to fund the development and growth of our business. In addition, the terms of any future debt or credit facility may preclude us from paying any dividends. As a result, capital appreciation, if any, of our common stock will be your sole source of potential gain for the foreseeable future.

Item 1B. Unresolved Staff Comments

None.

Item 2. Properties

We currently lease approximately 65,000 square feet of laboratory and office space at 4767 Nexus Centre Drive, San Diego, California, 92121. We believe that our facilities are adequate to meet our business requirements for the near-term and that additional space will be available on commercially reasonable terms, if required.

Item 3. Legal Proceedings

We are not a party to any material legal proceedings at this time.

Item 4. Mine Safety Disclosures

None.

PART II**Item 5. Market for Registrant's Common Equity, Related Stockholder Matters and Issuer Purchases of Equity Securities****Common Stock Market Price**

Our common stock commenced trading on the NASDAQ Stock Market on June 22, 2004 under the symbol "SNMX." The following table sets forth the high and low sales prices per share of our common stock as traded on the NASDAQ Stock Market for the periods indicated.

Fiscal 2016 Quarter ended	March 31, 2017	June 30, 2017	September 30, 2017	December 31, 2017
High	\$ 1.53	\$ 1.06	\$ 0.85	\$ 1.71
Low	\$ 0.93	\$ 0.81	\$ 0.56	\$ 0.62

Fiscal 2016 Quarter ended	March 31, 2016	June 30, 2016	September 30, 2016	December 31, 2016
High	\$ 3.85	\$ 3.74	\$ 4.85	\$ 4.17
Low	\$ 2.56	\$ 2.11	\$ 2.36	\$ 0.78

The last sale price for our common stock as reported by the NASDAQ Stock Market on February 27, 2018 was \$1.26 per share. As of February 2, 2018, there were approximately 45 stockholders of record of our common stock.

We have never declared or paid any cash dividends to our stockholders. We do not presently plan to pay cash dividends in the foreseeable future and intend to retain any future earnings for reinvestment in our business.

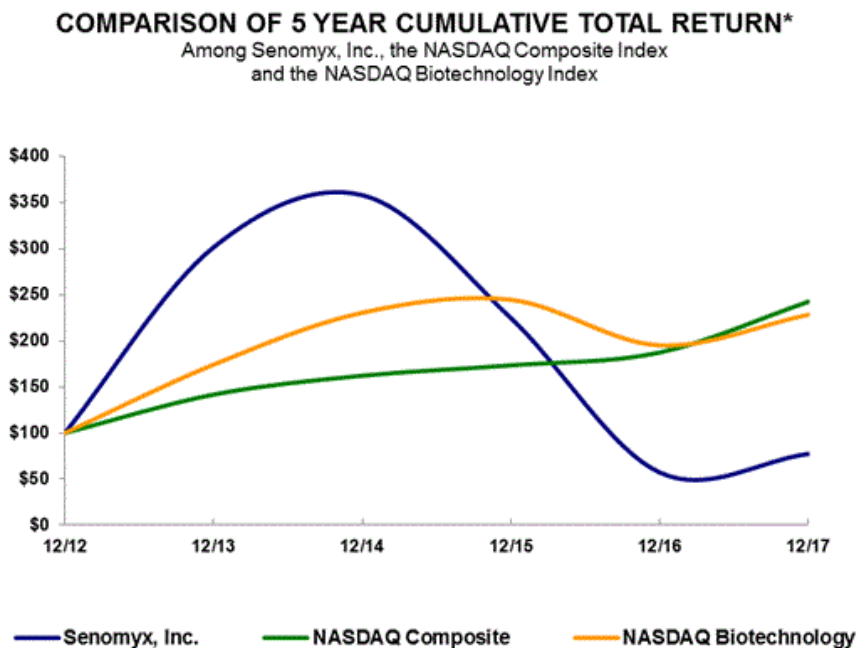
Information about our equity compensation plans is included in Item 12 of Part III of this annual report on Form 10-K.

Repurchases of Equity Securities

There were no repurchases of equity securities in 2017.

Performance Measurement Comparison (1)

The graph below matches Senomyx, Inc.'s cumulative 5-Year total shareholder return on common stock with the cumulative total returns of the NASDAQ Composite index and the NASDAQ Biotechnology index. The graph tracks the performance of a \$100 investment in our common stock and in each index (with the reinvestment of all dividends) from 12/31/2012 to 12/31/2017.



*\$100 invested on 12/31/12 in stock or index, including reinvestment of dividends.
Fiscal year ending December 31.

	<u>12/2012</u>	<u>12/2013</u>	<u>12/2014</u>	<u>12/2015</u>	<u>12/2016</u>	<u>12/2017</u>
Senomyx, Inc.	100.00	301.19	357.74	224.40	57.14	77.38
NASDAQ Composite	100.00	141.63	162.09	173.33	187.19	242.29
NASDAQ Biotechnology	100.00	174.05	230.33	244.29	194.95	228.29

(1) This section is not “soliciting material,” is not deemed “filed” with the SEC, is not subject to the liabilities of Section 18 of the Securities Exchange Act of 1934, as amended, and is not to be incorporated by reference in any of our filings under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended, whether made before or after the date hereof and irrespective of any general incorporation language in any such filing.

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Item 6. Selected Financial Data

The Statement of Operations Data and Balance Sheet Data presented below should be read in conjunction with Item 7, Management's Discussion and Analysis of Financial Condition and Results of Operations, and Item 8, Financial Statements and Supplementary Data included in this annual report on Form 10-K. Amounts are in thousands, except share and per share amounts.

	Years ended December 31,				
	2017	2016	2015	2014	2013
Statements of Operations Data:					
Revenues:					
Development revenues	\$ 7,789	\$ 13,797	\$ 17,838	\$ 21,827	\$ 24,657
Commercial revenues	21,531	9,242	7,044	5,835	4,630
Total revenues	29,320	23,039	24,882	27,662	29,287
Operating expenses:					
Cost of commercial revenues	1,832	1,096	638	644	325
Research, development and patents	16,685	20,950	24,085	26,627	28,612
Selling, general and administrative	12,136	11,752	12,849	12,578	12,283
Total operating expenses	30,653	33,798	37,572	39,849	41,220
Loss from operations	(1,333)	(10,759)	(12,690)	(12,187)	(11,933)
Other income	70	73	42	37	35
Net loss	\$ (1,263)	\$ (10,686)	\$ (12,648)	\$ (12,150)	\$ (11,898)
Basic and diluted net loss per share	\$ (0.03)	\$ (0.24)	\$ (0.29)	\$ (0.29)	\$ (0.29)
Shares used to compute basic and diluted net loss per share	47,192,957	44,803,952	43,968,167	42,611,904	40,662,640

	As of December 31,				
	2017	2016	2015	2014	2013
Balance Sheet Data:					
Cash, cash equivalents and investments available-for-sale	\$ 15,863	\$ 12,363	\$ 22,954	\$ 28,738	\$ 32,962
Working capital	19,565	15,310	19,649	19,800	15,611
Total assets	27,600	23,764	32,575	38,161	41,614
Accumulated deficit	(279,522)	(278,171)	(267,485)	(254,837)	(242,687)
Total stockholders' equity	18,763	14,802	19,524	23,558	19,678

Item 7. Management's Discussion and Analysis of Financial Condition and Results of Operations

The following discussion of our financial condition and results of operations should be read in conjunction with our Financial Statements and the related Notes to Financial Statements in Item 8, "Financial Statements and Supplementary Data" in this annual report on Form 10-K.

Certain statements contained in this annual report on Form 10-K, including statements regarding the development, growth and expansion of our business, our intent, belief or current expectations, primarily with respect to our future operating performance, and the products we expect to offer and other statements regarding matters that are not historical facts, are "forward-looking statements" within the meaning of Section 27A of the Securities Act and Section 21E of the Securities Exchange Act of 1934, as amended, and are subject to the "safe harbor" created by these sections. Future filings with the SEC, future press releases and future oral or written statements made by us or with our approval, which are not statements of historical fact, may also contain forward-looking statements. Because such statements include risks and uncertainties, many of which are beyond our control, actual results may differ materially from those expressed or implied by such forward-looking statements. Some of the factors that could cause actual results to differ materially from those expressed or implied by such forward-looking statements can be found under the caption "Risk Factors" and elsewhere in this annual report on Form 10-K. Readers are cautioned not to place undue reliance on forward-looking statements. The forward-looking statements speak only as of the date on which they are made, and we undertake no obligation to update such statements to reflect events that occur or circumstances that exist after the date on which they are made.

Overview and Recent Developments

We use proprietary taste receptor technologies to discover, develop and commercialize innovative flavor ingredients for the packaged food, beverage and ingredient supply industries. We consider flavor ingredients to include flavors, such as savory and cooling, and flavors with modifying properties, such as sweet and salt taste modifiers and bitter blockers. Flavors with modifying properties is a term used by the flavor industry to describe ingredients that function as part of a flavor system to modify or enhance the flavor profile of a variety of food and beverages. We also have an ongoing effort to discover and develop natural high intensity sweeteners, or natural HIS. We believe our flavor ingredients, when added as part of a flavor system, will enable packaged food, beverage and ingredient supply companies to improve the nutritional profile (i.e., reduce calories) of their products while maintaining or improving taste and, in certain cases, generating cost of goods savings.

Historically, we have derived our revenues from collaborative agreements by licensing our flavor ingredients to our collaborators on an exclusive or co-exclusive basis and receiving royalties and commercial milestones upon commercialization. We currently have collaborative agreements with several of the world's leading packaged food, beverage and ingredient companies, including Ajinomoto Co., Inc., or Ajinomoto, Firmenich SA, or Firmenich and PepsiCo, Inc., or PepsiCo. Depending upon the collaboration, our collaboration agreements have generally provided for license fees, research and development funding, reimbursement of certain costs, milestone payments based upon our achievement of research or development goals and, in the event of commercialization, commercial milestones, minimum periodic royalties and royalties on sales of products incorporating our flavor ingredients. As our technology has evolved from concept to commercial products, we have shifted our licensing approach with respect to collaborations for our flavor ingredients and natural HIS. Rather than licensing flavor ingredients and natural HIS to a collaborator on an exclusive or co-exclusive basis, we have begun licensing our ingredients on a non-exclusive basis to expand the addressable market for commercialization. We believe this approach will allow greater commercialization and usage of our ingredients by multiple food, beverage and ingredient supply companies.

In addition to revenues from collaborative agreements, we have a complementary commercialization strategy whereby we sell certain of our flavor ingredients directly to flavor companies for re-sale to their food and beverage company customers. The flavor companies add value by incorporating our ingredients into proprietary flavor systems, which include a combination or variety of flavor ingredients, for their customers. To support this direct sales program, we have established relationships with third party manufacturers. Our commercial revenues under the direct sales program are generated from sales of our flavor ingredients to flavor companies and other customers.

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In November 2017, we entered into an amendment to the Collaborative Research, Development, Commercialization and License Agreement with Firmenich. Under the agreement, the research period previously concluded and Firmenich has been and is currently exclusively commercializing cool flavor ingredients previously licensed by us to Firmenich.

Rights: The amendment expands Firmenich's rights under our cool taste program by granting Firmenich an exclusive license to Coolmyx CL19 and related cool flavor ingredients in all product categories other than therapeutics. The amendment also includes a license expansion of the previously licensed cool flavor ingredients for product categories covering all applications in the flavor, oral care and consumer product markets.

Consideration: As consideration for the additional rights, Firmenich paid us \$10.0 million in November 2017.

Royalties: We will receive royalty payments upon Firmenich's or a sublicensee's sale of products containing any of the licensed cool flavor ingredients. Firmenich's royalty obligations will be suspended between January 1, 2018 and December 31, 2020 but will resume on January 1, 2021 along with minimum annual royalty obligations.

Exclusivity: We will not, among other things, commercialize or sell cool flavor ingredients within the same chemical class as the licensed cool flavor ingredients. However, we shall have the right and ability to continue our cool research program independent of Firmenich and to discover, develop and commercialize all other cool flavor ingredients.

We have incurred significant losses since our inception in 1998. Our results of operations have fluctuated from period to period and likely will continue to fluctuate substantially in the future based upon:

- the ability and willingness of our product discovery, development and commercialization collaborators to commercialize products incorporating our flavor ingredients into food, beverage and ingredient products, on expected timelines, if at all;
- our ability to enter into new product discovery, development and commercialization collaborations and technology collaborations and our payment obligations, expected revenues and other terms of any of our agreements;
- our ability to grow our direct sales program;
- the demand for our collaborators' and other customers' products containing our flavor ingredients;
- the termination, expiration or amendment of any of our product discovery, development and commercialization collaboration agreements;
- our receipt of milestone payments in any particular period;
- our ability, or our collaborators' ability, to successfully satisfy all pertinent regulatory requirements; and
- general and industry specific economic conditions which may affect our collaborators' research and development expenditures and commercialization efforts.

Revenues

Our revenues to date have come from license fees, research and development funding, reimbursement of certain patent and regulatory costs, milestone payments and royalty payments under our collaborative agreements and from sales of our flavor ingredients directly to flavor companies for re-sale to food and beverage companies.

As of December 31, 2017, we have recognized cumulative revenues under our collaborations of \$322.5 million. If any of our collaborative agreements were to terminate earlier than currently anticipated, we may experience a significant decline in our revenues. We anticipate that a significant portion of our revenues in the near future will be derived from research and development funding. We may receive license fees and/or additional milestone payments in the future upon the achievement of certain goals set forth in our collaboration agreements.

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As our collaborators launch products incorporating our flavor ingredients or natural HIS, we may receive minimum periodic royalties and royalty payments based upon the sales of those products. In addition, we generate revenues from flavor ingredient sales directly to flavor companies for re-sale to food and beverage companies. Such royalty payments and flavor ingredient sales in the future could be significantly larger than research and development funding, license fees or milestone payments. In order for us to generate significant royalty revenues and flavor ingredient sales and to become profitable, we must retain our existing collaborations or establish new product discovery, development and commercialization collaborations and our collaborators and other customers must successfully commercialize products incorporating one or more of our flavor ingredients. Our ability to generate significant royalty revenues or flavor ingredient sales is inherently uncertain and will depend upon our ability to meet particular research, development and commercialization objectives and the ability and willingness of food and beverage companies to commercialize products incorporating our flavor ingredients on expected timelines.

Cost of Commercial Revenues

Cost of commercial revenues consists of royalties payable under our third-party licensing agreements and cost of goods sold for sales of our flavor ingredients under our direct sales program.

Research, Development and Patents

Our research, development and patent expenses consist primarily of costs associated with our discovery and development efforts related to natural HIS, sweet taste modifiers and salt taste modifiers. We track research, development and patent costs by the type of cost incurred rather than by project. Research, development and patent costs are comprised of salaries and other personnel-related expenses, facilities and depreciation, research and development supplies, patents and licensing, outside services and non-cash stock-based compensation expenses. We charge research, development and patent expenses to operations as incurred.

The research, development and patents payments we have received from our collaboration agreements historically have not covered all of our research, development and patents expenses. At this time, due to the risks inherent in the discovery of flavor ingredients and natural HIS, we are unable to estimate with any certainty the costs we will incur in the continued development of our products for commercialization. We anticipate that we will make determinations regarding the research and development projects to pursue and the funding of each project on an ongoing basis in response to the progress of each discovery and development program, as well as an ongoing assessment of its market potential.

Our ability to complete the development of our current product candidates is subject to many risks and uncertainties. These risks include the risks, among others, that:

- we are substantially dependent upon our collaborators for research and development funding;
- our collaborators may terminate their respective collaboration programs early;
- we may not be able to discover flavor ingredients or natural HIS with the desired taste attributes;
- we may not be successful in developing flavor ingredients or natural HIS with other attributes required for use in commercial products;
- we may not be able to develop manufacturing or fermentation processes that meet cost requirements;
- we may be unable to obtain and maintain FEMA GRAS determination for our flavor ingredients, or equivalent regulatory approvals in other geographies; and
- we may be unable to obtain and maintain US regulatory authorization for our natural HIS, or equivalent regulatory approvals in other geographies.

If we do not complete the development of our flavor ingredients or natural HIS on a timely basis, our collaborators may terminate or not renew our collaboration agreements, we may begin receiving revenue from the commercialization of products incorporating our flavor ingredients or natural HIS later than anticipated, or not at all, and it may be more difficult to enter into new collaboration agreements. In any of these cases, we may require substantial additional funding in order to continue development of our flavor ingredients and natural HIS.

Selling, General and Administrative

Selling, general and administrative expenses consist primarily of salaries and other personnel-related expenses related to business development, legal, financial, sales and commercial development, supply chain management and other administrative functions. Selling, general and administrative expenses also include non-cash stock-based compensation expenses.

Results of Operations

Years Ended December 31, 2017, 2016 and 2015

Revenues

We recorded revenues of \$29.3 million, \$23.0 million and \$24.9 million during the years ended December 31, 2017, 2016 and 2015, respectively. Research and development payments, license fees, milestone payments and royalty revenues under our material collaborations with Firmenich and PepsiCo accounted for 87% of the total revenues for the year ended December 31, 2017. The increase of \$6.3 million in total revenues from 2016 to 2017 resulted from a \$12.3 million increase in commercial revenues and a \$6.0 million decrease in development revenues in 2017.

Development revenues in 2017 decreased \$6.0 million from 2016 largely due to reduced research funding in 2017 under our sweet taste program collaboration with PepsiCo and the conclusion in July 2016 of the research funding period of the sweet taste program collaboration with Firmenich.

Commercial revenues increased \$12.3 million in 2017, largely due a \$10.0 million payment associated with the expansion of our cool program collaboration with Firmenich to include an exclusive license to an additional approved flavor ingredient and related analogs, expansion of rights and suspension of royalty obligations. Royalty revenues related to our sweet taste program increased \$2.8 million.

For 2016, research and development payments, license fees, milestone payments and royalty revenues under our material collaborations with Firmenich and PepsiCo accounted for 82% of the total revenues. The decrease of \$1.8 million in total revenues from 2015 to 2016 resulted from a \$4.0 million decrease in development revenues and a \$2.2 million increase in commercial revenues in 2016.

Development revenues in 2016 decreased \$4.0 million from 2015 largely due to the conclusion in July 2016 of the research funding period of the sweet taste program collaboration with Firmenich, which accounted for a decrease of \$2.4 million.

Commercial revenues increased \$2.2 million in 2016, reflecting a \$2.5 million increase in royalties related to our sweet taste program, as well as increases in direct sales and royalties from our bitter blocker and savory flavor programs. These increases were partially offset by a \$1.5 million decrease in commercial milestone payments. For 2018, we expect total revenues to decrease compared to 2017, due to decreasing commercial revenues.

Cost of Commercial Revenues

Our cost of commercial revenues were \$1.8 million, \$1.1 million and \$638,000 for the years ended December 31, 2017, 2016 and 2015, respectively. The increase in cost of commercial revenues from 2015 to 2016 and from 2016 to 2017 primarily resulted from higher royalties payable under our third-party licensing arrangements and higher cost of goods sold due to an increase in direct sales and inventory reserves.

Research, Development and Patents Expenses

Our research, development and patents expenses, which include stock-based compensation expenses associated with research and development personnel, were \$16.7 million, \$21.0 million and \$24.1 million for the years ended December 31, 2017, 2016 and 2015, respectively. A comparison of research, development and patents expenses by category is as follows (in thousands):

	Years Ended December 31,		
	2017	2016	2015
Salaries and personnel	\$ 6,583	\$ 9,832	\$ 12,007
Facilities and depreciation	3,493	3,926	4,469
Patents and licensing	1,884	2,027	2,021
Outside services	1,870	1,124	1,046
Non-cash stock-based compensation	1,206	1,932	2,234
Research and development supplies	923	1,259	1,415
Miscellaneous	726	850	893
Total research, development and patents expenses	<u>\$ 16,685</u>	<u>\$ 20,950</u>	<u>\$ 24,085</u>

Salaries and Personnel. Our expenses for research and development personnel, including consultants, were \$6.6 million, \$9.8 million and \$12.0 million for the years ended December 31, 2017, 2016 and 2015, respectively. The \$3.2 million decrease in 2017 was primarily due to decreased staffing levels associated with our organizational restructuring completed in 2016. The \$2.2 million decrease in salaries and personnel expenses from 2015 to 2016 was primarily due to decreased staffing levels and a decrease in employee bonuses. For 2018, we expect salaries and personnel expenses to remain consistent with 2017 levels.

Facilities and Depreciation. Our facilities and depreciation expenses were \$3.5 million, \$3.9 million and \$4.5 million for the years ended December 31, 2017, 2016 and 2015, respectively. The \$430,000 decrease from 2016 to 2017 primarily reflects reduction in facilities and related costs associated with decreased staffing levels. The \$540,000 decrease from 2015 to 2016 primarily reflects lower depreciation expenses as certain scientific equipment became fully depreciated. For 2018, we expect facilities and depreciation expenses to remain relatively constant compared to 2017.

Patents and Licensing. Our patents and licensing expenses were \$1.9 million for the year ended December 31, 2017 and \$2.0 million for each of the years ended December 31, 2016 and 2015. These costs do not include routine patent maintenance costs, as such costs are classified as selling, general and administrative expenses. For 2018, we expect our patents and licensing expenses to increase compared to 2017.

Outside Services. Our outside services expenses were \$1.9 million, \$1.1 million and \$1.0 million for the years ended December 31, 2017, 2016 and 2015, respectively. The \$746,000 increase from 2016 to 2017 primarily due to increased activities related to sweet taste product candidates in development. For 2018, we expect outside services expenses to increase from 2017.

Non-cash Stock-based Compensation. Our non-cash stock-based compensation expenses were \$1.2 million, \$1.9 million and \$2.2 million for the years ended December 31, 2017, 2016 and 2015, respectively. The decreases of \$726,000 from 2016 to 2017 and \$302,000 from 2015 to 2016 were primarily due to decreased valuations of stock options granted to employees. For 2018, we expect a decrease in non-cash stock-based compensation expenses in comparison to 2017 as a result of lower average valuations of stock options.

Research and Development Supplies. Our expenses for supplies used in research and development were \$923,000, \$1.3 million and \$1.4 million for the years ended December 31, 2017, 2016 and 2015, respectively. The decreases of \$336,000 from 2016 to 2017 and \$156,000 from 2015 to 2016 were primarily due to decreased purchases of scientific supplies resulting from reduced staffing levels. For 2018, we expect research and development supplies expenses to remain relatively constant compared to 2017.

Selling, General and Administrative Expenses

Our selling, general and administrative expenses, which include non-cash stock-based compensation expenses associated with selling, general and administrative personnel, were \$12.1 million, \$11.8 million and \$12.9 million for the years ended December 31, 2017, 2016 and 2015, respectively.

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The \$384,000 increase in expenses from 2016 to 2017 was attributable to a \$700,000 increase in advisor and consulting expenses offset by a decrease in non-cash stock-based compensation expenses. The \$1.1 million decrease in expenses from 2015 to 2016 was attributable to an \$864,000 decrease in personnel-related expenses due to reduced staffing levels and reduced bonuses for 2016, as well as a decrease in non-cash stock-based compensation expenses.

For 2018, we expect a decrease in our selling, general and administrative expenses in comparison to 2017, due in part to lower stock-based compensation expenses.

Other Income

Other income was \$70,000, \$73,000 and \$42,000 for the years ended December 31, 2017, 2016 and 2015, respectively. The changes reflect slight increases and decreases in interest rates for our investment securities over the period.

Liquidity and Capital Resources

Since our inception, we have financed our business primarily through our product discovery and development collaborations, private and public placements of stock, royalties and commercial payments. As of December 31, 2017, we had received \$265.8 million in non-refundable license fees, research and development payments, cost reimbursements and milestone payments from our collaboration agreements. In addition, we had received \$53.2 million in royalties and commercial payments.

At December 31, 2017, we had \$15.9 million in cash, cash equivalents and short-term investments available-for-sale as compared to \$12.4 million at December 31, 2016, an increase of \$3.5 million. This increase resulted primarily from an increase in commercial revenues offset by a decrease in research and development costs and the use of cash to fund our operations.

Operating Activities

Operating activities provided cash of \$2.0 million in 2017 and used cash of \$11.6 million and \$8.2 million in 2016 and 2015, respectively. The \$13.6 million increase in net cash provided by operating activities from 2016 to 2017 primarily reflects an increase of \$12.3 million in commercial revenues offset by a decrease in research funding payments received in 2017. The \$3.4 million increase in net cash used in operating activities from 2015 to 2016 primarily reflects decreased research funding payments received and an increase in rent payments in 2016.

Investing Activities

Investing activities used cash of \$1.4 million in 2017 and provided cash of \$9.1 million and \$5.7 million in 2016 and 2015, respectively. The sources of cash flow reflect changes in the timing of maturities and purchases of available-for-sale securities and purchases of property and equipment. Cash outflows from purchases of property and equipment varied from \$558,000 in 2017 to \$138,000 in 2016 and \$690,000 in 2015, primarily reflecting replacement of certain scientific equipment.

Financing Activities

Financing activities provided cash of \$2.0 million, \$1.2 million and \$3.4 million in 2017, 2016 and 2015, respectively. Cash provided by financing activities in 2017 primarily reflects net proceeds from the issuance of common stock through an equity purchase agreement with Lincoln Park Capital Fund, LLC and the sale of stock from our employee stock purchase program. Cash provided by financing activities in 2016 and 2015 reflects the net proceeds from the issuance or sale of common stock from our employee stock purchase program and the exercise of employee stock options. Such totals generally fluctuate based on changes in the price of our common stock and the lower price of our common stock through most of 2017.

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As of December 31, 2017, the future minimum payments due under our contractual obligations are as follows (in thousands):

	Payments Due by Period				
	Total	Less than 1 year	1-3 years	4-5 years	After 5 years
Operating leases	\$ 18,246	\$ 2,890	\$ 5,856	\$ 5,940	\$ 3,560
License payments	202	190	12	—	—
Total	\$ 18,448	\$ 3,080	\$ 5,868	\$ 5,940	\$ 3,560

As of December 31, 2017, we had no long-term debt obligations.

As of December 31, 2017, we have net open purchase orders (defined as total open purchase orders at year end less any accruals or invoices charged to or amounts paid against such purchase orders) totaling approximately \$1.3 million. In the next 12 months, we also plan to spend approximately \$1.1 million on capital expenditures.

Our license agreement with the University of California calls for annual maintenance fees, which commenced in 2006, or royalties or service revenues on sales of any products developed using technologies licensed under the agreement. Royalties are calculated as a percentage of covered sales and are included in cost of commercial revenues. The agreement specifies minimum annual royalty payments which continue through the expiration of the last to expire patent licensed under the agreement. Royalties currently paid under the agreement exceed the minimum annual royalty.

Our future capital uses and requirements depend on numerous forward-looking factors. These factors may include, but are not limited to, the following:

- our ability to generate flavor ingredient sales under our direct sales program;
- our ability to maintain product discovery, development and commercialization collaborations;
- the rate of progress and cost of research and development activities;
- the terms and timing of any collaborative, licensing and other arrangements that we may establish;
- the cost of our direct sales program, including purchases of inventory;
- the number and scope of our research activities;
- the costs of filing, prosecuting, defending and enforcing any patent claims and other intellectual property rights;
- the proceeds from the issuance of common stock upon the exercise of stock options;
- the effect of competing technological and market developments; and
- the extent to which we acquire or in-license new products, technologies or businesses.

We are entitled to receive \$10.5 million in non-refundable research and development payments from our collaborators from December 31, 2017 through the remaining life of our current collaboration agreements. This does not include any additional payments we may receive related to the following events:

- the achievement of milestones;
- the earning of royalties from the sale of products containing our flavor ingredients;
- the earning of any minimum periodic royalty payments;
- direct sales of flavor ingredients;
- the earning of any cost reimbursements; and
- the signing of new collaborations or extensions of existing collaborations.

We may not receive the payments if the collaborations are terminated, amended or not renewed, or if we do not achieve the milestones set forth in the collaboration agreements. In addition, the timing of the receipt of milestone payments in particular is uncertain, as we may achieve milestones significantly earlier or later than we currently expect. We cannot predict at this time the level of our collaborators' royalty-generating sales, as these sales to date have been based on launches of new products without established sales histories, or the level of flavor ingredient sales under our direct sales program.

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We continue to pursue additional collaborations which could result in additional revenues. We may not recognize revenues for license fees, research and development funding, milestones, minimum periodic royalties or royalties if the collaborations are terminated or amended, or if we do not achieve the milestones set forth in the collaboration agreements. Our expenses will vary based upon the forward-looking factors listed above.

We believe our available cash, cash equivalents, investments and existing sources of funding will be sufficient to satisfy our anticipated operating and capital requirements through at least the next 12 months after the filing of our Form 10-K.

Until we can generate significant cash from our operations, we expect to continue to fund our operations with existing cash resources that were primarily generated from license payments, research and development payments and milestone payments under our product discovery and development collaborations and from the proceeds of sales of our equity securities.

Off-Balance Sheet Arrangements

As of December 31, 2017 and 2016, we did not have any relationships with unconsolidated entities or financial partnerships, such as entities often referred to as special purpose or structured finance entities, which would have been established for the purposes of facilitating off-balance sheet arrangements or other contractually narrow or limited purposes. As such, we are not materially exposed to any financing, liquidity, market or credit risk that could arise if we had engaged in these relationships.

Critical Accounting Policies

Our discussion and analysis of our financial condition and results of operations are based on our financial statements, which have been prepared in accordance with United States generally accepted accounting principles, or GAAP. The preparation of these financial statements requires management to make estimates and judgments that affect the reported amounts of assets, liabilities and expenses and related disclosure of contingent assets and liabilities. On an ongoing basis, we evaluate these estimates, including those related to revenue recognition, stock-based compensation, uncollectible receivables, excess and obsolete inventories, long-lived assets, accrued liabilities and income taxes. These estimates are based on historical experience and various other assumptions that we believe to be reasonable under the circumstances, the results of which form the basis for judgments about the carrying values of assets and liabilities. Actual results may differ from these estimates under different assumptions or conditions. While our significant accounting policies are described in more detail in Note 1 to our financial statements, we believe the following accounting policies to be critical to the judgments and estimates used in the preparation of our financial statements:

Inventories

We sell certain of our flavor ingredients to flavor companies for their use in the development of proprietary flavor systems for their food and beverage company customers. To ensure adequate inventory supply for this direct sales program, we must forecast inventory needs of certain of our flavor ingredients and place orders with our manufacturers before firm orders are received from our customers. We may also be required to purchase substantial amounts of flavor ingredients in order to establish manufacturing relationships with third parties or to give potential customers greater confidence in the reliability of our supply.

Inventories consist entirely of purchased finished goods. Inventories are valued at lower of cost (on a moving average basis) or net realizable value. We are required to make assumptions regarding the level of reserves required to value items at the lower of cost or net realizable value. We make judgments and estimates regarding excess or obsolete inventory by analyzing forecasted demand, pricing trends, margins, product life cycles, remaining shelf life and expectations of efficacy, as well as qualitative factors based on the sales history of our products. For established businesses, factors in assessing excess inventory typically include historical data such as sales, gross margins and inventory turns calculations, as well as future sales forecasts. However, because our direct sales program is relatively new and requires a lengthy sales cycle, there is limited historical data available and such data is not representative of future anticipated sales. In lieu of considering historical data alone, we must consider other information such as sales forecasts, sales pipeline and qualitative factors such as the progress of sales and marketing efforts. If we fail to accurately forecast customer demand, we may experience excess inventory levels or a shortage of product to deliver to our customers. Inventory levels in excess of customer demand may result in inventory write-downs or write-offs and the sale of excess inventory at discounted prices. We also consider the risk that our inventory will degrade such that it will no longer meet product specifications and make judgments regarding the continued efficacy of our products through analytical testing.

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Revenue Recognition

Development Revenues

Development revenues are based on our product discovery, development and commercialization collaboration agreements. Some of our collaboration agreements contain multiple elements, including technological and territorial licenses and research and development services. In accordance with these agreements, we may be eligible for license fees, research and development funding, development milestone payments, cost reimbursements, royalty payments, minimum periodic royalty payments and commercial milestone payments. Development revenues include revenues from license fees, research and development funding, the achievement of development milestones and cost reimbursements.

Pursuant to the Revenue Recognition – Multiple-Element Arrangements Topic of the FASB ASC, each required deliverable is evaluated to determine if it qualifies as a separate unit of accounting. For us, this determination is generally based on whether the deliverable has “stand-alone value” to the customer. The arrangement’s consideration is then allocated to each separate unit of accounting based on the relative selling price of each deliverable. The estimated selling price of each deliverable is determined using the following hierarchy of values: (i) vendor-specific objective evidence of fair value; (ii) third-party evidence of selling price; and (iii) best estimate of selling price, or BESP. The BESP reflects our best estimate of what the selling price would be if the deliverable was regularly sold by us on a stand-alone basis. We expect, in general, to use the BESP for allocating consideration to each deliverable. In general, the consideration allocated to each unit of accounting is then recognized as the related goods or services are delivered, limited to the consideration that is not contingent upon future deliverables.

Non-refundable license fees, if not associated with our future performance, are recognized when received. Non-refundable license fees, if associated with our future performance obligations, are attributed to a specific program or collaboration and recognized over the period of service for that specific program or collaboration. Amounts received for research funding are recognized as revenues as the services are performed. Revenue is deferred for fees received before earned. Revenues from development milestones are accounted for in accordance with the Revenue Recognition – Milestone Method Topic of the FASB ASC. Milestones are recognized when earned, as evidenced by written acknowledgment from the collaborator or other persuasive evidence that the milestone has been achieved, provided that the milestone event is substantive. A milestone event is considered to be substantive if its achievability was not reasonably assured at the inception of the agreement and our efforts led to the achievement of the milestone or the milestone was due upon the occurrence of a specific outcome resulting from our performance. If both of these criteria are not met, the milestone payment is recognized over the remaining minimum period of our performance obligations under the agreement. We assess whether a milestone is substantive at the inception of each agreement. Revenues from cost reimbursement are recognized when earned, as evidenced by written acknowledgment from the collaborator or other persuasive evidence.

Commercial Revenues

Commercial revenues from collaboration agreements include license payments and royalties on sales made by our collaborators of products incorporating our flavor ingredients, minimum periodic royalty payments and revenues from the achievement of commercial milestones. Commercial revenues also include direct sales of our flavor ingredients to flavor companies.

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Royalties on sales made by our collaborators of products incorporating our flavor ingredients are recognized when a royalty report or other persuasive evidence is received, which is generally one quarter in arrears. Non-refundable minimum periodic royalty payments are recognized as revenues over the related royalty periods. Royalty terms are specific to each collaboration and collaborator and can vary from year to year. These terms vary based on factors such as the characteristics of the flavor ingredient and the product categories and geographies licensed by the collaborator. Periodically, as contractually specified, our collaborators are required to provide a report detailing all sales of products containing our flavor ingredients. To the extent that calculated royalties on sales of such products exceed the minimum periodic royalty payments made to date, the collaborators are required to remit to us the difference between royalties calculated and minimum periodic royalty payments made to date. We recognize this difference as royalties on product sales at the time the report is received. To the extent that minimum periodic royalty payments through the end of any applicable period exceed calculated royalties, we are not required to refund the difference. Revenues from commercial milestones are recognized when earned, as evidenced by written acknowledgment from the collaborator or other persuasive evidence that the milestone has been achieved, because we have no further performance obligations related to the commercial milestones.

Revenues from direct sales of our flavor ingredients are recorded when there is persuasive evidence that an arrangement exists, title has passed, collection is reasonably assured and the price is fixed or determinable. We generally do not offer discounts, rebates or a general right of return on sales of flavor ingredients.

Item 7A. *Quantitative and Qualitative Disclosures About Market Risk*

Our primary exposure to market risk is interest income sensitivity, which is affected by changes in the general level of United States interest rates. Due to the nature of our investments, we believe that we are not subject to any material market risk exposure. We do not have any foreign currency or other derivative financial instruments.

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Item 8. *Financial Statements and Supplementary Data*

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Report of Independent Registered Public Accounting Firm

To the Board of Directors and Stockholders of Senomyx, Inc.

Opinion on the Financial Statements

We have audited the accompanying balance sheets of Senomyx, Inc. (the Company) as of December 31, 2017 and 2016, and the related statements of operations and comprehensive loss, stockholders' equity and cash flows for each of the three years in the period ended December 31, 2017, 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 at December 31, 2017 and 2016, and the results of its operations and its cash flows for each of the three years in the period ended December 31, 2017, in conformity with U.S. generally accepted accounting principles.

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 Public Company Accounting Oversight Board (United States) (PCAOB) and are required to be independent with respect to the Company in accordance with the U.S. federal securities laws and the applicable rules and regulations of the Securities and Exchange Commission and the PCAOB.

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

Our 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/ Ernst & Young LLP
We have served as the Company's auditor since 2000
San Diego, California
March 8, 2018

Senomyx, Inc.
Balance Sheets
(In thousands, except share and per share data)

	December 31,	
	2017	2016
Assets:		
Current assets:		
Cash and cash equivalents	\$ 6,233	\$ 3,587
Short-term investments available-for-sale	9,630	8,776
Accounts receivable	7,130	5,352
Inventories	1,579	2,335
Other current assets	467	983
Total current assets	25,039	21,033
Property and equipment, net	2,561	2,731
Total assets	\$ 27,600	\$ 23,764
Liabilities and stockholders' equity		
Current liabilities:		
Accounts payable, accrued expenses and other current liabilities	\$ 4,920	\$ 5,504
Deferred rent	335	—
Leasehold incentive obligation	219	219
Total current liabilities	5,474	5,723
Deferred rent	2,229	1,886
Leasehold incentive obligation	1,134	1,353
Commitments		
Stockholders' equity:		
Preferred stock, \$0.001 par value, 7,500,000 shares authorized; no shares issued or outstanding at December 31, 2017 and 2016	—	—
Common stock, \$0.001 par value, 120,000,000 shares authorized; 47,786,793 and 45,298,403 shares issued and outstanding at December 31, 2017 and 2016, respectively	48	45
Additional paid-in capital	298,242	292,932
Accumulated other comprehensive loss	(5)	(4)
Accumulated deficit	(279,522)	(278,171)
Total stockholders' equity	18,763	14,802
Total liabilities and stockholders' equity	\$ 27,600	\$ 23,764

See accompanying notes to financial statements.

Senomyx, Inc.
Statements of Operations and Comprehensive Loss
(In thousands, except share and per share data)

	Years Ended December 31,		
	2017	2016	2015
Revenues:			
Development revenues	\$ 7,789	\$ 13,797	\$ 17,838
Commercial revenues	<u>21,531</u>	<u>9,242</u>	<u>7,044</u>
Total revenues	29,320	23,039	24,882
Operating expenses:			
Cost of commercial revenues	1,832	1,096	638
Research, development and patents	16,685	20,950	24,085
Selling, general and administrative	<u>12,136</u>	<u>11,752</u>	<u>12,849</u>
Total operating expenses	<u>30,653</u>	<u>33,798</u>	<u>37,572</u>
Loss from operations	(1,333)	(10,759)	(12,690)
Other income	<u>70</u>	<u>73</u>	<u>42</u>
Net loss	(1,263)	(10,686)	(12,648)
Other comprehensive income (loss):			
Unrealized gain (loss) on investments	<u>(1)</u>	<u>23</u>	<u>(17)</u>
Comprehensive loss	<u>\$ (1,264)</u>	<u>\$ (10,663)</u>	<u>\$ (12,665)</u>
Net loss per share, basic and diluted	<u>\$ (0.03)</u>	<u>\$ (0.24)</u>	<u>\$ (0.29)</u>
Shares used in calculating net loss per share, basic and diluted	<u>47,192,957</u>	<u>44,803,952</u>	<u>43,968,167</u>

See accompanying notes to financial statements.

Senomyx, Inc.
Statements of Stockholders' Equity
(In thousands, except for share data)

	Common Stock		Additional paid-in capital	Accumulated other comprehensive income/(loss)	Accumulated deficit	Total stockholders' equity
	Shares	Amount				
Balance at December 31, 2014	43,370,309	\$ 43	\$ 278,362	\$ (10)	\$ (254,837)	\$ 23,558
Issuance of common stock related to the exercise of options	698,851	1	2,139	—	—	2,140
Issuance of common stock related to employee stock plan purchases	434,660	1	1,220	—	—	1,221
Compensation related to stock options granted to employees and non-employee directors	—	—	5,230	—	—	5,230
Compensation related to stock options granted to consultants	—	—	40	—	—	40
Unrealized loss on investments	—	—	—	(17)	—	(17)
Net loss	—	—	—	—	(12,648)	(12,648)
Balance at December 31, 2015	44,503,820	\$ 45	\$ 286,991	\$ (27)	\$ (267,485)	\$ 19,524
Issuance of common stock related to the exercise of options	254,697	—	543	—	—	543
Issuance of common stock related to employee stock plan purchases	245,768	—	703	—	—	703
Issuance of common stock related to an equity purchase agreement	294,118	—	256	—	—	256
Compensation related to stock options granted to employees and non-employee directors	—	—	4,412	—	—	4,412
Compensation related to stock options granted to consultants	—	—	27	—	—	27
Unrealized gain on investments	—	—	—	23	—	23
Net loss	—	—	—	—	(10,686)	(10,686)
Balance at December 31, 2016	45,298,403	\$ 45	\$ 292,932	\$ (4)	\$ (278,171)	\$ 14,802
ASU 2016-09 stock based compensation adjustment	—	—	88	—	(88)	—
Issuance of common stock related to employee stock plan purchases	488,390	—	339	—	—	339
Issuance of common stock related to an equity purchase agreement	2,000,000	3	1,711	—	—	1,714
Compensation related to stock options granted to employees and non-employee directors	—	—	3,149	—	—	3,149
Compensation related to stock options granted to consultants	—	—	23	—	—	23
Unrealized loss on investments	—	—	—	(1)	—	(1)
Net loss	—	—	—	—	(1,263)	(1,263)
Balance at December 31, 2017	47,786,793	\$ 48	\$ 298,242	\$ (5)	\$ (279,522)	\$ 18,763

See accompanying notes to financial statements.

Senomyx, Inc.
Statements of Cash Flows
(In thousands)

	Years Ended December 31,		
	2017	2016	2015
Operating Activities			
Net loss	\$ (1,263)	\$ (10,686)	\$ (12,648)
Adjustments to reconcile net loss to net cash provided by (used in) operating activities:			
Depreciation	757	741	1,098
Accretion of premium on available-for-sale securities	29	152	148
Amortization of leasehold incentive obligation	(219)	(220)	(347)
Stock-based compensation for employees and non-employee directors	3,149	4,412	5,230
Stock-based compensation for non-employees	23	27	40
Change in operating assets and liabilities:			
Accounts receivable	(1,778)	(2,159)	(917)
Inventories	756	279	(877)
Other current assets	516	20	387
Accounts payable, accrued expenses and other current liabilities	(613)	(61)	255
Deferred revenues	—	(3,497)	(2,180)
Deferred rent	678	(559)	1,575
Net cash provided by (used in) operating activities	2,035	(11,551)	(8,236)
Investing activities			
Purchases of property and equipment	(558)	(138)	(690)
Purchases of available-for-sale securities	(11,635)	(9,538)	(16,108)
Maturities of available-for-sale securities	10,751	18,750	22,530
Net cash provided by (used in) investing activities	(1,442)	9,074	5,732
Financing activities			
Proceeds from issuance of common stock	2,053	1,246	3,361
Net cash provided by financing activities	2,053	1,246	3,361
Net change in cash and cash equivalents	2,646	(1,231)	857
Cash and cash equivalents at beginning of year	3,587	4,818	3,961
Cash and cash equivalents at end of year	\$ 6,233	\$ 3,587	\$ 4,818
Supplemental disclosure of cash flow information:			
Purchases of inventories included in accounts payable, accrued expenses and other current liabilities at year-end	\$ —	\$ 180	\$ —
Purchases of property and equipment included in accounts payable, accrued expenses and other current liabilities at year-end	\$ 28	\$ —	\$ —

See accompanying notes to financial statements.

Senomyx, Inc.
Notes to Financial Statements

1. Organization and Summary of Significant Accounting Policies

Organization and Business

Senomyx, Inc. (“we”, “us” or “our”) was incorporated in Delaware in September 1998 and commenced operations in January 1999. We use proprietary taste receptor technologies to discover, develop and commercialize innovative flavor ingredients and natural high intensity sweeteners (HIS) for the packaged food, beverage and ingredient supply industries to improve the nutritional profile of their products and generate cost of goods savings while maintaining or improving taste. Our current programs focus on the development and/or commercialization of sweet, savory and salt flavor ingredients, bitter blockers and cooling agents.

We currently have product discovery, development and commercialization collaborations with some of the world’s leading packaged food, beverage and ingredient companies: Ajinomoto Co., Inc. (“Ajinomoto”), Firmenich SA (“Firmenich”) and PepsiCo, Inc. (“PepsiCo”). Our collaboration agreements generally provide for license fees, research and development funding, reimbursement of certain costs, development milestone payments based upon our achievement of research or development goals and, in the event of commercialization, commercial milestone payments, minimum periodic royalties and royalties on sales of products incorporating our flavor ingredients. We also sell certain flavor ingredients directly to flavor companies for inclusion in flavor systems for re-sale to food and beverage companies.

Basis of Presentation

The accompanying financial statements have been prepared on a going-concern basis, which contemplates the realization of assets and the satisfaction of liabilities in the normal course of business. We have incurred net losses from operations since inception and have an accumulated deficit of \$279.5 million at December 31, 2017. Our ability to transition to profitable operations is dependent upon achieving a level of revenues adequate to support our cost structure through expanding our development and commercial revenues. Cash, cash equivalents, and short-term investments available-for-sale at December 31, 2017 totaled \$15.9 million. We have prepared cash flow forecasts which indicate, based on our current cash resources available, that we will have sufficient resources to fund our business for at least the next 12 months from the date of this filing.

Use of Estimates

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

Cash and Cash Equivalents

We consider all highly liquid investments with a remaining maturity of three months or less when purchased to be cash equivalents. Cash equivalents are recorded at cost, which approximates fair value.

Investments Available-for-Sale

Our surplus cash is generally invested in United States government agency securities and corporate debt securities with maturity dates of two years or less from the settlement date. The amortized cost of debt securities is adjusted for amortization of premiums and accretion of discounts to maturity with all amortization and accretion included in interest income. Our investments are classified as available-for-sale and carried at fair value, with unrealized gains and losses reported in accumulated other comprehensive loss as a separate component of stockholders’ equity. Realized gains and losses and declines in value judged to be other-than-temporary, if any, on available-for-sale securities are included in interest income. The cost of securities sold is based on the specific identification method. Interest on securities classified as available-for-sale is included in interest income.

[Table of Contents](#)**Fair Value of Financial Instruments other than Investments Available-for-Sale**

The carrying amount of cash and cash equivalents, accounts receivables, accounts payable and accrued expenses are considered to be representative of their respective fair value because of the short-term nature of these items.

Concentration of Credit Risk and Major Collaborations

Financial instruments, which potentially subject us to concentrations of credit risk, consist of cash, cash equivalents and short-term investments available-for-sale. We limit our exposure to credit loss by placing our cash, cash equivalents, and investments with high credit quality financial institutions in instruments with short maturities.

We derive significant portions of our revenues from a relatively small number of collaborators. For the years ended December 31, 2017, 2016 and 2015, revenues from any single collaborator that contributed 10% or more of revenues for the period were as follows:

	Years Ended December 31,		
	2017	2016	2015
PepsiCo (in millions)	\$ 13.8 (47%)	\$ 14.0 (61%)	\$ 14.9 (60%)
Firmenich (in millions)	\$ 13.5 (46%)	\$ 6.7 (29%)	\$ 8.8 (35%)

Accounts Receivable

We extend credit to our customers in the normal course of business based upon an evaluation of the customer's credit history, financial condition and other factors. Estimates of allowances for uncollectible receivables are determined by evaluating individual customer circumstances, historical payment patterns, length of time past due and other factors. At December 31, 2017 and 2016, we did not have any allowances for uncollectible receivables.

Accounts receivable from customers which contributed 10% or more of accounts receivable at December 31, 2017 and 2016 were as follows:

	December 31,	
	2017	2016
PepsiCo (in millions)	\$ 5.4 (76%)	\$ 3.4 (63%)
Firmenich (in millions)	\$ 1.6 (22%)	\$ 1.3 (24%)
Ajinomoto (in millions)	---	\$ 0.6 (11%)

Inventories

Inventories consist entirely of purchased finished goods. Inventories are valued at lower of cost (on a moving average basis) or net realizable value. We are required to make assumptions regarding the level of reserves required to value items at the lower of cost or net realizable value. We make judgments and estimates regarding excess or obsolete inventory by analyzing forecasted demand, pricing trends, margins, product life cycles, remaining shelf life and expectations of efficacy, as well as qualitative factors given the limited sales history of our products. At December 31, 2017 and 2016 we had reserves for lower of cost or net realizable value, excess or obsolete inventory of \$395,000 and zero, respectively.

In July 2015, the Financial Accounting Standards Board ("FASB") issued Accounting Standards Update ("ASU") No. 2015-11, *Simplifying the Measurement of Inventory*, which requires an entity to measure inventory within the scope of this ASU at the lower of cost or net realizable value. Net realizable value is the estimated selling price in the ordinary course of business, less reasonably predictable costs of completion, disposal, and transportation. The amendments in this guidance more closely align the measurement of inventory in GAAP with the measurement of inventory in International Financial Reporting Standards ("IFRS"). We adopted this guidance effective January 1, 2017. There was no material impact on our financial statements and related disclosures.

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Property and Equipment, net

Property and equipment, net are stated at cost less accumulated depreciation and are depreciated over the estimated useful lives of the assets (ranging from three to five years) using the straight-line method. Leasehold improvements are amortized over the estimated useful life of the asset or the lease term, whichever is shorter.

Impairment of Long-Lived Assets

In accordance with the Property, Plant and Equipment Topic of the FASB Accounting Standards Codification (“ASC”), if indicators of impairment exist, we assess the recoverability of the affected long-lived assets by determining whether the carrying value of such assets can be recovered through undiscounted future operating cash flows. If impairment is indicated, we measure the amount of such impairment by comparing the fair value to the carrying value. There have been no indicators of impairment through December 31, 2017.

Deferred Rent

Rent expense is recorded on a straight-line basis over the term of any lease. The difference between rent expense accrued and amounts paid under any lease agreement is recorded as deferred rent in the accompanying balance sheets.

Leasehold Incentive Obligation

In conjunction with the lease agreement covering the facility occupied by us, we received a tenant improvement allowance of \$155 per square foot leased, or \$10.1 million. As the tenant improvements were constructed, we recorded both the covered tenant improvements (as property and equipment) and an offsetting leasehold incentive obligation on our balance sheet. Through the term of the lease, we record depreciation expense to depreciate the tenant improvements and record an offsetting reduction to rent expense to amortize the leasehold incentive obligation.

Revenue Recognition

Development Revenues

Development revenues are based on our product discovery, development and commercialization collaboration agreements. Some of our collaboration agreements contain multiple elements, including technological and territorial licenses and research and development services. In accordance with these agreements, we may be eligible for license fees, research and development funding, development milestone payments, cost reimbursements, royalty payments, minimum periodic royalty payments and commercial milestone payments. Development revenues include revenues from license fees, research and development funding, the achievement of development milestones and cost reimbursements.

Pursuant to the Revenue Recognition – Multiple-Element Arrangements Topic of the FASB ASC, each required deliverable is evaluated to determine if it qualifies as a separate unit of accounting. For us, this determination is generally based on whether the deliverable has “stand-alone value” to the customer. The arrangement’s consideration is then allocated to each separate unit of accounting based on the relative selling price of each deliverable. The estimated selling price of each deliverable is determined using the following hierarchy of values: (i) vendor-specific objective evidence of fair value; (ii) third-party evidence of selling price; and (iii) best estimate of selling price, or BEBP. The BEBP reflects our best estimate of what the selling price would be if the deliverable was regularly sold by us on a stand-alone basis. We expect, in general, to use the BEBP for allocating consideration to each deliverable. In general, the consideration allocated to each unit of accounting is then recognized as the related goods or services are delivered, limited to the consideration that is not contingent upon future deliverables. For multiple-element arrangements entered into prior to January 1, 2011 and not materially modified thereafter, we continue to apply our prior accounting policy with respect to such arrangements.

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Non-refundable license fees, if not associated with our future performance, are recognized when received. Non-refundable license fees, if associated with our future performance obligations, are attributed to a specific program or collaboration and recognized over the period of service for that specific program or collaboration. Amounts received for research funding are recognized as revenues as the services are performed. Revenue is deferred for fees received before earned. Revenues from development milestones are accounted for in accordance with the Revenue Recognition – Milestone Method Topic of the FASB ASC. Milestones are recognized when earned, as evidenced by written acknowledgment from the collaborator or other persuasive evidence that the milestone has been achieved, provided that the milestone event is substantive. A milestone event is considered to be substantive if its achievability was not reasonably assured at the inception of the agreement and our efforts led to the achievement of the milestone or the milestone was due upon the occurrence of a specific outcome resulting from our performance. If these criteria are not met, the milestone payment is recognized over the remaining minimum period of our performance obligations under the agreement. We assess whether a milestone is substantive at the inception of each agreement. Revenues from cost reimbursement are recognized when earned, as evidenced by written acknowledgment from the collaborator or other persuasive evidence.

Commercial Revenues

Commercial revenues from collaboration agreements include license payments and royalties on sales made by our collaborators of products incorporating our flavor ingredients, minimum periodic royalty payments and revenues from the achievement of commercial milestones. Commercial revenues also include direct sales of our flavor ingredients to flavor companies.

Royalties on sales made by our collaborators of products incorporating our flavor ingredients are recognized when a royalty report or other persuasive evidence is received, which is generally one quarter in arrears. Non-refundable minimum periodic royalty payments are recognized as revenues over the related royalty periods. Royalty terms are specific to each collaboration and collaborator and can vary from year to year. These terms vary based on factors such as the characteristics of the flavor ingredient and the product categories and geographies licensed by the collaborator. Periodically, as contractually specified, our collaborators are required to provide a report detailing all sales of products containing our flavor ingredients. To the extent that calculated royalties on sales of such products exceed the minimum periodic royalty payments made to date, the collaborators are required to remit to us the difference between royalties calculated and minimum periodic royalty payments made to date. We recognize this difference as royalties on product sales at the time the report is received. To the extent that minimum periodic royalty payments through the end of any applicable period exceed calculated royalties, we are not required to refund the difference. Revenues from commercial milestones are recognized when earned, as evidenced by written acknowledgment from the collaborator or other persuasive evidence that the milestone has been achieved, because we have no further performance obligations related to the commercial milestones.

Revenues from direct sales of our flavor ingredients are recorded when there is persuasive evidence that an arrangement exists, title has passed, collection is reasonably assured and the price is fixed or determinable. We generally do not offer discounts, rebates or a general right of return on sales of flavor ingredients.

New Accounting Guidance

In May 2014, the FASB issued accounting guidance on the recognition of revenue from customers, which will replace most existing revenue recognition guidance in U.S. GAAP when it becomes effective. Under this guidance, an entity will recognize revenue when it transfers promised goods or services to customers in an amount that reflects that the entity expects in exchange for the goods or services. This guidance also requires more detailed disclosures to enable users of the financial statements to understand the nature, amount, timing and uncertainty of revenue and cash flows arising from contracts with customers. The guidance is currently effective for fiscal years beginning after December 15, 2017, and interim periods within those years. The guidance allows entities to select one of two methods of adoption, either the full retrospective approach, meaning the guidance would be applied to all periods presented, or modified retrospective, meaning the cumulative effect of applying the guidance would be recognized as an adjustment to our opening retained earnings new balance at January 1, 2018, along with providing certain additional disclosures. We will adopt the new standard on January 1, 2018 and elect the modified retrospective method of adoption. Our current analysis indicates that the new standard will impact the timing of recognition for royalty revenues associated with sales made by collaborators, requiring recognition earlier than historically recorded. We anticipate that the cumulative effect of the new guidance will be an adjustment to our opening retained earnings on January 1, 2018 of approximately \$1.5 million to reflect royalty revenues that would have been recorded in the first quarter of 2018 under previous revenue recognition guidance.

[Table of Contents](#)**Direct Sales**

Our direct sales revenues were \$1.8 million, \$1.1 million and \$640,000 for the years ended December 31, 2017, 2016 and 2015, respectively.

Cost of Commercial Revenues

Cost of commercial revenues represents royalties payable under our third-party licensing agreements and the cost of goods sold related to direct sales, including related shipping and handling costs.

Research, Development and Patents

Research and development costs, including those incurred in relation to our collaborative agreements, are expensed in the period incurred. Research and development costs primarily consist of salaries and related expenses for personnel, facilities and depreciation, research and development supplies, licenses and outside services. Such research and development costs totaled \$15.0 million, \$19.3 million and \$22.4 million for the years ended December 31, 2017, 2016 and 2015, respectively.

Costs related to filing and pursuing patent applications are expensed as incurred, as recoverability of such expenditures is uncertain. We include all external costs related to the filing of patents related to development in Research, Development and Patents expenses. Such patent-related expenses totaled \$1.7 million for each of the years ended December 31, 2017, 2016 and 2015. Costs to maintain existing patents are expensed to selling, general and administrative expense as incurred.

Employee Benefit Plans

We have a defined contribution plan under Section 401(k) of the Internal Revenue Code covering employees who meet certain eligibility requirements. Eligible employees may defer their pre-tax compensation up to the maximum allowed by the Internal Revenue Service, or IRS. Under the plan, we may match a portion of employee contributions up to a defined maximum. Such matching contributions become vested and non-forfeitable according to a defined vesting schedule. We made matching contributions of \$124,000, \$166,000 and \$183,000 for the years ended December 31, 2017, 2016 and 2015, respectively.

Stock-Based Compensation

Compensation cost for stock-based awards is based on the estimated grant-date fair value. We use the Black-Scholes option-pricing model for determining the estimated fair value for stock-based awards with the following weighted average assumptions (annualized percentages):

	Years Ended December 31,		
	2017	2016	2015
Stock Options			
Expected volatility	78.0%	65.2%	65.6%
Risk-free interest rate	2.15%	1.62%	1.73%
Dividend yield	0.0%	0.0%	0.0%
Expected term (in years)	6.0	6.0	6.1
Employee Stock Purchase Plan			
Expected volatility	110.8%	65.5%	68.4%
Risk-free interest rate	1.25%	0.67%	0.47%
Dividend yield	0.0%	0.0%	0.0%
Expected term (in years)	1.2	1.3	1.2

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Expected volatility is based on our historical volatility. The risk-free interest rate for the expected term of the option is based on the average United States Treasury yield curve at the grant date. The assumed dividend yield is based on our expectation of not paying dividends in the foreseeable future. The expected term of options granted is based on historical exercise data. The assumptions related to expected volatility and risk-free interest rate used for the valuation of stock options differ from those used for the valuation of employee stock purchase plan rights primarily due to the difference in their respective expected terms.

The weighted-average estimated fair value of stock options granted during the years ended December 31, 2017, 2016 and 2015 were \$0.68, \$1.70 and \$2.79 per share, respectively. The weighted-average estimated fair value of employee stock purchase plan rights granted during the years ended December 31, 2017, 2016 and 2015 were \$0.38, \$1.74 and \$2.88 per share, respectively.

In March 2016, the FASB issued ASU 2016-09, *Improvements to Employee Share-Based Payment Accounting*. This guidance simplifies how several aspects of share-based payments are accounted for and presented in the financial statements. This guidance is effective beginning January 1, 2017 and we adopted this ASU in the first quarter of 2017. We have excess tax benefits for which a benefit could not be previously recognized of approximately \$3.2 million and \$243,000 for Federal and California purposes, respectively. The balance of the unrecognized excess tax benefits are reversed with the impact recorded to retained earnings, including a change to the valuation allowance. Due to the full valuation allowance on our deferred tax assets, there was no impact to the financial statements as a result of this adoption. Additionally, ASU 2016-09 amends existing guidance to allow forfeitures of share-based awards to be recognized as they occur. Previous guidance required that share-based compensation expense include an estimate of forfeitures. We made a policy election to account for forfeitures as they occur. The cumulative effect of adoption was an increase of \$88,000 to both additional paid-in capital and accumulated deficit.

Stock-based compensation expenses for options and awards are recognized on a straight-line basis. Stock-based compensation expenses are allocated to research, development and patents or selling, general and administrative based upon the department to which the associated employee or non-employee reports.

Total stock-based compensation expenses recognized for the years ended December 31, 2017, 2016 and 2015 was comprised as follows (in thousands):

	Years Ended December 31,		
	2017	2016	2015
Research, development and patents	\$ 1,206	\$ 1,932	\$ 2,233
Selling, general and administrative	1,966	2,507	3,037
Total stock-based compensation expenses	\$ 3,172	\$ 4,439	\$ 5,270

The total fair value of options that vested during the years ended December 31, 2017, 2016 and 2015 was \$3.4 million, \$4.0 million and \$5.8 million, respectively. At December 31, 2017, total unrecognized estimated compensation expenses related to non-vested stock options granted prior to that date were \$2.2 million, expected to be recognized over a weighted average period of 1.8 years.

Income Taxes

We account for income taxes in accordance with provisions which set forth an asset and liability approach that requires the recognition of deferred tax assets and deferred tax liabilities for the expected future tax consequences of temporary differences between the carrying amounts and the tax bases of assets and liabilities. Valuation allowances are established when necessary to reduce deferred tax assets to the amount that is more likely than not expected to be realized. In making such a determination, a review of all available positive and negative evidence is considered, including scheduled reversal of deferred tax liabilities, projected future taxable income, tax planning strategies and recent financial performance.

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The provisions of the Income Taxes Topic of the FASB ASC defines a recognition threshold and measurement attributes for financial statement recognition and measurement of a tax provision taken or expected to be taken in a tax return. The Topic also provides guidance on de-recognition, classification, interest and penalties, accounting in interim periods, disclosure and transition. Under the Topic, the impact of an uncertain income tax position on the income tax return must be recognized at the largest amount that is more-likely-than-not to be sustained upon audit by the relevant taxing authority. An uncertain income tax position will not be recognized if it has less than a 50% likelihood of being sustained. We recognize interest and penalties related to uncertain tax positions as a component of the income tax provision.

Net Loss Per Share

Basic earnings per share (“EPS”) is calculated by dividing the net loss by the weighted average number of common shares outstanding for the period, without consideration for common stock equivalents. Diluted EPS is computed by dividing the net income or loss by the weighted average number of common share equivalents outstanding for the period determined using the treasury-stock method. Dilutive common share equivalents include the dilutive effect of in-the-money shares, which is calculated based on the average share price for each period using the treasury stock method. Under the treasury stock method, the exercise price of a share, the amount of compensation cost, if any, for future service that we have not yet recognized, and the amount of estimated tax benefits that would be recorded in paid-in capital, if any, when the share is exercised are assumed to be used to repurchase shares in the current period. For purposes of this calculation, options to purchase common stock are considered to be common stock equivalents and are only included in the calculation of diluted EPS when their effect is dilutive.

The following table sets forth the computation of basic and diluted net loss per share for the respective periods.

	Years Ended December 31,		
	2017	2016	2015
Numerator:			
Net loss (in thousands)	\$ (1,263)	\$ (10,686)	\$ (12,648)
Denominator:			
Weighted average common shares	47,192,957	44,803,952	43,968,167
Basic and diluted net loss per share	\$ (0.03)	\$ (0.24)	\$ (0.29)
Years Ended December 31,			
Outstanding antidilutive securities not included in diluted net loss per share calculation:			
Options to purchase common stock	10,125,212	10,538,693	10,942,398

Comprehensive Income (Loss)

The Comprehensive Income Topic of the FASB ASC requires that all components of comprehensive income (loss), including net income (loss), be reported in the financial statements in the period in which they are recognized. Comprehensive income (loss) is defined as the change in equity during a period from transactions and other events and circumstances from non-owner sources. Our accumulated other comprehensive income (loss) as of December 31, 2017, 2016 and 2015 consisted of unrealized gains or losses on investments available-for-sale and is reported in stockholders’ equity.

Segment Reporting

We operate in one business segment, which is the development and commercialization of flavor ingredients. All of our operations are located in the United States. Due to the confidential nature of our collaborations, it is impracticable to report geographic information related to revenues.

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Recent Accounting Pronouncements

In February 2016, the FASB issued ASU 2016-02, *Leases (Topic 842)* in order to increase transparency and comparability among organizations by recognizing lease assets and lease liabilities on the balance sheet for those leases classified as operating leases under previous GAAP. ASU 2016-02 requires that a lessee should recognize a liability to make lease payments (the lease liability) and a right-of-use asset representing its right to use the underlying asset for the lease term on the balance sheet. ASU 2016-02 is effective for fiscal years beginning after December 15, 2018 (including interim periods within those periods) using a modified retrospective approach and early adoption is permitted. The Company will adopt ASU 2016-02 in the first quarter of 2019. Although the Company is in the process of evaluating the impact of adoption of the ASU on its consolidated financial statements, the Company currently believes the most significant changes will be related to the recognition of new right-of-use assets and lease liabilities on the Company's balance sheet for real estate operating leases.

2. Balance Sheet Details

Short-term Investments Available-for-Sale

The following is a summary of short-term investments available-for-sale securities at December 31, 2017 (in thousands):

	Amortized Cost	Unrealized Gain	Unrealized Loss	Estimated Fair Value
United States government agency securities	\$ 4,592	\$ —	\$ (2)	\$ 4,590
Corporate debt securities	5,043	—	(3)	5,040
Short-term investments available-for-sale	<u>\$ 9,635</u>	<u>\$ —</u>	<u>\$ (5)</u>	<u>\$ 9,630</u>

The following is a summary of short-term investments available-for-sale securities at December 31, 2016 (in thousands):

	Amortized Cost	Unrealized Gain	Unrealized Loss	Estimated Fair Value
United States government agency securities	\$ 4,222	\$ —	\$ (2)	\$ 4,220
Corporate debt securities	4,558	—	(2)	4,556
Short-term investments available-for-sale	<u>\$ 8,780</u>	<u>\$ —</u>	<u>\$ (4)</u>	<u>\$ 8,776</u>

Short-term investments available-for-sale securities we consider to be temporarily impaired at December 31, 2017 were as follows (in thousands, except for number of investments):

Description	Number of investments	Less than 12 Months of Temporary Impairment	
		Estimated Fair Value	Unrealized Losses
United States government agency securities	5	\$ 4,590	\$ (2)
Corporate debt securities	9	4,149	(3)
Temporarily impaired securities	<u>14</u>	<u>\$ 8,739</u>	<u>\$ (5)</u>

We believe that the decline in value of these securities is temporary and primarily related to the change in market interest rates since purchase and that it is more likely than not that we will be able to hold these securities to maturity. Therefore we anticipate full recovery of their amortized cost basis at maturity.

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Gross realized gains and losses on available-for-sale securities were immaterial during the years ended December 31, 2017 and 2016. As of December 31, 2017, all available-for-sale securities had maturity dates within one year.

Property and Equipment, net

Property and equipment, net consists of the following (in thousands):

	As of December 31,	
	2017	2016
Scientific equipment	\$ 11,877	\$ 11,875
Computer equipment	3,090	2,791
Furniture and fixtures	1,077	1,077
Leasehold improvements	13,237	13,228
Property and equipment, gross	29,281	28,971
Less accumulated depreciation and amortization	(26,720)	(26,240)
Property and equipment, net	<u>\$ 2,561</u>	<u>\$ 2,731</u>

Depreciation expense was \$0.8 million, \$0.7 million and \$1.1 million for the years ended December 31, 2017, 2016 and 2015, respectively.

Accounts Payable, Accrued Expenses and Other Current Liabilities

Accounts payable, accrued expenses and other current liabilities consist of the following (in thousands):

	As of December 31,	
	2017	2016
Accounts payable	\$ 575	\$ 1,079
Accrued employee benefits	3,195	3,030
Other accrued expenses	1,150	1,395
Accounts payable, accrued expenses and other current liabilities	<u>\$ 4,920</u>	<u>\$ 5,504</u>

3. Fair Value Disclosures

The following table presents information about our financial assets and financial liabilities measured at fair value on a recurring basis as of December 31, 2017 and indicates the fair value hierarchy of the valuation techniques we use to determine such fair value. In general, fair values determined by Level 1 inputs use quoted prices (unadjusted) in active markets for identical assets or liabilities that we have the ability to access. We classify money market funds and United States Treasuries as Level 1 assets.

Fair values determined by Level 2 inputs utilize inputs other than quoted prices included in Level 1 that are observable for the asset or liability, either directly or indirectly. Level 2 inputs include quoted prices for similar assets and liabilities in active markets, and inputs other than quoted prices that are observable for the asset or liability, such as interest rates and yield curves that are observable at commonly quoted intervals. We obtain the fair value of Level 2 financial instruments from a third-party professional pricing service using quoted market prices for identical or comparable instruments. The professional pricing service gathers market prices from a variety of industry standard data providers, security master files from large financial institutions and other third-party sources. The service uses these multiple prices as inputs into a distribution-curve based algorithm to determine a fair value. We then validate the quoted fair values provided by the professional pricing service by comparing the service's assessment of the fair values of our Level 2 investment portfolio balance against the fair values of our Level 2 investment portfolio balance provided by our investment managers. We classify United States government agency securities and corporate debt securities as Level 2 assets. There were no transfers between Level 1 and Level 2 during 2017 or 2016.

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Level 3 inputs are unobservable inputs for the asset or liability, and include situations where there is little, if any, market activity for the asset or liability. In certain cases, the inputs used to measure fair value may fall into different levels of the fair value hierarchy. In such cases, the level in the fair value hierarchy within which the fair value measurement in its entirety falls has been determined based on the lowest level input that is significant to the fair value measurement in its entirety. Our assessment of the significance of a particular input to the fair value measurement in its entirety requires judgment, and we consider factors specific to the asset or liability. We do not hold any Level 3 assets or liabilities.

The fair value as of December 31, 2017 and 2016 for assets that have recurring measurements are shown below (in thousands):

Description	Balance as of December 31, 2017	Fair Value Measurement at Reporting Date Using		
		Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Financial instruments owned:				
Money market funds	\$ 2,999	\$ 2,999	\$ —	\$ —
U.S. government securities	4,590	—	4,590	—
Corporate debt	6,538	—	6,538	—
Total financial instruments owned	\$ 14,127	\$ 2,999	\$ 11,128	\$ —

Description	Balance as of December 31, 2016	Fair Value Measurement at Reporting Date Using		
		Quoted Prices in Active Markets for Identical Assets (Level 1)	Significant Other Observable Inputs (Level 2)	Significant Unobservable Inputs (Level 3)
Financial instruments owned:				
Money market funds	\$ 3,028	\$ 3,028	\$ —	\$ —
U.S. government agency bonds	4,220	—	4,220	—
Corporate bonds	4,556	—	4,556	—
Total financial instruments owned	\$ 11,804	\$ 3,028	\$ 8,776	\$ —

4. Product Discovery, Development and Commercialization Collaborations

Our current collaboration agreements generally provide for research and development funding, milestone payments, cost reimbursement and royalty payments in the event the collaborator commercializes a product incorporating our flavor ingredients.

Development milestones are generally due upon selection and regulatory events. Development milestones are considered to be due to our performance and are accounted for as substantive milestones in accordance with the Revenue Recognition – Milestone Method Topic of the FASB ASC. Development milestones are recorded as development revenues. An example of a selection event would be a collaborator selecting a compound for development. An example of a regulatory event would be a selected compound obtaining either U.S. or foreign regulatory approval. There are circumstances under which we and our collaborators in the future may mutually agree to pursue additional program goals, in which case we could then be eligible to earn additional development milestones. Any such additional milestones remain uncertain at this time. Development milestones generally range in value up to \$750,000 each. We do not consider any individual development milestone to be material due to the relatively small size of any individual development milestone payment in relation to our annual revenues, and due to the uncertainty associated with the scientific progress required for us to earn such milestones.

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Commercial milestones are generally due upon commercial events. We do not consider commercial events to be due to our performance, and as such, are not accounted for as substantive milestones in accordance with the Revenue Recognition – Milestone Method Topic of the FASB ASC. Examples of commercial events would be the first commercial sale of a product containing a developed compound or upon sales of a product containing a developed compound reaching a certain level. There are circumstances under which we and our collaborators in the future may mutually agree to pursue additional program goals, in which case we could then be eligible to earn additional commercial milestones. Any such additional milestones remain uncertain at this time. Commercial milestones generally range in value up to \$1.5 million each. We consider milestones for commercial events to be commercial revenues.

The specific type of royalty and method for calculating royalty payments varies by agreement. We have retail-based royalty agreements, where any potential royalty payable to us is calculated as a percentage of the net sales price of a manufacturer's finished products or is based on the volume of a manufacturer's finished product that it sells. Our retail-based royalty agreements provide for an effective royalty rate of up to 4%. Our agreements with Ajinomoto and PepsiCo are either exclusively or partially retail-based royalty agreements. We have ingredient supply agreements, where any potential royalty payable to us is calculated as a percentage of the sales price of either our ingredient itself or the flavor system in which our ingredient is contained or is based on the volume of the ingredient itself used by a manufacturer in a finished product. Our ingredient supply royalty agreements specify royalty rates that are typically greater than the rates specified by our retail-based agreements. Our agreements with Firmenich and PepsiCo are either exclusively or partially ingredient supply-based royalty agreements. Certain of our current collaboration agreements also provide for upfront license fees and minimum periodic royalties. Below is a discussion of our material agreements.

Material Agreements

Firmenich (Sweet). In July 2009, we entered into a collaboration agreement with Firmenich to work for a minimum two-year collaborative period to discover novel flavor ingredients intended to modify the sweet taste of sucrose, fructose or various forms of rebaudioside. The agreement includes three consecutive options of one year each that could further extend the collaborative research funding period. The agreement was subsequently amended in October 2009. Under the agreement as amended, Firmenich agreed to pay a license fee, payable in three installments, research and development fees and specified payments upon the achievement of milestones. In the event of commercialization, we are entitled to receive royalties on future sales of products containing a discovered flavor ingredient.

In October 2010, we and Firmenich further amended the agreement to include, among other things, commercial development of S6973, our novel sucrose modifier, for specific beverage applications. The amendment also converts Firmenich's license for use of S6973 in powdered beverages from co-exclusive to exclusive and grants Firmenich an exclusive right to commercialize any compound that they select for development for use in confectionary food products. In return, under the terms of the amendment we received an additional license fee, and incremental milestone payments and minimum annual royalties.

In November 2010, Firmenich exercised its option to expand the companies' agreement to include the discovery, development, and worldwide commercialization of natural flavor ingredients that modify the taste of sucrose, fructose, and various forms of rebaudioside. In consideration of the expansion of the agreement, Firmenich paid us additional research funding as well as milestones, minimum annual royalties, and royalties on sales of natural sweet enhancers developed under the collaboration.

In April 2013, we amended and restated the collaboration agreement with Firmenich to extend the collaborative research period through July 2016, subject to limited termination rights. Firmenich paid an additional non-refundable license fee of \$5 million, of which \$4 million was paid in 2013 and the remaining \$1 million was paid at the end of the research period. Firmenich also paid approximately \$13 million in research funding over the three-year extension period from July 2013 through July 2016. Firmenich continues to have obligations for other milestone payments, cost reimbursements and royalty payments under an increased royalty rate structure based upon Firmenich sales of flavor ingredients developed under the collaboration.

In connection with this collaborative agreement, we recognized development revenues of \$0.3 million, \$3.7 million and \$6.2 million for the years ended December 31, 2017, 2016 and 2015, respectively.

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Through December 31, 2017, we have received \$58.6 million in license fees, research and development funding and cost reimbursements and milestones under this agreement.

PepsiCo (Sweet). In August 2010 we entered into a collaboration agreement with PepsiCo. The agreement relates to a research program to discover and develop (1) novel natural and artificial flavor ingredients intended to modify the sweet taste of sucrose and fructose, including high fructose corn syrup, and (2) natural HIS, in each case for use in non-alcoholic beverage product categories on a worldwide basis. Under the agreement, we received an upfront payment of \$30.0 million from PepsiCo, \$7.5 million of which was paid in the second quarter of 2010 in connection with the signing of a letter agreement between the parties and \$22.5 million of which was paid in the third quarter of 2010. The upfront payment is being recognized over the entire research period of the agreement. We received \$32.0 million in research and development payments over the initial four-year research period. We are also entitled to milestone payments and reimbursement of certain out-of-pocket expenses. Upon commercialization, we are entitled to minimum annual royalties during specified periods of time and/or royalty payments on products that incorporate selected flavor ingredients and/or natural HIS.

In May 2014, PepsiCo exercised its option to extend the research period for an additional two years through August 2016, which entitled us to \$17.6 million in committed research funding to be paid in quarterly installments over the additional two-year period.

In July 2016, we entered into a Letter Agreement with PepsiCo to extend the research period for an additional 45 days through September 2016 at the same research funding rate provided under the agreement. We received research funding of \$1.1 million during the extension period. Except for this extension, all other terms and conditions of the collaboration agreement remained unchanged and continued in full force and effect.

In September 2016, we amended and restated the collaboration agreement to extend PepsiCo's research funding for our natural sweet taste program for an additional three years, through September 2019. Under the agreement, we will receive up to \$18.0 million in research and development payments, payable in equal quarterly installments over the three-year research period beginning October 2016. In addition, PepsiCo has also agreed to reimburse us for certain specified out-of-pocket expenses that we may incur during the course of the research program. PepsiCo has the option to extend the natural sweet taste research program for two additional years, which would result in additional research funding commitments and payments during the extension of the research program. PepsiCo will have non-exclusive rights for commercial development of natural sweeteners and natural sweet enhancers discovered, developed and selected under the collaboration for use in all non-alcoholic beverage categories on a worldwide basis. We will be eligible for milestone payments based on the achievement of predetermined goals as well as royalty payments upon the sale of products containing natural sweeteners or natural sweet enhancers selected under the collaboration.

In connection with this agreement, we recognized development revenues of \$6.4 million, \$9.3 million and \$10.0 million for the years ended December 31, 2017, 2016 and 2015, respectively.

Through December 31, 2017, we have received \$95.7 million in upfront fees, research and development funding, cost reimbursements and milestones under this agreement. Including the remaining research and development funding, we are entitled to an additional \$10.5 million for a total of \$106.2 million.

Firmenich (Cool). In December 2007, we entered into a collaboration agreement with Firmenich to work for a three-year collaborative period to discover and develop novel flavor ingredients that may be used by Firmenich on an exclusive basis worldwide to impart a cool taste in flavor systems. In November 2010, we amended the agreement to extend the collaborative period until December 2012. In December 2012, we amended the agreement to extend the collaborative period until June 2013, which marked the end of the collaborative period. Under the agreement, Firmenich agreed to pay research fees and specified payments upon the achievement of milestones. Firmenich also agreed to reimburse us for a portion of the costs associated with the development and regulatory approval process of flavor ingredients that it selects for development, as well as a portion of certain expenses that we incur related to the research program. In addition, following the receipt of regulatory approval in 2014 of a discovered flavor ingredient, we are entitled to minimum periodic royalties and royalties on sales of products containing the discovered flavor ingredient until the expiration of relevant patents. In November 2017, we amended the agreement to grant Firmenich an exclusive license to an additional approved flavor ingredient and related analogs, and to expand the licensed product categories to include all applications in the flavor, oral care and consumer product markets. In addition, the amendment suspended Firmenich's royalty obligations from 2018 through 2020, such royalty obligations shall resume on January 1, 2021. In exchange for the exclusive license, expansion of rights and suspension of royalty obligations, we received a nonrefundable cash payment of \$10.0 million in November 2017.

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Under this agreement, through December 31, 2017, we have received \$19.5 million in research and development funding, cost reimbursements, milestones, license fees and royalty payments. We are entitled to receive royalties on future net sales of products containing a discovered flavor ingredient beginning in 2021 until the expiration of relevant patents. Any future royalties under this collaboration are uncertain and difficult to predict.

This footnote only discloses amounts recognized for individually material collaboration agreements during the years ended December 31, 2017, 2016 and 2015, and does not represent the entire amount of development and commercial revenues recognized during those periods.

5. Commitments

Leases and Loans

We lease our primary laboratory and office facility in San Diego, California under a lease that expires on February 28, 2024. The lease provides for certain rent-free periods and an annual 1% rent increase during the lease period. Rent expense for the years ended December 31, 2017, 2016 and 2015 was \$2.3 million, \$2.3 million and \$2.2 million, respectively. We have also entered into various operating lease agreements for office equipment.

For all of our operating leases in effect at December 31, 2017, the estimated annual future minimum rental payments for the years ending December 31 are as follows (in thousands):

	Operating Leases
2018	\$ 2,870
2019	2,898
2020	2,927
2021	2,956
2022	2,984
Thereafter	3,560
Total minimum lease payments	<u>\$ 18,195</u>

In connection with certain license agreements, our annual future minimum obligation payment is \$190,000 for the year ending December 31, 2018.

6. Stockholders' Equity

Convertible Preferred Stock

Our certificate of incorporation, as amended and restated, authorizes us to issue up to 7,500,000 shares of preferred stock, with a par value of \$0.001, in one or more series. Our Board of Directors may authorize the issuance of convertible preferred stock with voting or conversion rights that could adversely affect the voting power or other rights of the holders of the common stock. The issuance of convertible preferred stock, while providing flexibility in connection with possible acquisitions and other corporate purposes, could, among other things, have the effect of delaying, deferring or preventing a change in control of the company and may adversely affect the market price of the common stock and the voting and other rights of the holders of common stock. No shares of convertible preferred stock were outstanding as of December 31, 2017 or 2016.

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Equity Incentive Plan

We adopted the 2004 Equity Incentive Plan in connection with our initial public offering and adopted the 2013 Equity Incentive Plan effective for grants beginning January 1, 2014 (collectively, the “Plan”). The Plan provides for the grant of incentive and non-statutory stock options and restricted stock purchase rights to our employees, directors and consultants. The Plan, as amended, authorizes us to issue up to 18,935,450 shares of common stock. At December 31, 2017, 2,801,407 shares remain available for grant under the Plan. We issue new shares of common stock upon the exercise of stock options.

The Plan allows us to grant restricted stock purchase rights at no less than 85% of the fair value of our common stock as determined by our Board of Directors at the date of the grant. All restricted stock purchase rights vest in accordance with a vesting schedule determined by our Board of Directors, typically over a four-year period. Since the Plan’s inception, 457,069 restricted stock purchase rights have been granted at exercise prices ranging from \$0.35 to \$0.94 per share, all of which have been exercised as of December 31, 2017. We have repurchased a total of 131,152 shares since the Plan’s inception and no shares are subject to repurchase at December 31, 2017. No restricted stock purchase rights were granted during the three years ended December 31, 2017.

Options granted under the Plan generally expire no later than 10 years from the date of grant (five years for a 10% stockholder). Options generally vest and become fully exercisable over a period of four years. In certain cases, grants to officers, directors and consultants can be made fully exercisable at the date of grant. The exercise price of incentive stock options must be equal to at least the fair value of our common stock on the date of grant, and the exercise price of non-statutory stock options may be no less than 85% of the fair value of our common stock on the date of grant. The exercise price of any option granted to a 10% stockholder may be no less than 110% of the fair value of our common stock on the date of grant. We have an option to repurchase all unvested shares at the original purchase price for any reason upon the voluntary or involuntary termination of employment with us or consulting services provided to us. At December 31, 2017, no shares of common stock were unvested and subject to repurchase.

The following is a summary of stock option activity under the Plan through December 31, 2017:

	<u>Shares</u>	<u>Weighted Average Exercise Price</u>	<u>Weighted Average Remaining Contractual Term (years)</u>	<u>Aggregate Intrinsic Value (in thousands)</u>
Outstanding at December 31, 2016	10,538,693	\$ 5.12		
Granted	1,761,380	\$ 1.01		
Exercised	—	—		
Forfeited or expired	<u>(2,174,861)</u>	\$ 7.14		
Outstanding at December 31, 2017	<u>10,125,212</u>	\$ 3.97	5.0	\$ 480
Vested or expected to vest at December 31, 2017	<u>10,125,212</u>	\$ 3.97	5.0	\$ 480
Exercisable at December 31, 2017	<u>7,830,026</u>	\$ 4.58	3.9	\$ 30

The aggregate intrinsic value represents the difference between the closing market price of our common stock at December 31, 2017 of \$1.30 and the exercise price of in-the-money options. The total intrinsic value of options exercised was zero, \$0.4 million and \$1.8 million during the years ended December 31, 2017, 2016 and 2015, respectively. We received zero, \$0.6 million and \$2.1 million in proceeds from the exercise of stock options during the years ended December 31, 2017, 2016 and 2015, respectively.

[Table of Contents](#)**Employee Stock Purchase Plan**

During 2004, we adopted the 2004 Employee Stock Purchase Plan (the “Purchase Plan”), which allows all eligible employees to purchase shares of our common stock at the lower of: (i) 85% of the fair market value on the first day of a two-year offering period; or (ii) 85% of the fair market value on the last date of each six-month purchase period within the two-year offering period. Employees may authorize us to withhold up to 15% of their compensation during any purchase period, subject to certain limitations. The Purchase Plan authorizes up to 5,633,096 shares to be granted. At December 31, 2017, 4,273,972 shares of common stock have been issued under the Purchase Plan at an average price of \$2.44 per share.

Equity Purchase Agreement

In December 2016, we entered into a purchase agreement with Lincoln Park Capital Fund, LLC (“LPC”), whereby we had the right to sell to LPC from time to time in our sole discretion up to \$14 million in shares of our common stock through December 20, 2018, subject to certain limitations and conditions set forth in the agreement. During the year ended December 31, 2017, we sold 2,000,000 shares to LPC for gross cash proceeds of \$2.1 million. In November 2017, we terminated the purchase agreement with LPC. There were no cancellation fees associated with the termination of the purchase agreement.

Shares Reserved for Future Issuance

The following shares of common stock are reserved for future issuance:

	<u>December 31, 2017</u>
Common stock options granted and outstanding	10,125,212
Common stock options reserved for future grant	2,801,407
Common stock reserved under Purchase Plan	<u>1,359,124</u>
Total common stock shares reserved for future issuance	<u><u>14,285,743</u></u>

7. Income Taxes

Significant components of our net deferred tax assets at December 31, 2017 and 2016 are shown below (in thousands). A valuation allowance of \$62.7 million and \$89.6 million has been established to offset the net deferred tax assets as of December 31, 2017 and 2016, respectively, due to uncertainties surrounding our ability to generate future taxable income to realize these assets.

	Years ended	
	December 31,	
	<u>2017</u>	<u>2016</u>
Deferred tax assets:		
Net operating loss carryforwards	\$ 28,500	\$ 41,500
Capitalized research and development	16,500	27,400
Research and development credits	12,500	11,500
Stock-based compensation	3,600	6,900
Deferred revenues	—	100
Other, net	<u>1,600</u>	<u>2,200</u>
Total deferred tax assets	<u>62,700</u>	<u>89,600</u>
Total deferred tax liabilities	<u>—</u>	<u>—</u>
Net deferred tax assets	62,700	89,600
Valuation allowance for deferred tax assets	<u>(62,700)</u>	<u>(89,600)</u>
Net deferred tax assets	<u><u>\$ —</u></u>	<u><u>\$ —</u></u>

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The provision for income taxes on earnings subject to income taxes differs from the statutory federal rate at December 31, 2017, 2016 and 2015, due to the following (in thousands):

	2017	2016	2015
Federal income taxes at 35%	\$ (442)	\$ (3,740)	\$ (4,426)
State income tax, net of Federal benefit	21	(26)	1
Tax effect on non-deductible expenses and credits	2,180	3,054	968
Expiring state net operating losses	8	11	143
Research credits	(153)	(427)	(635)
Uncertain tax positions	38	173	2,038
Tax Cuts and Jobs Act	28,732	—	—
Excess tax benefit	(3,425)	—	—
Rate change	(43)	(639)	6,066
Other	(1)	(123)	(10)
Change in valuation allowance	(26,915)	1,717	(4,145)
	<u>\$ —</u>	<u>\$ —</u>	<u>\$ —</u>

At December 31, 2017, we had Federal and California tax net operating loss carryforwards of approximately \$116.1 million and \$99.3 million, respectively. The Federal and California tax loss carryforwards will begin to expire in 2019 and 2018, respectively, unless previously utilized.

At December 31, 2017, we also had Federal and California research and development tax credit carryforwards of approximately \$9.9 million and \$8.7 million, respectively. The Federal credit carryforward will begin to expire in 2021 unless previously utilized and the California credit will carry forward indefinitely until utilized.

We have analyzed filing positions in all of the Federal and state jurisdictions where we are required to file income tax returns for all open tax years in these jurisdictions. Our analysis concluded that, due to past ownership changes, our deferred tax assets for net operating losses and research and development credits will be subject to an annual limitation. As such, \$3.1 million of net operating losses will expire and \$944,000 of research and development credits will expire for Federal purposes as a result of the multiple ownership changes which occurred in prior years. As a result of the completion of the analysis, we have included the net operating loss and research and development credit carryforward net of the amount to be expired as a deferred tax asset. However, we have determined that sufficient future taxable income may not be available to realize the deferred tax assets for net operating loss and research and development credit carryforwards. Therefore, we have recognized a full valuation allowance for these deferred tax assets.

We updated our Section 382 and 383 analyses through December 31, 2017 and determined that there has not been a subsequent ownership change since February 2007. The completion of our Section 382 and 383 analyses through December 31, 2017 does not prevent further limitations to our net operating loss and research and development credit carryforwards. Additional limitations may arise if we experience an ownership change in subsequent periods.

On December 22, 2017, the Tax Cuts and Jobs Act was signed into legislation. We estimate there is no impact to net income tax expense or income tax payable as a result of this legislation for the year ended December 31, 2017, as we recognized a full valuation allowance on the deferred tax assets. However, we will continue to make and refine our calculations as additional analysis is completed. In addition, our estimates may also be affected as we gain a more thorough understanding of the tax law.

We remeasured certain deferred tax assets and liabilities based on the rates at which they are expected to reverse in the future, which is generally 21%. The provisional amount recorded related to the remeasurement of our deferred tax balance was \$28.7 million, of which is fully offset by a corresponding decrease to our valuation allowance. However, we are still analyzing certain aspects of the Act and refining our calculations, which could potentially affect the measurement of these balances or potentially give rise to new deferred tax amounts.

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A rollforward of changes in our unrecognized tax benefits is shown below (in thousands).

	2017	2016	2015
Balance at beginning of year	\$ 8,268	\$ 7,447	\$ 4,360
Additions based on tax positions related to the current year	57	139	195
Additions based on tax positions of prior years	—	682	2,994
Reductions based on tax positions of prior years	—	—	(102)
Balance at end of year	<u>\$ 8,325</u>	<u>\$ 8,268</u>	<u>\$ 7,447</u>

In the next twelve months, we do not expect a significant change in our unrecognized tax benefits. Due to the existence of the valuation allowance, future changes in unrecognized tax benefits will not impact our effective tax rate.

We are subject to taxation in the United States and state jurisdictions. Our tax years for 2014 and forward are subject to examination by the IRS and tax years 2013 and forward are subject to examination by California tax authorities. Due to the carryforward of unutilized net operating losses and research and development credits, the IRS and the California tax authorities may go back to the taxable years in which the net operating losses and research and development credits became available to recompute such amounts, but not redetermine the tax liability for such years. We are currently not under examination by any taxing authorities.

We recognize interest and penalties related to income tax matters in income tax expense. For the three years ended December 31, 2017, we did not recognize any interest or penalties.

8. Summary of Quarterly Financial Data (unaudited)

The following is a summary of the unaudited quarterly results of operations for the years ended December 31, 2017 and 2016 (in thousands, except per share amounts):

	Year Ended December 31, 2017			
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Selected Quarterly Financial Data:				
Revenues	\$ 4,466	\$ 4,870	\$ 5,055	\$ 14,929
Total operating expenses	7,914	7,711	7,246	7,782
Net income (loss)	(3,436)	(2,828)	(2,172)	7,173
Basic and diluted net loss per common share	\$ (0.07)	\$ (0.06)	\$ (0.05)	\$ 0.15

	Year Ended December 31, 2016			
	First Quarter	Second Quarter	Third Quarter	Fourth Quarter
Selected Quarterly Financial Data:				
Revenues	\$ 6,250	\$ 6,567	\$ 6,020	\$ 4,202
Total operating expenses	8,688	8,721	8,501	7,888
Net loss	(2,419)	(2,136)	(2,461)	(3,670)
Basic and diluted net loss per common share	\$ (0.05)	\$ (0.05)	\$ (0.05)	\$ (0.08)

Item 9. Changes in and Disagreements with Accountants on Accounting and Financial Disclosure

None.

Item 9A. Controls and Procedures

Conclusion Regarding the Effectiveness of Disclosure Controls and Procedures

Under the supervision and with the participation of our management, including our principal executive officer and principal financial officer, we conducted an evaluation of our disclosure controls and procedures, as such term is defined under Rule 13a-15(e) promulgated under the Securities Exchange Act of 1934, as amended, or the Exchange Act. Based on this evaluation, our principal executive officer and our principal financial officer concluded that our disclosure controls and procedures were effective as of the end of the period covered by this annual report.

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 Exchange Act Rule 13a-15(f). Under the supervision and with the participation of our management, including our Chief Executive Officer and our Vice President, Finance we conducted an evaluation of the effectiveness of our internal control over financial reporting based on the framework in *Internal Control - Integrated Framework* issued by the Committee of Sponsoring Organizations of the Treadway Commission (2013 framework). Based on our evaluation under the framework in *Internal Control — Integrated Framework*, our management concluded that our internal control over financial reporting was effective as of December 31, 2017.

This Annual Report on Form 10-K does not include an attestation report of our independent registered public accounting firm regarding internal control over financial reporting. We were not required to have, nor have we, engaged our independent registered public accounting firm to perform an audit of internal control over financial reporting pursuant to SEC rules that permit us to provide only management's report in this Annual Report on Form 10-K.

Changes in Internal Control Over Financial Reporting

There was no change in our internal control over financial reporting during our most recent fiscal quarter that has materially affected, or is reasonably likely to materially affect, our internal controls over financial reporting.

Item 9B. Other Information

None.

PART III

Certain information required by Part III of this Form 10-K is omitted from this report because registrant will file a definitive Proxy Statement within 120 days after the end of its fiscal year pursuant to Regulation 14A for its 2016 Annual Meeting of Stockholders to be held on May 24, 2018, referred to as the Proxy Statement, and the information included therein is incorporated herein by reference.

Item 10. Directors, Executive Officers and Corporate Governance

The information required by this item is incorporated by reference to the Proxy Statement under the sections entitled “Election of Directors,” “Section 16(a) Beneficial Ownership Reporting Compliance,” “Code of Business Conduct and Ethics,” and “Information Regarding the Board of Directors and its Committees.”

Item 11. Executive Compensation

The information required by this item is incorporated herein by reference to the information from the Proxy Statement under the sections entitled “Executive Compensation,” “Compensation Committee Report,” “Compensation Committee Interlocks and Insider Participation” and “Director Compensation for Fiscal 2016.”

Item 12. Security Ownership of Certain Beneficial Owners and Management and Related Stockholder Matters

The information required by this item is incorporated herein by reference to the information from the Proxy Statement under the sections entitled “Security Ownership of Certain Beneficial Owners and Management” and “Equity Compensation Plan Information.”

Item 13. Certain Relationships and Related Transactions, and Director Independence

The information required by this item is incorporated herein by reference to the information from the Proxy Statement under the sections entitled “Election of Directors” and “Certain Relationships and Related Transactions.”

Item 14. Principal Accountant Fees and Services

The information required by this item is incorporated herein by reference to the information from the Proxy Statement under the section entitled “Principal Accountant Fees and Services.”

PART IV

Item 15. Exhibits and Financial Statement Schedules

(a) 1. Financial Statements

See Index to Financial Statements in Item 8 of this annual report on Form 10-K, which is incorporated herein by reference.

2. Financial Statement Schedules

All schedules have been omitted because they are not applicable or required, or the information required to be set forth therein is included in the Financial Statements or notes thereto included in Item 8 of this annual report on Form 10-K.

3. Exhibits

Exhibit Number	Description of Document	Incorporated by reference herein
3.1	Amended and Restated Certificate of Incorporation as currently in effect.	Registration Statement File No. 333-113998
3.2	Amended and Restated Bylaws as currently in effect.	Current Report on Form 8-K filed with the Securities and Exchange Commission on December 20, 2007
4.1	Form of Common Stock Certificate.	Registration Statement File No. 333-113998
10.1+	Form of Indemnity Agreement.	Registration Statement File No. 333-113998
10.2+	1999 Equity Incentive Plan and Form of Stock Option Agreement thereunder.	Registration Statement File No. 333-113998
10.3+	Amended and Restated 2004 Equity Incentive Plan and Form of Employee and Consultant Stock Option Agreement thereunder.	Registration Statement File No. 333-113998
10.4+	Form of Non-Employee Director Stock Option Agreement under the 2004 Equity Incentive Plan.	Current Report on Form 8-K filed with the Securities and Exchange Commission on September 25, 2009
10.5+	2013 Equity Incentive Plan.	Registration Statement File No. 333-193306
10.6+	Form of Employee Stock Option Agreement under the 2013 Equity Incentive Plan.	Annual Report on Form 10-K for the year ended December 31, 2013
10.7+	Form of Non-Employee Director Stock Option Agreement under the 2013 Equity Incentive Plan.	Annual Report on Form 10-K for the year ended December 31, 2013
10.8+	2004 Employee Stock Purchase Plan and Form of Offering Document thereunder.	Registration Statement File No. 333-113998
10.9+	Amendment No. 1 to Senomyx, Inc. 2004 Employee Stock Purchase Plan.	Quarterly Report on Form 10-Q for the quarter ended June 30, 2013
10.10+	Senomyx, Inc. 2017 Executive Bonus Plan.	Current Report on Form 8-K filed with the Securities and Exchange Commission on February 24, 2017
10.11+	Non-Employee Director Compensation Policy effective January 1, 2015.	Annual Report on Form 10-K for the year ended December 31, 2015
10.12+	Letter agreement dated September 20, 2013 between Senomyx, Inc. and Kent Snyder.	Quarterly Report on Form 10-Q for the quarter ended September 30, 2013
10.13+	Letter agreement dated September 20, 2013 between Senomyx, Inc. and John Poyhonen.	Quarterly Report on Form 10-Q for the quarter ended September 30, 2013
10.14+	Second Amendment to Change in Control Agreement dated September 20, 2013 between Senomyx, Inc. and John Poyhonen.	Quarterly Report on Form 10-Q for the quarter ended September 30, 2013
10.15+	Employment letter agreement dated March 14, 2006 between Senomyx, Inc. and Sharon Wicker.	Annual Report on Form 10-K for the year ended December 31, 2006
10.16+	First Amendment to Employment Agreement dated March 14, 2006, as amended effective December 31, 2008, between Senomyx, Inc. and Sharon Wicker.	Current Report on Form 8-K filed with the Securities and Exchange Commission on December 23, 2008
10.17+	Employment letter agreement dated February 20, 2002 between Senomyx, Inc. and Antony E. Rogers.	Quarterly Report on Form 10-Q for the quarter ended September 30, 2009
10.18+	Employment letter agreement dated May 9, 2014 between Senomyx, Inc. and Catherine C. Lee.	Annual Report on Form 10-K for the year ended December 31, 2016
10.19+	First Amendment to Employment Agreement dated May 9, 2014, as amended February 19, 2016, between Senomyx, Inc. and Catherine C. Lee.	Annual Report on Form 10-K for the year ended December 31, 2016
10.20+	Form of Amended and Restated Change in Control Agreement.	Current Report on Form 8-K filed with the Securities and Exchange Commission on December 23, 2008
10.21*	Lease Agreement dated January 12, 2006 between ARE-NEXUS CENTRE II, LLC and Senomyx, Inc.	Annual Report on Form 10-K for the year ended December 31, 2005

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10.22	<u>First Amendment dated February 19, 2015 to Lease Agreement dated January 12, 2006 between ARE-NEXUS CENTRE II, LLC and Senomyx, Inc.</u>	Annual Report on Form 10-K for the year ended December 31, 2015
10.23	<u>Subordination, Non-Disturbance and Attornment Agreement dated October 23, 2009 by and between Pacific Life Insurance Co., Senomyx, Inc. and ARE-Nexus Centre II, LLC.</u>	Annual Report on Form 10-K for the year ended December 31, 2009
10.24*	<u>License Agreement dated October 11, 2006 between Senomyx, Inc. and The Regents of the University of California.</u>	Annual Report on Form 10-K for the year ended December 31, 2006
10.25*	<u>First Amendment dated February 7, 2007 to the License Agreement dated October 11, 2006 between Senomyx, Inc. and The Regents of the University of California.</u>	Quarterly Report on Form 10-Q for the quarter ended March 31, 2007
10.26*	<u>Second Amendment dated November 20, 2009 to the License Agreement between Senomyx, Inc. and The Regents of the University of California dated October 11, 2006.</u>	Annual Report on Form 10-K for the year ended December 31, 2009
10.27*	<u>Collaborative Research, Development, Commercialization and License Agreement dated August 16, 2010 between Senomyx, Inc. and PepsiCo, Inc.</u>	Quarterly Report on Form 10-Q for the quarter ended September 30, 2010
10.28*	<u>Amended and Restated Collaborative Research, Development, Commercialization and License Agreement dated September 30, 2016 between Senomyx, Inc. and PepsiCo, Inc.</u>	Quarterly Report on Form 10-Q for the quarter ended September 30, 2016
10.29*	<u>Amended and Restated Collaborative Research, Development, Commercialization and License Agreement dated April 9, 2013 between Senomyx, Inc. and Firmenich SA.</u>	Quarterly Report on Form 10-Q for the quarter ended June 30, 2013
10.30	<u>Purchase Agreement, dated as of December 21, 2016, by and between Senomyx, Inc. and Lincoln Park Capital Fund, LLC.</u>	Current Report on Form 8-K filed with the Securities and Exchange Commission on December 22, 2016
10.31	<u>Amended and Restated Collaborative Research, Development, Commercialization and License Agreement dated February 5, 2018 between Senomyx, Inc. and Firmenich SA.</u>	
23.1	<u>Consent of Independent Registered Public Accounting Firm.</u>	
24.1	<u>Power of Attorney. Reference is made to the signature page.</u>	
31.1	<u>Certification of John Poyhonen, Chief Executive Officer, pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.</u>	
31.2	<u>Certification of Dave Humphrey, Vice President, pursuant to Section 302 of the Sarbanes-Oxley Act of 2002.</u>	
32.1	<u>Certification of John Poyhonen, Chief Executive Officer, and Dave Humphrey, Vice President, pursuant to 18 U.S.C. Section 1350, as adopted pursuant to Section 906 of the Sarbanes-Oxley Act of 2002.</u>	
101	The following financial statements from the Senomyx, Inc. Annual Report on Form 10-K for the year ended December 31, 2017, formatted in Extensive Business Reporting Language (XBRL): (i) balance sheets, (ii) statements of operations, (iii) statements of stockholders' equity, (iv) statements of cash flows, and (v) notes to financial statements (tagged as blocks of text).	

+ Indicates management contract or compensatory plan.

* Confidential treatment has been granted or requested with respect to certain portions of this exhibit. Omitted portions have been filed separately with the Securities and Exchange Commission.

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(b) Exhibits

See Item 15(a) above.

(c) Financial Statement Schedules

See Item 15(a) above.

SIGNATURES

Pursuant to the requirements of Section 13 or 15(d) of the Securities Exchange Act of 1934, the Registrant has duly caused this report to be signed on its behalf by the undersigned, thereunto duly authorized.

Senomyx, Inc.

By: /S/ JOHN POYHONEN
John Poyhonen
President, Chief Executive Officer and Director

Dated: March 8, 2018

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENTS, that each person whose signature appears below constitutes and appoints John Poyhonen and David Humphrey, and each of them, as his or her true and lawful attorneys-in-fact and agents, with full power of substitution and resubstitution, for him or her and in his or her name, place, and stead, in any and all capacities, to sign any and all amendments to this report, and to file the same, with all exhibits thereto, and other documents in connection therewith, with the Securities and Exchange Commission, granting unto said attorneys-in-fact and agents, and each of them, 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 he or she might or could do in person, hereby ratifying and confirming that all said attorneys-in-fact and agents, or any of them or their or his substitute or substituted, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Exchange Act of 1934, this report has been signed below by the following persons on behalf of the Registrant and in the capacities and on the dates indicated.

Signature	Title	Date
<u>/S/ JOHN POYHONEN</u> John Poyhonen	President, Chief Executive Officer and Director (Principal Executive Officer)	March 8, 2018
<u>/S/ DAVID HUMPHREY</u> David Humphrey	Vice President, Finance (Principal Financial and Accounting Officer)	March 8, 2018
<u>/S/ STEPHEN A. BLOCK</u> Stephen A. Block, Esq.	Director	March 8, 2018
<u>/S/ MARY ANN GRAY</u> Mary Ann Gray, Ph.D.	Director (Lead Independent Director)	March 8, 2018
<u>/S/ MICHAEL E. HERMAN</u> Michael E. Herman	Director	March 8, 2018
<u>/S/ KENT SNYDER</u> Kent Snyder	Chairman of the Board of Directors	March 8, 2018
<u>/S/ DANIEL E. STEBBINS</u> Daniel E. Stebbins	Director	March 8, 2018
<u>/S/ CHRISTOPHER TWOMEY</u> Christopher Twomey	Director	March 8, 2018

***Text Omitted and Filed Separately
with the Securities and Exchange Commission.
Confidential Treatment Requested
Under 17 C.F.R. Sections 200.80(b)(4) and 240.24b-2

**AMENDED AND RESTATED
COLLABORATIVE RESEARCH, DEVELOPMENT,
COMMERCIALIZATION
AND LICENSE AGREEMENT**

BETWEEN

SENOMYX, INC.

AND

FIRMENICH SA

**AMENDED AND RESTATED COLLABORATIVE RESEARCH, DEVELOPMENT,
COMMERCIALIZATION AND LICENSE AGREEMENT**

THIS AMENDED AND RESTATED AGREEMENT is entered into as of February 7, 2018, by and between SENOMYX, INC., a Delaware Corporation having offices at 4767 Nexus Centre Drive, San Diego, CA 92121, U.S.A. (“Senomyx”) and FIRMENICH SA, a Swiss Company, having its principal place of business at 1, route des Jeunes, 1211 Geneva 8, Switzerland (“Firmenich”).

BACKGROUND

Firmenich and Senomyx entered into this Agreement on the Effective Date covering a research and development program to discover and develop Natural Compounds discovered by high throughput screening [...***...] and provide a cooling taste effect for use in the Field.

This Agreement has been amended five separate times and the parties wish to amend and restate this Agreement for the sole purpose of consolidating the Agreement entered into on the Effective Date and its five amendments into one single agreement.

NOW, THEREFORE, in consideration of the foregoing promises and of the covenants, representations and agreements set forth below, the parties hereby agree as follows:

THE AGREEMENT

1. **Definitions.** Certain terms set forth in this Agreement with initial capitals are defined in Appendix A, which is incorporated herein by reference.
2. **Steering Committee.** Within [...***...] of the Effective Date, the parties will establish a joint steering committee, which will be made up of representatives from the parties (the “Steering Committee”). The Steering Committee will manage the Collaborative Program and will (i) provide strategic direction and performance criteria for the Collaborative Program; (ii) direct the efforts of the Collaborative Program and monitor progress and communicate status of the Collaborative Program; (iii) facilitate the cooperation between the parties; (iv) approve the achievement of milestones, and (v) continue to communicate following the Collaborative Period regarding the development and commercialization of Products. The Steering Committee will consist of two (2) representatives designated by Senomyx and two (2) representatives designated by Firmenich. Steering Committee members may delegate their voting powers to delegates from their respective companies. Each member of the Steering Committee will have one (1) vote. The Steering Committee will meet at least four (4) times per year, unless otherwise agreed, during the Collaborative Period, and thereafter from time to time, using mutually agreed upon meeting locations and formats including teleconferencing and videoconferencing. Each party shall bear its own expenses relating to the meetings and activities of the Steering Committee. Senomyx will prepare and deliver to the members of the Steering Committee minutes of such meetings for review and approval by both parties. Decisions of the Steering Committee will be made by unanimous vote, at a meeting where all four voting representatives are represented, or by unanimous written consent. All unresolved disputes will be settled in accordance with Section 17.4, or as otherwise mutually agreed in writing.

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3. Collaborative Program.

3.1 Research. During the Collaborative Period, Senomyx will collaborate with Firmenich in the Collaborative Program on an Exclusive basis in the Field.

3.1.1 The Collaborative Program will be conducted pursuant to the Research Plan.

3.1.2 During the Collaborative Period, Senomyx will use its reasonable commercial efforts using the Research Fees provided under Section 7.1 to perform the activities outlined in the Research Plan. Senomyx will prepare a data package containing [...] for [...] under the Collaborative Program. For the avoidance of doubt, the Compounds set forth in the data package will be Natural Compounds, unless the Option is properly exercised pursuant to Section 8.2.

During the Extension Period Senomyx will prepare a data package for [...] under the Collaborative Program, one (1) of which [...] and one (1) of which shall be [...***...], containing the following information:

- Preliminary [...] profiling of Compound for [...***...]
- Physical properties of Compound:
[...***...]
- Stability of Compound under stress conditions

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[...***...]

- Summary of Senomyx sensory data for Compound
 - Cooling intensity [...***...] of one or more concentrations of compound [...***...]
- Summary of literature safety data on structurally related compounds or potential metabolites
- Description of the method of synthesis for Compound (including supporting spectral data)
- [...***...]

In addition, Senomyx will send [...***...] of lab synthesized Compound material to be used for Firmenich's evaluation with the data package.

- 3.1.3 During the Collaborative Period, Firmenich will use its reasonable commercial efforts to perform the activities in accordance with the Research Plan, including the evaluation of the data package provided by Senomyx under Section 3.1.2. Such evaluation may not exceed [...***...].
- 3.1.4 During the Collaborative Period, the Steering Committee will select the Selected Compound(s) under the Collaborative Program after evaluation of the data package by Firmenich, as provided for under Section 3.1.3.
- 3.1.5 During the Collaborative Period, the parties will cooperate in good faith to support the other party's performance of the activities set forth in the Research Plan. Upon expiration of the Collaborative Period, the parties' research and development obligations pursuant to this Section 3.1 will expire. If no Compounds are selected as Selected Compounds during the Collaborative Period pursuant to this Section 3.1, the licenses set forth under Section 8 will terminate.

3.2 Product Development and Commercialization.

- 3.2.1 **Product Development.** Within [...***...] of the selection of a Selected Compound, Firmenich will prepare a plan for product development ("Product Development Plan") for Products incorporating such Selected Compound for review by the Steering Committee (the "Product Development Plan"), which will be incorporated into the minutes of the Steering Committee; however, Firmenich shall have sole discretion to determine the Product Development Plan. The Product Development Plan(s) will set forth the following: [...***...] Firmenich will use its commercially reasonable and diligent efforts to perform the activities set forth in the Product Development Plan(s). For the avoidance of doubt, Firmenich will be responsible for [...***...] to be used in [...***...] including [...***...] with such activities, in accordance with the activities outlined in the Product Development Plan(s).

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3.2.2 Product Commercialization.

- 3.2.2.1 Within [...***...] from the date of compound selection for each Selected Compound, Firmenich shall submit a Strategic Marketing Plan to the Steering Committee for Products containing such Selected Compound, which will be incorporated into the minutes of the Steering Committee; however, [...***...] Firmenich will update such Strategic Marketing Plan on a [...***...] basis and such updates shall be provided to the Steering Committee and incorporated into the minutes of the Steering Committee. The Strategic Marketing Plan [...***...] and neither Firmenich nor any of its Affiliates [...***...] in the Strategic Marketing Plan will be achieved.
- 3.2.2.2 [RESERVED]
- 3.2.2.3 [RESERVED]
- 3.2.2.4 For the avoidance of doubt, Firmenich will be responsible for [...***...].
- 3.2.2.5 In accordance with the efforts and resources Firmenich would use for [...***...], which is [...***...] as the applicable Selected Compound, Firmenich will [...***...] at any time during which it has exclusive rights for such Selected Compound under this Agreement.

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3.3 Regulatory.

3.3.1 Regulatory filings for Selected Compounds shall be made by [...] to perform the foregoing activities. [...] to obtain guidance on those countries in which Selected Compounds are likely to be used in the Field and Senomyx shall [...] of Selected Compounds.

3.3.2 All regulatory filings made or filed by [...] for any Selected Compound will be owned exclusively by [...] and shall be subject to the license grant pursuant to Section 8.

3.3.3 [...] shall [...] in [...] reasonably incurred and directly associated with regulatory filings (e.g. safety studies, manufacturing compounds for safety studies, and filing fees) for Selected Compounds. If such costs [...] associated with the regulatory approval of all Selected Compounds exceed [...] in the aggregate as documented by [...], then [...] shall [...] for such [...]. If such costs to [...] associated with the regulatory approval of all Selected Compounds exceed [...] in the aggregate as documented [...]. All such regulatory [...] shall not reflect [...]. In addition, [...] shall have the right to review [...] in this Section 3.3.3 in open book, provided that [...] under Section 10. Notwithstanding anything to the contrary contained in this Section 3.3.3, [...] shall pay [...] incurred and associated with regulatory filings [...] in the Licensed Fields. Prior to undertaking [...] shall obtain prior written consent from [...], such consent not to be unreasonably withheld. In addition, [...] shall promptly share the results of [...] study reports with [...] prior to sharing the results with any third party.

4. Collaboration with an Affiliate or Third Party. During the Term, Senomyx will have the right to enter into collaborative programs with its Affiliates and/or with Third Parties including, but not limited to, collaborative programs to (i) discover compounds [...] for use outside the Field; and (ii) modulate modalities other than cooling taste effect within the Field.

5. Law and Regulation. The Compounds, Selected Compounds, and any other materials provided by Senomyx under this Agreement must be used in compliance with all applicable laws and regulations, including, without limitation, all import and export laws and regulations.

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6. **Reporting.** Each party will report to the other a written summary of results of research and development work it carries out, if any, under this Agreement within [...] after the end of each calendar [...]. Each party agrees to prepare and exchange written and electronic reports concerning any results and data that must be used by either party as supporting information for any regulatory filings. The exchange of such report may be reasonably supplemented, at the request of the party receiving a report, by correspondence and/or upon reasonable prior notice, visits to the other party's facilities.

7. **Financial Terms.**

7.1 **Research and Development Support.** During the Collaborative Period, Firmenich will pay Senomyx research fees for the Collaborative Program including the activities performed pursuant to the Research Plan ("Research Fees") as follows:

7.1.1 **Natural Compounds.**

- For the first [...] of the Collaborative Period, Firmenich will provide funding to Senomyx of [...] for the Collaborative Program. These payments will be made [...] in advance in the amount of US [...]. The first payment of [...] will be made within [...] following the Effective Date.
- For [...] of the Collaborative Period, Firmenich will pay Senomyx funding of [...] for the Collaborative Program. These payments will be made [...] in advance in the amount of [...].
- For [...] of the Collaborative Period, Firmenich will pay Senomyx funding of [...] for the Collaborative Program. These payments will be made [...] in advance in the amount of [...].

7.1.2 **Option for Synthetic Compounds.** In the event the Option is exercised pursuant to Section 8.2, the Research Fees for each [...] of the Collaborative Program shall be based on the Steering Committee's assessment of the [...] needed to complete [...] required for Synthetic Compounds for such [...], provided that there shall be a minimum of [...] during any [...]. At each [...] Steering Committee meeting, the Steering Committee (i) will discuss and agree upon the [...] for the following [...] for Synthetic Compounds of research in an effort to complete the Collaborative Program in an expeditious manner as outlined in the Research Plan; and (ii) will forecast [...] for the next subsequent [...] for Synthetic Compounds research. In the event the Option is exercised, all work on Natural Compounds will conclude. The [...] Research Fee shall be calculated by [...] in any given [...] by [...]

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[...***...].

The Research Fees under this Section 7.1 will be paid in equal [...***...] installments payable in advance. Payments for any period which is less than [...***...] of the Collaborative Period will be prorated based on the actual number of days in such period. Any adjustments in funding due to exercise of the Option above will be made by Firmenich within [...***...] of exercise of the Option or with the next [...***...] payment, whichever is earlier. These Research Fees are inclusive of [...***...]. These payments do not include: (i) [...***...] associated with [...***...] for the Collaborative Program; or (ii) the [...***...] as requested and agreed to by the Steering Committee. Additional Research Fees, if any, may be proposed to the Steering Committee and agreed to in writing.

The parties will [...***...] all [...***...] associated with Natural Compounds (other than for [...***...]Senomyx of compound libraries) including, without limitation, [...***...], etc. The parties recognize that Firmenich and/or Senomyx may have the in-house capabilities required to perform certain research or development activities associated with Natural Compounds. The Steering Committee will discuss the relative capabilities of the two parties and decide the most appropriate party to perform such activities.

Notwithstanding Section 7.1.2 of the Agreement, the parties hereby agree that during the Extension Period, the minimum [...***...] shall be [...***...]. Unless the Steering Committee intends to approve a greater [...***...] for a given [...***...], no additional action is required by the Steering Committee to set the level of Research Fees for the Extension Period.

Notwithstanding anything in the Agreement or the Research Plan to the contrary, Senomyx and Firmenich mutually agree that during the Extension Period referenced in this Second Amendment, Senomyx's research and development activities under the Agreement shall be limited to (i) [...***...]. During the Extension Period the Steering Committee will meet at least [...***...] times, and by not later than March 15, 2013 the Steering Committee shall discuss the prioritization of [...***...] activities during the final 90-days of the Extension Period and any additional potential extension of the Collaborative Period, it being understood that neither party shall have any obligation to enter into any such extension of the Collaborative Period.

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7.2 **Milestone Payments.** Firmenich will pay Senomyx the following non-creditable, non-refundable milestone payments below within [...] of the occurrence of the following milestone events for the Collaborative Program:

Milestone	Objective	Payment
[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]

7.3 **Royalty for Products.** During the applicable Royalty Term, Firmenich shall pay to Senomyx a royalty of [...] containing one or more Selected Compounds [...***...]. Firmenich and its Affiliates may sell any Selected Compound alone (i.e., as a Stand-Alone Product) subject to Section 7.3.1, or as part of a flavour, fragrance or other formulation for a particular use in the Licensed Fields.

The royalty paid to Senomyx [...] will be based on [...***...]. The following examples are provided for illustration purposes only:

[...***...]

Sales of Products by Firmenich and its Affiliates in all cases (including, without limitation, to related parties such as Affiliates and joint ventures) shall be conducted through arms-length transactions [...***...]; provided, royalties [...] shall only be paid [...] in an arm's length transaction. In the event of a dispute between the parties regarding [...***...], the parties shall resolve the dispute pursuant to Section 17.4.

7.3.1 **Royalty on [...***...].** In the event Firmenich or its Affiliate desires to sell any Selected Compound [...***...], Firmenich shall inform Senomyx's within [...] after each such sale and Firmenich shall pay to Senomyx [...] [...***...]. The applicable royalty rate(s) will be [...***...]. In the event of a dispute between the parties regarding the applicable royalty rate for a [...***...], the parties shall resolve the dispute pursuant to Section 17.4.

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7.4 Minimum Annual Royalties. Commencing on the [...] of the Minimum Annual Royalty Date for the first Selected Compound and throughout the Term, in the event that earned royalties paid under Section 7.3 during a Minimum Annual Royalty Year (as defined below) is less than the amount of the applicable Minimum Annual Royalty set forth in the schedule below, then Firmenich shall pay Senomyx the difference between such amounts within [...] from the end of that Minimum Annual Royalty Year. A “Minimum Annual Royalty Year” shall mean each twelve-(12)-month period commencing on the Minimum Annual Royalty Date for the first Selected Compound and each anniversary thereof.

Anniversary of the Minimum Annual Royalty Date for the first Selected Compound	Minimum Annual Royalty Payment due Senomyx
[...] Anniversary	[...***...]
[...] Anniversary	[...***...]
[...] Anniversary and successive anniversaries	[...***...]

Notwithstanding the foregoing, in the event that (i) the Minimum Annual Royalty Date is triggered by [...] first [...] is not achieved within two (2) years of the [...***...], then the Minimum Annual Royalty payment amounts set forth above [...] Such payment amounts will automatically [...] set forth above upon [...***...]. Adjustment of payments for any period which is less than one year will be prorated based on the actual number of days in such period.

With respect to [...] has not been received by [...***...], then the Minimum Annual Royalties set forth above will be [...] (due after the Royalty Suspension Period). The MAR payment amounts referenced above will [...] to the original payment amounts set forth above, [...] following [...***...]. For the avoidance of doubt, a [...] triggered by [...] shall only apply [...***...].

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Adjustment of payments for any period which is less than one year will be prorated based on the actual number of days in such period. For purposes of this Section 7.4, Regulatory Approval [...***...] means approval by the [...***...] as laid down in [...***...], or as subsequently amended, or as otherwise agreed by the Steering Committee as the appropriate regulatory pathway in [...***...].

By way of illustration, but not limitation, an example of the calculation of Minimum Annual Royalty is set forth below:

Assumptions for Example:

[...***...]

[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]
[...***...]	[...***...]	[...***...]

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- 7.5 **Payment Terms.** The royalties due under Section 7.3 will be paid within [...] after the end of [...] period in which such royalties are earned during the Royalty Term for each Product. With each such [...] payment, Firmenich (or its respective Affiliate or sublicensee(s)) will furnish to Senomyx a royalty statement in sufficient detail to permit confirmation of the accuracy of the royalty payment made, which sets forth [...] the relevant sales information, including [...***...], the method used to calculate the royalty, [...***...]. Firmenich will be responsible for all royalties due to Senomyx from Affiliates and sublicensees if they do not fulfil their payment obligations to Senomyx.
- 7.6 **Currency of Payment.** All payments to be made under this Agreement, including the royalties payable to Senomyx by Firmenich, will be paid in United States dollars by wire transfer or other mutually acceptable means to a bank account designated by Senomyx. With respect to each [...***...], for countries other than the United States, whenever conversion of payments from any foreign currency are required, such conversion will be made [...***...].
- 7.7 **Taxes Withheld.** Any income or other tax that Firmenich, or any of its Affiliates is required by a government agency to withhold and pay on behalf of Senomyx with respect to the royalties payable under this Agreement will be deducted from and offset against such royalties prior to remittance to Senomyx; provided, however, that in regard to any tax so deducted, Firmenich will give or cause to be given to Senomyx such assistance as may reasonably be necessary to enable Senomyx to claim exemption from or credit for the tax so deducted, and in each case will promptly furnish to Senomyx proper evidence of the taxes paid on Senomyx's behalf.
- 7.8 **Late Payment.** In the event that any payment, including royalty payments, due hereunder is not made when due, the payment will accrue interest from that date due at the rate of [...***...]; provided, however, that in no event will such rate exceed the maximum legal annual interest rate. The payment of such interest will not limit Senomyx from exercising any other rights it may have as a consequence of the lateness of any payment.

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- 7.9 Records of [...***...]Net Sales and Royalty Calculations.** During the Royalty Term and for [...***...] Firmenich will keep complete and accurate records of sales and all other information necessary to calculate [...***...] in sufficient detail to allow the accrued royalties to be determined accurately in accordance with International Financial Reporting Standards (“IFRS”) and to verify the royalty payments pursuant to Section 7.3. Senomyx, with reasonable written notice to Firmenich and not to exceed [...***...], will have the right to [...***...] to verify the accuracy of the reports of [...***...] Senomyx agrees not to disclose Confidential Information concerning royalty payments reports, and all other information learned in the course of [...***...], except to the extent necessary for Senomyx to enforce its rights under this Agreement or if disclosure is required by law.
- 7.10 CL19 Payment.** In consideration for (i) the addition of the CL19 Program Compounds as Selected Compounds and the accompanying grant of rights from Senomyx pursuant to Section 8.1, (ii) the suspension of Firmenich’s royalty obligations under Section 7.3 and Section 7.4, for royalties that will be earned between January 1, 2018 and December 31, 2020 (the “Royalty Suspension Period”); (iii) the right of first negotiation with respect to Future Cool Taste Compounds set forth in Section 8.2.1, (iv) the right of first negotiation in the event of a Senomyx Insolvency set forth in Section 8.2.2 and (v) the exclusivity agreement set forth in Section 8.7, Firmenich shall make a non-creditable, non-refundable payment of US \$10.0 Million (ten million US dollars) to Senomyx (“CL19 Payment”) within [...***...] from the Fifth Amendment Effective Date. Firmenich’s royalty obligations under Sections 7.3 and Section 7.4 shall resume on January 1, 2021. Minimum Annual Royalties pursuant to Section 7.4 will be adjusted and prorated for that period of time (i) between July 1, 2017 and December 31, 2017; and (ii) between January 1, 2021 and June 30, 2021. During the Royalty Suspension Period, Firmenich, its Affiliates and sublicensees shall [...***...].
- 7.11 Sublicense Payment.** In addition to royalty payments due under Section 7.3. or 7.3.1., if Firmenich grants a third party a sublicense under the Senomyx Technology to make, have made, use, import, offer for sale or sell any [...***...], and in consideration for any such license grant receives any Sublicense Revenue, then Firmenich shall pay to Senomyx [...***...]. Firmenich shall pay such amount to Senomyx within [...***...] of its receipt of the Sublicense Revenue from the sublicensee.

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8. Grants.

8.1 License Grant. Subject to the terms and conditions of this Agreement, as of the Fifth Amendment Effective Date (with respect to expansion of the license to the CL19 Program Compounds, and expansion of the field to the Licensed Fields), Senomyx hereby grants to Firmenich the following rights:

- (i) an Exclusive, non-transferable (except as permitted under Sections 8.3.1 and 17.12), worldwide license under the Senomyx Technology to use Selected Compounds for development of [...] in the Licensed Fields; and
- (ii) an Exclusive, non-transferable (except as permitted under Sections 8.3.1 and 17.12), worldwide license under the Senomyx Technology, to make, have made, use, sell, offer for sale, have sold, import and export [...] Selected Compounds in the Licensed Fields.

These licenses includes (a) the right for Firmenich to allow its customers to sell and promote any end-product that contains the Product(s), consistent with the above sub-paragraph, and (b) the right to sell Stand Alone Products subject to Section 7.3.1

8.2 [RESERVED]

8.2.1 Right of First Negotiation for Future Cool Taste Compounds. If after the Fifth Amendment Effective Date, Senomyx develops additional Synthetic Compounds [...] each a "Future Cool Taste Compound") for use in one or more of the Licensed Fields, Senomyx agrees that prior to Senomyx commercializing the Future Cool Taste Compounds directly or granting a Third Party license to commercialize such Future Cool Taste Compound, Senomyx will notify Firmenich in writing of such Future Cool Taste Compound opportunity and Firmenich will then have [...] to evaluate such Future Cool Taste Compound [...] then Senomyx shall be free to enter into directly commercialize or enter into a Third Party license with respect to such Future Cool Taste Compound. [...***...][...***...].

8.2.2 Right of First Negotiation in event of Senomyx Insolvency. If after the Fifth Amendment Effective Date, there is a Senomyx Insolvency, Senomyx shall [...***...]. If the parties have not executed a mutually acceptable agreement by the end of the aforementioned [...***...], then Senomyx shall be free to license, sell or otherwise commercialize [...***...] to/with any Third Party

8.3 Limitations to Licenses.

8.3.1 Firmenich shall have the right to grant sublicenses of the rights granted it in Section 8, subject to the terms in this Section 8.3.1. Firmenich may sublicense its rights [...***...], on the condition that Firmenich assumes the responsibility for performance due by any such sublicensee under a sublicense of the obligations imposed upon Firmenich in the license under the Agreement (including, without limitation, diligence obligations under Section 3 of this Agreement and the timely payment by Firmenich under Section 7 of the Agreement). Firmenich will agree to be responsible for and to guarantee payment of royalties due on [...***...] by any [...***...].

8.3.2 For the avoidance of doubt, Firmenich shall not knowingly sell or provide [...***...] to any third party for use outside the Licensed Fields. Firmenich shall [...***...] with its purchasers which include [...***...] upon Firmenich in this Section 8 with respect to the Licensed Fields, in the case of [...***...]and CL19 Program Compounds. If Firmenich [...***...] Selected Compound or Product outside of the Licensed Fields licensed to Firmenich under this Section 8, then Firmenich will [...***...] and [...***...].

8.3.3 With respect to any rights licensed to Senomyx [...***...], notwithstanding the exclusive licenses granted in this Section 8, Firmenich acknowledges that (i) academic, government and other not-for-profit organizations are not precluded from practicing such rights for educational and research purposes; and (ii) the research leading to such rights was funded in part by the U.S. Government, and the U.S. Government has certain rights as set forth in 37 CFR 401. Firmenich agrees to comply with all obligations resulting from such government rights, including, but not limited to, the requirement that any Products embodying such rights sold in the United States must be substantially manufactured in the United States to the extent required by 35 U.S.C. Sec. 204, if such statute is applicable. No earned royalty will be collected or paid hereunder to [...***...] on Products sold to, or otherwise exploited for, the account of the United States government as provided for in the license to the United States government. Firmenich will reduce the amount charged for Products sold to or otherwise exploited by the United States Government by an amount equal to the earned royalty for such product otherwise due [...***...].

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8.4 Grant of Rights from Firmenich to Senomyx.

8.4.1 If Firmenich identifies any Firmenich Technology that it considers may be relevant or useful for the research purposes under this Agreement, Senomyx [...] the relevant Firmenich Technology and Firmenich [...] of the Firmenich Technology. Where Firmenich [...] in this Section 8.4, Firmenich will [...] to use the relevant Firmenich Technology for research purposes solely related to Senomyx's performance of its obligations pursuant to this Agreement. For the avoidance of doubt this [...] will not include [...] unless Firmenich gives its consent, which may be withheld for any reason.

8.4.2 Senomyx [...] License. Firmenich hereby grants to Senomyx a non-exclusive, sublicenseable, royalty-free, perpetual, worldwide license under any [...] owned by Firmenich pursuant to Section 9.5.3 and all claims within Patent Rights claiming such [...] (i) to make, have made, use, sell, offer for sale, have sold, import and export products outside of the Licensed Fields; and (ii) in the event that Firmenich's Exclusive licenses under Section 8 terminate, to make, have made, use, sell, offer for sale, have sold, import and export products in the Licensed Fields.

8.4.3 [RESERVED]

8.5 Limited Product Applications. In the event that (a) Firmenich has commenced sales of Products and determined in good faith that [...] within [...] due to limited product application(s) [...] within the Licensed Field, and (b) [...] in such [...] by [...], then upon good faith request of Firmenich the Steering Committee will [...] and to [...]. The Steering Committee will document any such changes to [...] in the minutes of the Steering Committee. In such event, [...] Firmenich in Section 8 [...] Licensed [...] and in respect to [...] and the Minimum Annual Royalties [...]. For the avoidance of doubt, any [...] of Firmenich will be subject to the terms of this Agreement including full milestone and royalty payments under Section 7.2 and 7.3.

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8.6 [RESERVED].

8.7 **Exclusivity.** During the Term, neither Senomyx nor any of its Affiliates may, directly or indirectly, (i) research, develop, manufacture, market, promote, sell, distribute or otherwise exploit for any use in the Licensed Fields in any country (aside from receiving proceeds from the licenses granted to Firmenich with respect to the Selected Compounds) [...] and/or provides a cooling taste effect or cooling sensation and that (a) are specifically described in or [...] by [...] or (b) are encompassed by the formula:

[...***...]

[...***...] are defined according to [...***...]; or (ii) develop, sell or otherwise commercialize any Pre-Existing Collaboration Cool Taste Compounds (aside from receiving proceeds from the licenses granted to Firmenich with respect to the Selected Compounds). Upon termination of the Agreement, the foregoing covenant shall terminate. As used in this Section, “**Pre-existing Collaboration Cool Taste Compounds**” shall mean compounds that were [...***...] and for which Senomyx had determined [...***...][...***...] that such compounds [...***...]. The term “[...***...]” for purposes of this Section shall mean [...***...].

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Notwithstanding the foregoing, nothing in this Section 8.7 shall prevent Senomyx from enforcing its patent rights, consistent with this Agreement, against any party; subject to the terms of Section 11 (Intellectual Property Enforcement and Defense of Claims).

For clarity, aside from the foregoing covenant, Senomyx shall have the full right and ability to continue its cool research program and to discover, develop and commercialize compounds that [...***...] and/or provides a cooling taste effect or cooling sensation outside of Pre-existing Collaboration Cool Taste Compounds, provided that such compounds are Substantially Different from Pre-existing Collaboration Cool Taste Compounds. The term “Substantially Different” for the purpose of this Section shall mean a compound with a Similarity Index [...***...]. “Similarity Index Test” means [...***...] from time to time.

9. Ownership of Intellectual Property.

- 9.1 Retention of Rights.** Senomyx retains all rights in Senomyx Technology not expressly licensed, or assigned in this Agreement. Firmenich retains all rights in Firmenich Technology not expressly licensed, or assigned in this Agreement. Except as otherwise expressly provided in this Agreement, nothing in this Agreement is intended to convey or transfer ownership or the grant of any license or sublicense by one party to the other party of any rights in any Confidential Information, Patent Rights or Know-How Controlled by a party.
- 9.2 Senomyx Sole Inventions.** Senomyx will own all Inventions and other Know-How made solely by its employees and agents under this Agreement (the “Senomyx Sole Inventions”), and all claims within Patent Rights claiming such Inventions and Know-How. Senomyx hereby irrevocably assigns to Firmenich all right, title and interest in and to any such Senomyx Sole Inventions that consist of improvements to the Firmenich Technology (“Firmenich Improvements”), and all claims within Patent Rights claiming such Senomyx Sole Inventions, subject to any license granted to Senomyx pursuant to Section 8. In the event that Senomyx is legally unable to assign such rights to Firmenich, then Senomyx agrees either to waive the enforcement of such rights against Firmenich and any sublicensees and assignees, or to grant Firmenich an Exclusive, irrevocable, perpetual, worldwide, fully paid-up license, with right to sublicense through multiple tiers of sublicense, to such rights, subject to any license granted to Senomyx pursuant to Section 8.

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- 9.3 Firmenich Sole Inventions.** Firmenich will own all Inventions and other Know-How made solely by its employees and agents under this Agreement (“Firmenich Sole Inventions”), and all claims within Patent Rights claiming such Inventions and Know-How. Firmenich hereby irrevocably assigns to Senomyx all right, title and interest in and to any such Firmenich Sole Inventions that consist of improvements to the Senomyx Technology (“Senomyx Improvements”), including, without limitation, [...***...], and all claims within Patent Rights claiming such Firmenich Sole Inventions, subject to any licenses granted to Firmenich pursuant to Section 8. In the event that Firmenich is legally unable to assign such rights to Senomyx, then Firmenich agrees either to waive the enforcement of such rights against Senomyx and any sublicensees and assignees, or to grant Senomyx an Exclusive, irrevocable, perpetual, worldwide, fully paid-up license, with right to sublicense through multiple tiers of sublicense, to such rights, subject to any license granted to Firmenich pursuant to Sections 8.
- 9.4 Joint Inventions.** All Inventions and other Know-How made under this Agreement jointly by employees or agents of Senomyx and employees or agents of Firmenich (the “Joint Inventions”) and all claims within Patent Rights claiming such Joint Inventions will be owned jointly by Firmenich and Senomyx. Firmenich hereby irrevocably assigns to Senomyx all interest in and to any Joint Inventions that consist of Senomyx Improvements, including, without limitation, compounds, Compounds (including both Natural Compounds and Synthetic Compounds) and Selected Compounds (including both Natural Compounds and Synthetic Compounds), and uses thereof, and all claims within Patent Rights claiming such Joint Inventions, subject to the licenses granted to Firmenich pursuant to Section 8. In the event that Firmenich is legally unable to assign such rights to Senomyx, then Firmenich agrees either to waive the enforcement of such rights against Senomyx and any sublicensees and assignees, or to grant Senomyx an Exclusive, irrevocable, perpetual, worldwide, fully paid-up license, with right to sublicense through multiple tiers of sublicense, to such rights, subject to any license granted to Firmenich pursuant to Sections 8. Senomyx hereby irrevocably assigns to Firmenich all interest in and to any Joint Inventions that consist of Firmenich Improvements, and all claims within Patent Rights claiming such Joint Inventions, subject to any licenses granted to Senomyx pursuant to Section 8. In the event that Senomyx is legally unable to assign such rights to Firmenich, then Senomyx agrees either to waive the enforcement of such rights against Firmenich and any sublicensees and assignees, or to grant Firmenich an Exclusive, irrevocable, perpetual, worldwide, fully paid-up license, with right to sublicense through multiple tiers of sublicense, to such rights, subject to any license granted to Senomyx pursuant to Section 8.

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9.5 [...***...].

9.5.1 [...***...]. For the avoidance of doubt, all [...***...] Controlled by [...***...] prior to the Effective Date (the [...***...]) and all claims within Patent Rights claiming such [...***...] will be owned solely by [...***...].

9.5.2 [...***...] Notwithstanding anything to the contrary contained in Sections 9.2, 9.3 or 9.4, [...***...] developed by [...***...] under this Agreement which consist of improvements to [...***...] or which are [...***...] and all claims within Patent Rights claiming such [...***...] will be owned solely by [...***...].

9.5.3 [...***...] Notwithstanding anything to the contrary contained in Sections 9.2, 9.3, 9.4 or 9.5.2, all [...***...] developed by [...***...] under this Agreement and all claims within Patent Rights claiming such [...***...] will be owned by [...***...], subject to [...***...] pursuant to Section 8.4.2. Notwithstanding anything to the contrary in this Agreement, [...***...] will have no right to practice [...***...] of the Licensed Fields, [...***...].

9.6 **Other Inventions.** Ownership of any Inventions made pursuant to this agreement but not included in Sections 9.2, 9.3, 9.4 or 9.5 will be determined by inventorship.

9.7 **Inventorship and Assignment.** United States patent law will determine inventorship of patentable inventions. Senomyx and Firmenich agree to execute all documentation necessary to perfect all assignments of Patent Rights contemplated in this Agreement.

9.8 **CREATE Act.** The parties intend for this Agreement to qualify for the benefits of the Cooperative Research and Technology Enhancement (CREATE) Act (35 U.S.C. 103(c)). Accordingly, each party agrees, without demanding any further consideration therefor, at the request of the other party, to do (and cause its employees to do) all lawful and just acts that may be or become necessary for evidencing, maintaining, recording and perfecting the benefits of the CREATE Act.

10. Treatment of Confidential Information; Publicity.

10.1 **Confidentiality.** Subject to the terms and conditions of this Agreement, each of Senomyx and Firmenich agrees that, during the Term and for a period of [...***...] thereafter, it will keep confidential, and will cause its Affiliates to keep confidential, all of the other party's Confidential Information. Neither Senomyx nor Firmenich nor any of their respective Affiliates will use the other party's Confidential Information, except as expressly permitted by this Agreement.

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- 10.2 Disclosure to Related Parties.** Senomyx and Firmenich each agree that any disclosure to any of its Affiliates, or to its or their respective directors, officers, employees, contractors, consultants, sublicensees or agents of the other party's Confidential Information will be made only if and to the extent necessary to carry out its responsibilities under this Agreement and to exercise the rights granted to it hereunder, will be limited to the extent consistent with such responsibilities and rights, and will be provided only to such persons or entities who are under an obligation of confidentiality no less stringent than as set forth in this Agreement. Each party will use reasonable efforts to take such action, and to cause its Affiliates to take such action, to preserve the confidentiality of the other party's Confidential Information, which will be the same efforts as it would customarily take to preserve the confidentiality of its own Confidential Information.
- 10.3 Return of Confidential Material Upon Termination.** Upon termination of this Agreement, each party, upon the other party's request, will return or destroy all Confidential Information received from the other party including, without limitation, all copies and extracts of documents, within [...***...] of the date of receipt of the request of such other party; provided, however, one copy of the Confidential Information may be retained in a secure location with limited access for ensuring legal compliance with any ongoing obligation of confidentiality.
- 10.4 Exceptions to Confidential Information.** Confidential Information will not include any information, which the receiving party can prove by competent written evidence:
- (A) is now, or hereafter becomes, through no act or failure to act on the part of the receiving party, generally known or available;
 - (B) is known by the receiving party prior to receiving such information, as evidenced by its records;
 - (C) is hereafter furnished to the receiving party without restriction as to disclosure or use by a third party lawfully entitled to furnish such information;
 - (D) is independently developed by the employees, agents or contractors of the receiving party without the aid, application or use of the disclosing party's Confidential Information; or
 - (E) is the subject of a written permission to disclose provided by the disclosing party.

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A party may also disclose the other party's Confidential Information of where required to do so by law, legal process, securities related regulations or by stock exchange rules; provided, however, that, in such event, the party required to disclose such information must give advance written notice of such disclosure to the other party to the extent reasonably possible and must cooperate with the other party's efforts to seek, at the request and expense of the other party, all confidential treatment and protection for such disclosure as is permitted by applicable laws, regulations and rules; provided further that the relevant party may disclose the other party's Confidential Information only to those persons to whom disclosure is so required. Anything in this Section 10.4 to the contrary notwithstanding, the exceptions provided in (B) and (D) above shall not apply to information developed by Firmenich independently and/or jointly with Senomyx that constitutes a Senomyx Improvement or information developed by Senomyx independently and/or jointly with Firmenich that constitutes a Firmenich Improvement.

- 10.5 Confidential Financial Information.** The parties agree that the material financial and business terms of this Agreement will be considered Confidential Information of both parties. Notwithstanding the foregoing, either party may disclose such terms in legal proceedings or as are required to be disclosed in its financial statements, by law or SEC regulation, or under an obligation of confidentiality to bona fide potential sublicensees. Senomyx may provide a copy of this Agreement or other Confidential Information provided under this Agreement including, without limitation, progress and royalty reports to the extent required by its licensors [...***...] Either party will have the further right to disclose the material financial terms of this Agreement under an obligation of confidentiality to [...***...]. Notwithstanding the foregoing, the parties will agree upon a press release to announce the execution of this Agreement and [...***...] and the nature of the research program (cool). Thereafter, Firmenich and Senomyx may each disclose to Third Parties the information contained in such press release without the need for further approval by the other party.
- 10.6 Permitted Use and Disclosures.** Each party may use or disclose Confidential Information disclosed to it by the other party to the extent such information is included in the Firmenich Technology, Senomyx Technology or Joint Patent Rights, and to the extent such use or disclosure is reasonably necessary and permitted in the exercise of the rights granted hereunder in filing or prosecuting patent applications, prosecuting or defending litigation, complying with applicable governmental regulations, or court orders or otherwise submitting information to tax or other governmental authorities, conducting taste testing, submitting information for regulatory applications, or making a permitted sublicense or otherwise exercising rights expressly granted to the other party pursuant to the terms of this Agreement; provided, however, that if a party is required to make any such disclosure of the other party's Confidential Information, other than pursuant to a confidentiality agreement, it will give reasonable advance notice of such disclosure to the other party where reasonably possible and, save to the extent inappropriate in the case of patent applications, will use its reasonable efforts to secure confidential treatment of such Confidential Information in consultation with the other party prior to such disclosure (whether through protective orders or otherwise). Any disclosure of Confidential Information shall be limited to the minimum necessary to comply with such requirements.

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10.7 Publication of Results. Subject to this Section 10, results and data obtained by either party in the course of the collaboration may be submitted for publication by Senomyx in accordance with Senomyx's customary practices. Senomyx will send a copy of the proposed publication to Firmenich and will allow Firmenich [...] from the date of receipt for review and comment. Firmenich may, within [...] object to the proposed publication on the grounds that either the publication contains Confidential Information of Firmenich in which case any such data determined in fact to be Confidential Information shall be removed from the publication before it is published or the publication may prejudice a subsequent patent application by Firmenich in which case Senomyx shall delay publication for a further [...] or until such patent application is filed, if earlier. If no answer is received from Firmenich within [...] days of receipt of the proposed publication, Senomyx will be free to submit such proposed publication.

10.8 Confidential Research Information. Subject to the provisions of Sections 3.3.2 and 9 regarding ownership of certain regulatory data and intellectual property, the parties agree that all results and data generated from the research and development by a party under the Collaborative Program will be owned exclusively by that party and considered Confidential Information of that party subject to the confidentiality requirements of this Section 10. Firmenich will not provide to a Third Party any materials including, without limitation, Compounds provided to it by Senomyx and Senomyx will not provide to a Third Party any materials provided to it by Firmenich. However, Firmenich may [...***...].

11. Intellectual Property Enforcement and Defense of Claims.

11.1 Notice. If Senomyx or Firmenich believes that any Patent within the Senomyx Technology, Firmenich Technology or Jointly Owned Technology is (a) being infringed by a Third Party's activities and that such infringement could affect the exercise by the parties of their respective rights and obligations under this Agreement, or (b) becomes aware that any such Patent becomes subject to any declaratory judgment action, inter partes review, opposition or any similar proceeding that may affect the validity or enforceability of such Patent ("Other Proceeding"), it shall promptly notify the other party in writing and provide such other party with any evidence of such infringement or other proceeding that is reasonably available. Promptly after the receipt of such written notice, the parties shall meet and discuss in good faith how to stop such infringement or respond to such other proceeding.

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11.2 General.

11.2.1 Enforcement. If a Party initiates a claim, suit or proceeding relating to enforcement of the applicable Patent described above in connection with the abatement of such an infringement, or becomes involved in a declaratory judgment action related to the applicable Relevant Patent, then such Party shall use counsel reasonably acceptable to the other Party, and shall keep the other Party fully informed as to the status of such matters and the resolution thereof. Whether or not requested by the Party initiating such claim, suit or proceeding, the other Party shall have the right to be represented by counsel of its own selection, at its own expense, in any such claim, suit or proceeding against a Third Party under this Section for an Infringement, and the initiating Party agrees not to oppose attempts by the other Party to join in any such proceeding.

11.2.2 Other Proceeding. With respect to any Other Proceeding, the owner of the applicable Patent Right (the “Relevant Patent”) shall have the right to lead the defense of any such Other Proceeding, using counsel of its choice. Such Party shall keep the other Party fully informed as to the status of such matters and the resolution thereof. Whether or not requested by the Party initiating such claim, suit or proceeding, the other Party shall have the right to be represented by counsel of its own selection, at its own expense.

11.2.3 Settlement. Neither Party may [...***...] any settlement with respect to any Infringement that (i) makes any [...***...] or (ii) would [...***...].

11.3 Senomyx Technology Infringement. With respect to any actual or potential infringement of Senomyx Technology or Jointly Owned Technology in one or more of the Licensed Fields, Firmenich shall have [...***...] to take action to abate such infringement using commercially appropriate steps, including without limitation, [...***...]. At Firmenich’s request and expense, Senomyx shall (a) join any such action as a party, if required by applicable law, and (b) cooperate reasonably with Firmenich in such action. In the event Firmenich [...***...] of any such Senomyx Technology or Jointly Owned Technology within [...***...] following notice of such infringement, or earlier notifies Senomyx of its intent not to take such steps, then Senomyx shall have the right to do so at its expense; provided, however, that if Firmenich has commenced negotiations with an alleged infringer for discontinuance of such infringement within such [...***...], Firmenich shall have [...***...] to conclude its negotiations before Senomyx may bring suit for such infringement or take other similar action. In the event Firmenich brings such suit for infringement or takes other similar action, Senomyx shall have the right to join in such infringement suit or similar action at its own expense.

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11.4 Firmenich Technology.

11.4.1 General. With respect to any infringement of any Firmenich Technology, Firmenich shall have the sole right, but not the obligation, to take action to abate any such infringement at its own expense.

11.4.2 Senomyx Compound [...***...]. With respect to Patent Rights owned by Firmenich pursuant to Section 9.5.3 claiming Senomyx [...***...] where such infringement is outside of the Licensed Fields, Firmenich will have the sole right, but not the obligation, to take action to stop infringement of the claims in such Patent Rights which claim Senomyx [...***...] only against Third Parties that are not licensees of Senomyx.

12. Patent Prosecution and Maintenance.

12.1 Senomyx Owned Patents. As of the Fifth Amendment Effective Date, [...***...] shall have [...***...] of the patents and patent applications (including without limitation divisional applications and utility models) licensed to Firmenich, using [...***...]. [...***...] expects [...***...] patent applications in at least the following jurisdictions: [...***...]. [...***...] will be [...***...], unless [...***...] elects not to pursue such activities as provided in Section 12.2 below. Firmenich will reasonably confer with Senomyx [...***...] and shall [...***...] with patent offices with regard to the licensed patent applications and patents. the parties will discuss in good faith a filing strategy, and the parties will discuss and agree [...***...] before the due date of international filings or [...***...] before the due date of 30-month national phase filings, in which countries/regions to file patent applications claiming selected compounds.

12.2 Opt-Out by [...***...]. Notwithstanding the foregoing, if [...***...] a patent application or [...***...] a patent within the Senomyx Patent Rights covering one or more Selected Compound(s) in [...***...] shall have the [...***...] or [...***...]; provided, however, that if [...***...] such patent application in such country, [...***...] will [...***...] for the preparation, filing or prosecution of such application or maintenance costs in connection with any patents issuing therefrom in such country.

12.3 [...***...]. Upon expiration of the Term or earlier termination of this agreement, [...***...] [...***...] patents and patent applications [...***...] shall [...***...], and in such case, Senomyx shall [...***...] application or [...***...] in connection with any such patents and patent applications. In this event, [...***...] will [...***...] and [...***...] Senomyx.

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- 12.4 Related Firmenich Patent Filings.** Notwithstanding anything to the contrary in this agreement, Firmenich shall [...] related to the [...] patent rights. Moreover, in the event Firmenich desires to [...***...], Firmenich shall provide [...] of all [...] and shall [...] related to the [...***...].
- 13. Manufacturing.** All actual [...] manufacturing the Selected Compounds will be paid [...***...]. Subject to the terms and conditions of this Agreement, Firmenich may, in its sole discretion, [...] with a third party regarding Selected Compounds.
- 14. Term, Early Conclusion and Termination.**
- 14.1 Term.** The term of this Agreement will begin on the Effective Date and will continue through the end of the Royalty Term, unless terminated earlier in accordance with the provisions of Section 14.2, 14.3 or 14.4 hereof (the “Term”).
- 14.2 Termination By Mutual Agreement.** The parties may terminate this Agreement at any time, in whole or in part, by mutual written agreement executed by both parties.
- 14.3 Termination By Firmenich.** After the Collaborative Period, Firmenich will have the right to terminate this Agreement without cause [...] to Senomyx.
- 14.4 Termination for Breach.** Either party has the right to terminate this Agreement at any time for a material breach of this Agreement by the other party, provided that the breaching party has not cured such breach [...] after written notice thereof by the non-breaching party. The non-breaching party, upon termination of this Agreement, may seek actual or general damages and remedies available to it at law or in equity.
- 15. Effect of Termination.**
- 15.1** Upon termination of this Agreement pursuant to Section 14, Firmenich will have no right to practice within or use of the Senomyx Technology, and all rights, title and interest in and to the Senomyx Technology will revert to and become the sole property of Senomyx, unless otherwise agreed upon in writing by the parties on or before the effective date of such termination.

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- 15.2** Notwithstanding the foregoing Section 15.1, within a period of [...***...] after the date of termination, Firmenich is [...***...] subject to the terms of this Agreement, including, but not limited to, the rendering of reports and payment of earned royalties, and any other payments therefore required under this Agreement. Firmenich may not otherwise make, sell, offer for sale, import or export Products after the date of termination.
- 15.3** Expiration or termination of this Agreement will not relieve the parties of any obligation accruing prior to such expiration or termination
- 15.4** **Survival.** The obligations and rights of the parties under Sections 3.3.2, 7.8, 7.9, 8.4.2, 9, 10, 14, 15, 16, 17, and Appendix A, will survive termination or expiration of this Agreement. The obligations and the rights of the Parties under Section 8.6 will survive termination or expiration of this Agreement. Furthermore, as of the effective date of expiration of the Royalty Term with respect to a Product containing the Selected Compounds, the licenses from Senomyx to Firmenich under Sections 8.2.1. shall convert to fully paid, royalty free, irrevocable, perpetual, non-exclusive licenses under the Senomyx Know How to develop, make, have made, use, sell, offer for sale, have sold, import and export Products containing the Selected Compounds in the Licensed Fields.

16. Warranties and Indemnification.

16.1 Mutual Representations and Warranties. The parties make the following representations and warranties to each other:

- 16.1.1 Corporate Power.** Each party hereby represents and warrants that as of the Effective Date such party (i) is duly organized and validly existing under the laws of the jurisdiction of its incorporation and has full corporate power and authority to enter into this Agreement and to carry out the provisions of this Agreement; (ii) has the requisite power and authority and the legal right to own and operate its property and assets, to lease the property and assets it operates under lease, and to carry on its business as it is now being conducted; and (iii) is in compliance with all requirements of applicable law of its state or country of incorporation, except to the extent that any noncompliance would not have a material adverse effect on its ability to perform its obligations under this Agreement.
- 16.1.2 Due Authorization.** Each party hereby represents and warrants that as of the Effective Date such party (i) has the requisite power and authority and the legal right to enter into this Agreement and to perform its obligations hereunder; and (ii) has taken all necessary action on its part to authorize the execution and delivery of this Agreement and to authorize the performance of its obligations hereunder and the grant of rights extended by it hereunder.

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- 16.1.3 Binding Agreement.** Each party hereby represents and warrants to the other that as of the Effective Date (i) this Agreement has been duly executed and delivered on its behalf and is a legal and valid obligation binding upon it and is enforceable in accordance with its terms; (ii) the execution, delivery and performance of this Agreement by such party does not conflict with any agreement, instrument or understanding, oral or written, to which it is a party or by which it may be bound, nor violate any law or regulation of any court, governmental body or administrative or other agency having authority over it; and (iii) all necessary consents, approvals and authorizations of all governmental authorities and other persons required to be obtained by it in connection with the Agreement have been obtained.
- 16.1.4 Performance of Obligations.** Each party hereby represents and warrants that any individual performing obligations under the Agreement for a party is qualified to perform the work in the Research Plan. Upon request of Firmenich, Senomyx shall identify to Firmenich the Senomyx personnel, including their academic and work experience, who shall participate in the Collaborative Program.
- 16.1.5 Natural Compound Libraries.** Senomyx warrants that, to the best of its knowledge as of the Effective Date, it has rights under agreements with the third parties from whom it has acquired its natural sample libraries to be screened under the Collaborative Program under the intellectual property owned by such third parties that are consistent with the licenses granted to Firmenich under this Agreement. However, Firmenich acknowledges that the compounds within the natural samples contained in such libraries are unknown until the natural samples are screened, fractionated and structures are elucidated under the Collaborative Program. Accordingly, Senomyx cannot and does not represent or warrant that a third party does not already have, or that it may not obtain at some future date, patent rights relating to any compounds within the samples.
- 16.1.6 Current Activities.** As of the Fifth Amendment Effective Date, Senomyx hereby represents and warrants that of such date it is not conducting and is not planning to conduct, alone or with any third party, research and development with respect to any compound that Senomyx has identified on or before the Fifth Amendment Effective Date as providing a cooling taste effect. Notwithstanding the preceding statement, Senomyx continues [...***...].

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- 16.2** EXCEPT AS EXPRESSLY SET FORTH IN THIS AGREEMENT, SENOMYX MAKES NO WARRANTIES OF ANY KIND. IN PARTICULAR, (i) SENOMYX (INCLUDING ITS OFFICERS, EMPLOYEES AND AGENTS) EXPRESSLY DISCLAIMS ANY REPRESENTATIONS AND WARRANTIES, WHETHER EXPRESS OR IMPLIED, RELATING TO SENOMYX TECHNOLOGY; AND (ii) SENOMYX FURTHER DISCLAIMS ANY EXPRESS OR IMPLIED WARRANTY (a) OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OF SENOMYX TECHNOLOGY OR SENOMYX PATENT RIGHTS; (b) THAT THE PRACTICE OF SENOMYX TECHNOLOGY OR ANYTHING MADE, USE, SOLD OR OTHERWISE DISPOSED OF UNDER ANY LICENSE GRANTED UNDER THIS AGREEMENT WILL NOT INFRINGE A PATENT, COPYRIGHT, TRADEMARK OR OTHER RIGHT OF A THIRD PARTY; AND (c) REGARDING THE PATENTABILITY OF ANY SENOMYX TECHNOLOGY, INCLUDING, WITHOUT LIMITATION, SENOMYX TECHNOLOGY CLAIMED IN PATENT APPLICATIONS AS PART OF SENOMYX PATENT RIGHTS. IN ADDITION, NOTHING IN THIS AGREEMENT MAY BE DEEMED TO BE A REPRESENTATION OR WARRANTY BY SENOMYX OF THE ACCURACY, SAFETY, EFFICACY, OR USEFULNESS, FOR ANY PURPOSE, OF THE SENOMYX TECHNOLOGY.
- 16.3** **Senomyx Indemnification.** Senomyx shall indemnify Firmenich, its Affiliates and their respective directors, officers, employees and agents (collectively, "Firmenich Indemnitees"), and defend and save each of them harmless, from and against any and all losses, damages, liabilities, costs and expenses (including without limitation, reasonable attorneys' fees and expenses) (collectively, "Losses") in connection with any and all Third Party suits, investigations, claims or demands (collectively, "Third Party Claims") arising from or occurring as a result of (a) any material breach by Senomyx of this Agreement; (b) any representation or warranties made by Senomyx herein having been incorrect or misleading; or (c) any gross negligence or willful misconduct (but not patent infringement which is covered in Section 11) on the part of Senomyx or its Affiliates in performing any activity contemplated by this Agreement including, but not limited to, product liability claims arising out of any tests conducted solely by Senomyx. Notwithstanding the foregoing, Senomyx shall have no obligation to indemnify a Firmenich Indemnitee to the extent, and only to the extent, that Firmenich has an obligation to indemnify any Senomyx Indemnitee pursuant to Section 16.5 for any such Losses.
- 16.4** **Firmenich Indemnification.** Firmenich shall indemnify Senomyx, its Affiliates and their respective directors, officers, employees and agents (collectively "Senomyx Indemnitees"), and defend and save each of them harmless, from and against any and all Losses in connection with any and all Third Party Claims arising from or occurring as a result of (a) any material breach by Firmenich of this Agreement; (b) any representation or warranties made by Firmenich herein having been incorrect or misleading; (c) any gross negligence or willful misconduct (but not patent infringement which is covered in Section 11) on the part of Firmenich or its Affiliates in performing any activity contemplated by this Agreement; (d) any development, manufacturing, formulation, handling, storage, shipment, sale or other disposition of a Compound or a Selected Compound by or through Firmenich or its Affiliates or its permitted sublicensees; (e) a product liability claim on any Product; (f) the practice by Firmenich of any license granted hereunder. Notwithstanding the foregoing, Firmenich shall have no obligation to indemnify a Senomyx Indemnitee, except to the extent, and only to the extent, Senomyx has an obligation to indemnify any Firmenich Indemnitee pursuant to Section 16.4 for any such Losses.

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16.5 Limitation of Liability. NOTWITHSTANDING ANYTHING TO THE CONTRARY IN THIS AGREEMENT, NEITHER PARTY WILL SEEK OR BE RESPONSIBLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES IN ANY AMOUNT UNDER ANY THEORY OF LIABILITY INCLUDING TORT, CONTRACT, NEGLIGENCE OR OTHERWISE UNDER THIS AGREEMENT AND NEITHER PARTY WILL SEEK OR BE RESPONSIBLE FOR ANY PUNITIVE DAMAGES IN ANY AMOUNT (INCLUDING, WITHOUT LIMITATION, ANY AND ALL CLAIMS ARISING PURSUANT TO SECTION 14 OR THIS SECTION 16).

16.6 With respect to rights licensed to Senomyx by [...***...], Firmenich hereby agrees to indemnify, defend and hold harmless [...***...], as appropriate, and their respective officers, directors, employees, sponsors and agents from and against all damages or other amounts payable to a Third Party (including product liability) resulting or arising from Firmenich's use of the rights granted herein to the extent that such indemnification by Firmenich is required by [...***...] pursuant to the agreement between Senomyx and [...***...].

17. Miscellaneous.

17.1 Force Majeure. Neither party will lose any rights hereunder or be liable to the other party for damages or losses on account of failure of performance by the defaulting party (other than a payment default) if the failure is occasioned by war, fire, explosion, flood, (e.g. El Niño), earthquake, strike, lockout, embargo, act of God, or any other similar cause beyond the control of the defaulting party; provided, however, that the party claiming force majeure has exerted all reasonable commercial efforts to avoid or remedy such force majeure and thereafter takes all reasonable steps to mitigate any such delay in performance hereunder and any damages that may be incurred by the other party thereby.

17.2 Governing Law and Jurisdiction. This Agreement will be governed exclusively by the laws of [...***...] as such laws are applied to contracts entered into and to be performed entirely within such state.

17.3 Binding Effect. This Agreement will be binding upon and inure to the benefit of the successors (including as a result from a Change in Control of a party) and permitted assigns of the parties. Any assignment not in accordance with this Agreement will be void.

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17.4 Dispute Resolution.

- 17.4.1 Negotiation.** The parties recognize that disputes as to certain matters may from time to time arise during the Term, which relate to either party's rights and/or obligations hereunder ("Disputes"). It is the objective of the parties to establish procedures to facilitate the resolution of Disputes arising under this Agreement in an expedient manner by mutual cooperation and negotiation. The parties agree that prior to any arbitration concerning this Agreement or any court action relating to patent rights, Senomyx's president and Firmenich's Corporate Vice President, Research and Development will meet in person or by video-conferencing in a good faith effort to resolve any disputes concerning this Agreement. Within [...***...] of a formal request by either party to the other party, either party may, by written notice to the other party, have such dispute referred to their respective officers designated or their successors, for attempted resolution by good faith negotiations, such good faith negotiations to begin within [...***...] after such notice is received.
- 17.4.2 Arbitration.** Any Dispute arising out of or relating to this Agreement which is not resolved between the parties or the designated officers of the parties pursuant to this Section 17.4 will be resolved by final and binding arbitration conducted in [...***...]. The arbitration will be conducted by three (3) arbitrators who are knowledgeable in the subject matter at issue in the dispute. Senomyx will select one arbitrator, and one arbitrator will be selected by Firmenich. The third arbitrator will be selected by mutual agreement of the two arbitrators selected by the parties. The decision of the arbitrators will be final and binding on the parties and may be sued on or enforced by the party in whose favor it runs in any court of competent jurisdiction at the option of such party.
- 17.4.3 Interlocutory Relief.** Notwithstanding anything to the contrary in this Section 17.4, either party may seek immediate injunctive or other interim relief from any court of competent jurisdiction, including in Switzerland, with respect to any breach of Sections 9 or 10 hereof, or otherwise to enforce and protect the Patent Rights, copyrights, trademarks, or other intellectual property rights Controlled by such party. In addition, arbitration will not be used to resolve disputes concerning Patent Rights Controlled by either party. Subject to Section 17.4.1, disputes concerning Patent Rights, including, but not limited to, disputes concerning patent ownership, claim language, claim scope and issues of validity will be settled in a court of law. Any arbitration ruling that relies on an interpretation of Patent Rights will have no binding effect in a court of law on any Patent Rights related to this Agreement, unless such Patent Rights have been adjudicated in a court of law.

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- 17.5 Severability.** If any term, covenant or condition of this Agreement or the application thereof to any party or circumstance is, to any extent, held to be invalid or unenforceable, then the remainder of this Agreement, or the application of such term, covenant or condition to parties or circumstances other than those as to which it is held invalid or unenforceable, will not be affected thereby and each term, covenant or condition of this Agreement will be valid and enforced to the fullest extent permitted by law; the parties covenant and agree to renegotiate any such term, covenant or condition or the application thereof in good faith in order to provide a reasonably acceptable alternative to the term, covenant or condition of this Agreement or the application thereof that is invalid or unenforceable, it being the intent of the parties that the basic purposes of this Agreement are to be effectuated.
- 17.6 Independent Contractors.** It is expressly agreed that Firmenich and Senomyx will be independent contractors and that the relationship between the parties will not constitute a partnership or agency of any kind. Neither Firmenich nor Senomyx will have the authority to make any statements, representations or commitments of any kind, or to take any action, which will be binding on the other party, without the prior written authorization of the other party to do so.
- 17.7 Entire Agreement; Amendment.** This Agreement sets forth all of the covenants, promises, agreements, warranties, representations, conditions and understandings between the parties with respect to the Collaborative Program, and supersedes and terminates all prior agreements and understandings between the parties, with respect to the subject matter of this Agreement. There are no covenants, promises, agreements, warranties, representations, conditions or understandings, either oral or written, between the parties other than as set forth in this Agreement. No subsequent alteration, amendment, change or addition to this Agreement will be binding upon the parties unless reduced to writing and signed by the respective authorized officers of the parties. This Agreement will not be strictly construed against either party. Any conflict between the terms set forth in the text of this Agreement and the terms of any Appendix hereto will be resolved in favor of the text of this Agreement.
- 17.8 Waiver.** Except as specifically provided for in this Agreement, the waiver from time to time by either of the parties of any rights or the failure to exercise any remedy will not operate or be construed as a continuing waiver of the same right or remedy or any of the other of such party's rights or remedies provided in this Agreement.
- 17.9 Construction.** The term "Article" or "Section" can refer to any single paragraph level found in this Agreement or any collection of multiple paragraphs thereunder.
- 17.10 No Third Party Beneficiaries.** No Third Party, including any employee of any party to this Agreement (except as specifically provided in this Agreement), will have or acquire any rights by reason of this Agreement. Nothing contained in this Agreement will be deemed to constitute the parties partners with each other or any Third Party.

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17.11 Notices. Any notices or communications provided for in this Agreement to be made by either party to the other party must be in writing, in English, and will be made by prepaid air mail or overnight carrier with return receipt addressed to the other party at its address set forth below. Any such notice or communication may also be given by hand, or facsimile to the appropriate designation. Notices will be sent:

If to Senomyx, to:

Senomyx, Inc.
4767 Nexus Centre Drive
San Diego, CA 92121
U.S.A.
Facsimile number:
(858) 404-0750
Attention: General Counsel with a copy to the President

If to Firmenich, to:

Firmenich SA
1, route des Jeunes,
1211 Geneva 8
Switzerland
Facsimile number: +41.22.780.23.97
Attention: General Counsel

By like notice, either party may specify or change an address to which notices and communications must be thereafter sent. Notices sent by mail, facsimile or overnight carrier will be effective upon receipt and notices given by hand will be effective when delivered.

17.12 Assignment. Notwithstanding any provision of this Agreement to the contrary, neither party may assign any of its rights or obligations under this Agreement in any country to any third party without the prior written consent of the non-assigning party, which consent will not be unreasonably withheld; provided, however, that either party may assign its rights and obligations under this Agreement without the consent of the other party (i) to a successor to substantially all of the assets of such party to which this Agreement relates, whether by merger, sale of stock, sale of assets or other transaction or (ii) to any Affiliate. [...***...]. Notwithstanding the foregoing, any such assignment to an Affiliate will not relieve the assigning party of its responsibilities for performance of its obligations under this Agreement. This Agreement will survive any merger or consolidation of either party with or into another party and, subject to the foregoing provisions, no consent for any such merger, consolidation or similar reorganization will be required hereunder. Any assignment in contravention of the provisions of this Section 17.12 shall be null and void *ab initio*.

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17.13 Counterparts. This Agreement may be executed in two or more counterparts, each of which will be deemed an original, but all of which together will constitute one and the same instrument.

17.14 Reporting Changes Resulting from Acquisition of Senomyx [...*...].** In the event that a Change in Control of Senomyx [...***...], Firmenich shall [...***...] pursuant to Sections 3.2.2. Furthermore, Firmenich may elect, in its sole discretion, [...***...]. The [...***...] associated with such [...***...] shall be [...***...] by the parties.

17.15 Bankruptcy.

- (a) **Rights in Bankruptcy.** All rights and licenses granted by Senomyx to Firmenich under or pursuant to this Agreement are, and shall otherwise be deemed to be, for purposes of Section 365(n) of Title 11 of the United States Code and other similar laws in any jurisdiction outside the US (collectively, the “Bankruptcy Code”), licenses of rights to “intellectual property” as defined under the Bankruptcy Code. If a case is commenced during the Term by or against Senomyx under Bankruptcy Code then, unless and until this Agreement is rejected as provided in such Bankruptcy Code, Senomyx (in any capacity, including debtor-in-possession) and its successors and assigns (including a trustee) shall perform all of the obligations provided in this Agreement to be performed by Senomyx. If a case is commenced during the Term by or against Senomyx under the Bankruptcy Code, this Agreement is rejected as provided in the Bankruptcy Code, and Firmenich elects to retain its rights hereunder as provided in the Bankruptcy Code, then Senomyx (in any capacity, including debtor-in-possession) and its successors and assigns (including a Title 11 trustee), shall provide to Firmenich copies of all information necessary for Firmenich to prosecute, maintain and enjoy its rights under the terms of this Agreement promptly upon Firmenich’s written request therefor. All rights, powers and remedies of Firmenich as provided herein are in addition to and not in substitution for any and all other rights, powers and remedies now or hereafter existing at law or in equity (including the Bankruptcy Code) in the event of the commencement of a case by or against Senomyx under the Bankruptcy Code.
- (b) **Rejection.** To the extent Senomyx rejects this Agreement under the Bankruptcy Code and Firmenich elects to retain its rights, (x) Firmenich shall have the full rights provided to it under Section 365(n) of the Bankruptcy Code; (y) the waivers under Section 365(n) (2)(C) shall apply only to rights of setoff and administrative claims arising solely out of this Agreement, and not to any other agreements or instruments, including, without limitation, claims or rights arising out of agreements supplementary to this Agreement; and (z) Senomyx shall, without need for notice or hearing, provide to Firmenich any intellectual property (including such embodiment) held by Senomyx and/or any other entity or person, and shall not interfere with the rights of Firmenich as provided in this Agreement, or any agreement supplementary to this Agreement, to such intellectual property (including such embodiment) including any right to obtain such intellectual property (and such embodiment) from another entity or person.

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(c) **General.** For purposes of this Agreement, the term “embodiment” shall mean any and all materials required to be delivered by Senomyx to Firmenich hereunder and any materials relating to the licenses granted hereunder which, in the course of dealing between the Parties under this Agreement, are customarily delivered, in whatever format (whether electronic, written or otherwise). All written agreements entered into relating to and in connection with the Parties’ performance hereunder from time-to-time, shall be considered agreements “supplementary” to this Agreement for purposes of Section 365(n) of the Bankruptcy Code. Senomyx acknowledges and agrees that the rights of Firmenich to such intellectual property (and such embodiments) are unique, and that to the extent Senomyx, or their respective trustees in bankruptcy, were to sell any portion of such intellectual property free and clear of liens, claims or interests, Firmenich would suffer irreparable damages, such that Senomyx agrees that such sale shall not occur without Firmenich’s express written consent. For the avoidance of doubt, “intellectual property,” as used in this Section 17.15, is limited to intellectual property included in the Senomyx Technology, and any tangible embodiments of such intellectual property, and includes all such intellectual property and tangible embodiments of such intellectual property.

IN WITNESS WHEREOF, the parties, through their authorized officers, have executed this Agreement as of the February 7, 2018.

FIRMENICH SA

By: _____

Name: _____

Title: _____

FIRMENICH SA

By: _____

Name: _____

Title: _____

SENO MYX, INC.

By: _____

Name: _____

Title: _____

[SIGNATURE PAGE TO AMENDED AND RESTATED COLLABORATIVE
RESEARCH, DEVELOPMENT, COMMERCIALIZATION AND LICENSE AGREEMENT]

APPENDIX A - DEFINITIONS

“Affiliate” means any entity which, directly or indirectly, Controls, is Controlled by or is under common Control with a party. “Control” means (i) having the actual, present capacity to elect a majority of the directors of such affiliate; (ii) having the power to direct at least [...] of the voting rights entitled to elect directors; or (iii) [...] where the local law will not permit foreign equity participation of a majority, ownership or control, directly or indirectly, of the maximum percentage of such outstanding stock or voting rights permitted by local law.

“Agreement” means this agreement, together with all appendices attached to it, as it may be amended or supplemented from time to time hereafter by a written agreement executed by authorized representatives of both parties.

“Air Care Field” means use of [...] and/or CL19 Program Compounds for the primary purpose of [...] Air Care Field expressly excludes the Fine Fragrance and the Deodorant Use Field, the Topical Use Field, the Other Use Field and Therapeutics.

“Change in Control” shall mean the sale of all or substantially all the assets of a party; any merger, consolidation or acquisition of a party with, by or into another corporation, entity or person; or any change in the ownership of more than [...] of the voting capital stock of a party in one or more related transactions.

“CL19” shall mean Senomyx’s proprietary cool taste compound (one of the Cool Analogs) and having the chemical structure set forth below:

[...***...]

“CL19 Program Compounds” shall mean CL19 and all analogs of CL19 (including the Cool Analogs), as set forth in attached Appendix C.

“Collaborative Period” means the period beginning on the Effective Date and ending June 14, 2013.

“Collaborative Program” means a research and development program during the Collaborative Period to discover and develop Natural Compounds discovered by high throughput screening which are [...] and provide a cooling taste effect. Upon proper exercise of the Option, the Collaborative Program will be expanded to also include Synthetic Compounds.

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“Compound(s)” means: molecules synthesized or acquired in the course of the Collaborative Program wherein such molecules provide [...***...] and cooling taste effect properties. Such desired properties will be defined by the Steering Committee.

“Confidential Information” of a party means all Inventions, Know-How or other information, including, without limitation, information and material (whether or not patentable) regarding technology, products, research, development, manufacturing, marketing, finances, personnel or other business information or objectives which is disclosed orally or in writing by the disclosing party to the other party. Information developed by Firmenich independently or jointly with Senomyx that is or should be assigned to Senomyx pursuant to Section 9 shall be deemed Confidential Information of Senomyx and information developed by Senomyx independently or jointly with Firmenich that is or should be assigned to Firmenich pursuant to Section 9 shall be deemed Confidential Information of Firmenich; and (ii) with respect to a party, other information developed jointly by Firmenich and Senomyx shall be deemed to be the other party’s Confidential Information for the purpose of the confidentiality obligations hereunder except in respect of use by such other party.

“Control” or “Controlled” means, with respect to intellectual property, possession by a party, as of the Effective Date or during the Agreement, of the ability to grant a license or sublicense in accordance with the terms of this Agreement, without violating the terms of any agreement by such party with any Third Party.

“Cool Analogs” means all analogs of [...***...] as described in the Firmenich Patent Filing.

“Effective Date” means December 14, 2007.

“Exclusive” means exclusive even as to the party granting the license; provided, however, that Senomyx may exercise such rights for the purpose of performing its obligations under this Agreement.

“Extension Period” shall mean the period commencing December 15, 2012 through the expiration of the Collaborative Program.

“Field” means [...***...], each for human consumption. Notwithstanding the foregoing, Field specifically excludes Therapeutics.

“Fifth Amendment Effective Date” means November 13, 2017.

“Fine Fragrance and Deodorant Use Field” means use of [...***...] and/or CL19 Program Compounds in [...***...], it being acknowledged that [...***...] and/or CL19 Program Compounds [...***...]. Fine Fragrance and Deodorant Use Field expressly excludes the Air Care Field, the Topical Use Field, the Other Use Field and Therapeutics.

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“Firmenich Competitor” means [...***...]

“Firmenich Know-How” means, any know-how relating to [...***...] which is not covered by Firmenich Patent Rights but is necessary or appropriate for purposes of the activities to be conducted under this Agreement, and which is Controlled by Firmenich as of the Effective Date or which becomes Controlled by Firmenich during the Term. Firmenich Know-How excludes Know-How under Jointly Owned Technology.

“Firmenich Patent Filing” means Firmenich’s United State provisional patent application [...***...] together with any applications claiming priority to this patent application.

“Firmenich Patent Rights” means, any Patent Rights relating to [...***...] that are necessary or appropriate for purposes of the activities to be conducted under this Agreement, and which are Controlled by Firmenich as of the Effective Date or which become Controlled by Firmenich during the Term. Firmenich Patent Rights excludes Patent Rights under Jointly Owned Technology.

“Firmenich Technology” means Firmenich Patent Rights and Firmenich Know-How. For the avoidance of doubt, Firmenich Technology includes Firmenich Improvements as defined in Section 9.2.

“Fourth Amendment Effective Date” means April 29, 2016.

“First [...***...]” means the [...***...] that will allow a Selected Compound(s) to be used or sold for the Products in the Field.

“Fragrance and Personal Care Products” means [...***...]. Notwithstanding the foregoing, Personal Care Products specifically excludes Therapeutics.

“Invention” means any invention including, without limitation, any new and useful process, method, or composition of matter, or improvement, whether or not patentable, made in the course of the Agreement.

“Joint Invention” has the meaning set forth in Section 9.4.

“Joint Patent Rights” means all Patent Rights containing one or more claims to a Joint Invention.

“Jointly Owned Technology” means Know-How and/or Patent Rights with respect to Joint Inventions that are jointly owned by Firmenich and Senomyx. For the avoidance of doubt, Jointly Owned Technology does not include Firmenich Improvements or Senomyx Improvements.

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“Know-How” means information and data, whether or not patentable, which is not generally known to the public, including, without limitation, designs, concepts, formulae, software, techniques, practices, processes, methods, knowledge, skill, experience, expertise, technical information, and data, including pharmacological, toxicological and clinical test data, analytical and quality control data, patent and legal data or marketing, sales and manufacturing data.

“Licensed Fields” means all uses except Therapeutics. For clarity, the Licensed Fields, include without limitation, the Field (as originally defined in the Agreement), the Air Care Field, the Topical Use Field, the Other Uses Field and the Fine Fragrance and Deodorant Use Field.

“Major Countries” means [...***...].

“Minimum Annual Royalty Date” means the date that is [...***...] from [...***...], or as subsequently amended or as otherwise agreed by the Steering Committee as the appropriate [...***...] that will allow a Selected Compound(s) to be used and/or sold for the Products in the Field.

“Major Firmenich Customer” means any Firmenich customer where (a) such customer is one of Firmenich’s [...***...] as measured by [...***...]; and (b) [...***...] in the market or product segment where the Product is used.

“Modulate the Perception” means [...***...] the Selected Compound.

“Natural Compounds” means Compounds that are natural as defined by [...***...].

“Net Sales” means, with respect to a Product, [...***...] by Firmenich and its Affiliates and/or permitted sublicensees on any sales or other transfer of the Product, less the following items:

- i) [...***...];
- ii) [...***...];
- iii) [...***...];
- iv) [...***...]; and
- v) [...***...].

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Net Sales will be determined [...***...].

“Non-Major Country” means any country that is not a Major Country.

“Option” has the meaning set forth in Section 8.2.

“Other Use Field” means the use of [...***...] and/or CL19 Program Compounds, for any and all uses, other than the Field, the Air Care Field, the Fine Fragrance and Deodorant Use Field, the Topical Use Field and Therapeutics. Other Use Field expressly excludes Therapeutics.

“Patent Rights” means all rights associated with all U.S. or foreign (including regional authorities such as the European Patent Office) utility or provisional patents or patent applications, including any improvements, continuations, continuations-in-part, or divisionals or any substitute or equivalent applications, and any patent issuing thereon, including any reissue, reexamination or extension thereof.

“Product(s)” means a Firmenich product(s) (or, in the case of a permitted sublicense, a product of a Firmenich sublicensee) for use in one or more of the Licensed Fields that incorporates a Selected Compound.

“Product Development Plan” has the meaning set forth in Section 3.2.

“Regulatory Approval” means in respect of (i) the United States of America and Brazil, listing as Generally Recognized As Safe by the Flavor and Extract Manufacturers’ Association of the United States (“FEMA for GRAS”); (ii) Mexico, approval by the Mexican Health authorities and inclusion in the lists of permitted flavoring substances in the Acuerdo por el que se determinan las sustancias permitidas como aditivos y coadyuvantes en alimentos, bebidas y suplementos alimenticios; (iii) the People’s Republic of China, approval by the State Food & Drug Administration of the Peoples’ Republic of China and inclusion in the list of permitted flavoring agents (reference GB270, as of the date of this Agreement); (iv) France, Germany and the United Kingdom, approval by the European Food Safety Authority for [...***...] in the positive list of flavoring substances as laid down in Regulation (EC) No. 2232/96, or as subsequently amended; (v) Japan, approval by the Japan Ministry of Health, Labor and Welfare for use as a flavoring agent in accordance with the Japanese Food Sanitation Law; and (vi) [...***...]. In the event the regulatory requirements are amended or the parties desire to use a different regulatory pathway for any country, the Steering Committee will revise this definition as necessary and document such revisions in the minutes of the Steering Committee.

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“Regulatory Approval Date” means the date in a particular country that the Regulatory Approval is granted.

“Related Firmenich Patent Filing(s)” means any patent filing(s) that may be filed by Firmenich after the Fourth Amendment Effective Date claiming the [...] and their respective analogs [...].

“Research Plan” means the detailed scientific research plan attached hereto as Appendix B that describes the research program, defines the key activities and responsibilities of the parties, research milestones and timeline for the Collaborative Program. The Research Plan will include a brief description of the anticipated process required to obtain appropriate regulatory approval(s). The Research Plan is incorporated by reference into this Agreement. The Research Plan may be updated from time to time by the Steering Committee and such updates will be maintained in the records of the Steering Committee.

“Royalty Term” means, in the case of any Product and as to [...], the period of time commencing on the first commercial sale of such Product [...] and ending upon the date that there no longer exists a Valid Claim in a Patent Right controlled by Senomyx or its Affiliates covering the manufacture, use or sale of such Product (or Selected Compound contained therein) [...] in which the Product is sold, with the limitation that for [...] the Royalty Term for [...] shall end upon the date that there no longer exists a Valid Claim in a Patent Right controlled by Senomyx or its Affiliates covering the manufacture, use or sale of such Product (or Selected Compound contained therein) [...] or [...].

“Selected Compound(s)” means the CL19 Program Compounds and Compound(s) selected by the Steering Committee for development prior to the Fifth Amendment Effective Date (i.e., [...]).

[...] shall mean any [...] Notwithstanding the foregoing, [...] excludes any Know-How that does not relate to, or claims within Patent Rights that do not claim any Compound(s) or Selected Compound(s).

“Senomyx Insolvency” means the occurrence of one of the following events: (i) Senomyx makes a general assignment for the benefit of creditors; (ii) Senomyx files an insolvency petition in bankruptcy; (iii) Senomyx petitions for or acquiesces in the appointment of any receiver, trustee or similar officer to liquidate or conserve its business or any substantial part of its assets; (iv) Senomyx commences under the laws of any jurisdiction any proceeding involving its insolvency, bankruptcy, reorganization, adjustment of debt, dissolution, liquidation or any other similar proceeding for the release of financially distressed debtors, or the board of directors (or other governing body) of Senomyx votes to commence any such proceeding or (v) Senomyx becomes a party to any proceeding or action of the type described above and such proceeding or action remains undismissed or unstayed for a period of more than [...].

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“Senomyx Know-How” means any Know-How related to [...***...], which is not covered by the Senomyx Patent Rights, but is necessary or appropriate for purposes of the activities to be conducted under this Agreement, and which is Controlled by Senomyx as of the Effective Date or which becomes Controlled by Senomyx during the Term. Senomyx Know-How excludes Know-How under Jointly Owned Technology.

“Senomyx Patent Rights” means any Patent Rights relating to [...***...] and, that are necessary or appropriate for purposes of the activities to be conducted under the Agreement, and which are Controlled by Senomyx as of the Effective Date or which become Controlled by Senomyx during the Term. Senomyx Patent Rights excludes Patent Rights under Jointly Owned Technology.

“Senomyx Technology” means the Senomyx Patent Rights, and Senomyx Know-How. For the avoidance of doubt, Senomyx Technology includes Senomyx Improvements as defined in Section 9.3.

“Strategic Marketing Plan” means a worldwide marketing plan prepared by Firmenich for each Selected Compound which includes at least the following items:

- (i) [...***...];
- (ii) [...***...];
- (iii) [...***...];
- (iv) [...***...]; and
- (v) [...***...].

“Synthetic Compounds” means compounds that are not Natural Compounds.

“Stand-Alone Product” means a Compound for use [...***...] that consists of [...***...]

“Steering Committee” has the meaning set forth in Section 2.

“Sublicense Revenue” means any payment received by Firmenich after the Fifth Amendment Effective Date in consideration for a grant of rights to practice any Senomyx Technology to make, have made, use, import, offer for sale or sell [...***...] in [...***...], provided, however, Sublicense revenue shall not include [...***...] for: [...***...][...***...].

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“Term” has the meaning set forth in Section 14.1.

“Therapeutics” means any Compound(s) which is a “drug” as defined in the U.S. Food, Drug and Cosmetic Act and any Compound(s) for the therapeutic treatment of any human disease or condition, which requires FDA approval of a NDA for claims of safety or efficacy.

“Third Party(ies)” means any party other than a party to this Agreement or an Affiliate of Senomyx or Firmenich.

“Topical Use Field” means use of [...***...] and/or CL19 Program Compounds in [...***...] where [...***...]. Topical Use Field expressly excludes the Air Care Field, the Fine Fragrance and Deodorant Use Field, the Other Use Field and Therapeutics.

“Valid Claim” means a claim of a pending patent application or an issued patent within the Patent Rights, which has not (i) expired or been canceled; (ii) been declared invalid by an unreversed and unappealable decision of a court or other appropriate body of competent jurisdiction; (iii) been admitted to be invalid or unenforceable through reissue, disclaimer or otherwise; and/or (iv) been abandoned.

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APPENDIX "B" - RESEARCH PLAN

Capitalized terms used in this Research Plan without definition shall have the meanings provided therefore in the Agreement.

[...***...]

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Appendix B-1

[...***...]

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Appendix B-7

APPENDIX C

CL19 PROGRAM COMPOUNDS

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CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in the following Registration Statements:

- (1) Registration Statement (Form S-3 No. 333-219507) of Senomyx, Inc.,
- (2) Registration Statement (Form S-8 No. 333-193306) pertaining to the 2013 Equity Incentive Plan, as amended, of Senomyx, Inc., and
- (3) Registration Statement (Form S-8 Nos. 333-116893, 333-127771, 333-134578, 333-142619, 333-149247, 333-157289, 333-164693, 333-171943, 333-179211, 333-186207, 333-190293) pertaining to the 2004 Equity Incentive Plan and the 2004 Employee Stock Purchase Plan, as amended, of Senomyx, Inc.;

of our report dated March 8, 2018, with respect to the financial statements of Senomyx, Inc. included in this Annual Report (Form 10-K) of Senomyx, Inc. for the year ended December 31, 2017.

/s/ Ernst & Young LLP

San Diego, California
March 8, 2018

CERTIFICATION

I, John Poyhonen, certify that:

1. I have reviewed this annual report on Form 10-K of Senomyx, 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)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) 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 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 8, 2018

/S/ JOHN POYHONEN

John Poyhonen
President, Chief Executive Officer and Director

CERTIFICATION

I, David Humphrey, certify that:

1. I have reviewed this annual report on Form 10-K of Senomyx, 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)) and internal control over financial reporting (as defined in Exchange Act Rules 13a-15(f) and 15d-15(f)) 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 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 8, 2018

/S/ DAVID HUMPHREY

David Humphrey
Vice President, Finance

CERTIFICATION

Pursuant to the requirement set forth in Rule 13a-14(b) of the Securities Exchange Act of 1934, as amended (the "Exchange Act"), and Section 1350 of Chapter 63 of Title 18 of the United States Code (18 U.S.C. §1350), John Poyhonen, Chief Executive Officer of Senomyx, Inc. (the "Company"), and David Humphrey, Vice President, Finance of the Company, each hereby certifies that, to the best of his or her knowledge:

1. The Company's annual report on Form 10-K for the period ended December 31, 2017, to which this Certification is attached as Exhibit 32.1 (the "Annual Report") fully complies with the requirements of Section 13(a) or Section 15(d) of the Exchange Act, and

2. The information contained in the annual report fairly presents, in all material respects, the financial condition and results of operations of the Company.

In Witness Whereof, the undersigned have set their hands hereto as of the 8th day of March, 2018.

/S/ JOHN POYHONEN

/S/ DAVID HUMPHREY

John Poyhonen
President, Chief Executive Officer and Director

David Humphrey
Vice President, Finance

This certification accompanies the Form 10-K to which it relates, is not deemed filed with the Securities and Exchange Commission and is not to be incorporated by reference into any filing of Senomyx, Inc. under the Securities Act of 1933, as amended, or the Securities Exchange Act of 1934, as amended (whether made before or after the date of the Form 10-K), irrespective of any general incorporation language contained in such filing.

