

Mail Stop 4720

July 20, 2009

Kent Snyder
President & Chief Executive Officer
Senomyx, Inc.
4767 Nexus Centre Drive
San Diego, California 92121

**Re: Senomyx, Inc.
Form 10-K for the year ended December 31, 2008
Filed February 12, 2009
File No. 000-50791**

Dear Mr. Snyder:

We have reviewed your filing and have the following comments. Where the comments request you to revise disclosure, the information you provide should show us what the revised disclosure will look like and identify the annual or quarterly filing, as applicable, in which you intend to first include it. If you do not believe that revised disclosure is necessary, explain the reason in your response. After reviewing the information provided, we may raise additional comments and/or request that you amend your filing.

Please understand that the purpose of our review process is to assist you in your compliance with the applicable disclosure requirements and to enhance the overall disclosure in your filing. We look forward to working with you in these respects. We welcome any questions you may have about our comment or on any other aspect of our review. Feel free to call us at the telephone numbers listed at the end of this letter.

Item 1. Business

Product Discovery and Development Collaborations, page 13

1. We note that you have described the material terms of the following collaboration agreements, but have not filed them as exhibits to your annual report:
 - Collaborative Research and License Agreement with Cadbury Adams USA, LLC, entered into in July 2005;
 - Collaboration Agreement with Firmenich, entered into in December 2007; and
 - Second Collaboration Agreement with Firmenich, entered into in November 2008.

Please file the above agreements and related amendments as exhibits, or provide us with a legal analysis as to why the agreements need not be filed as exhibits pursuant to Item 601(b)(10)(ii)(B) of Regulation S-K.

Signatures

2. We note that your chief executive officer and chief financial officer have signed this Form 10-K on behalf of the registrant and in their respective capacities, but that the Form 10-K has not been signed by your controller or principal accounting officer in this capacity pursuant to Instruction D to Form 10-K. Please amend your Form 10-K to have your controller or principal accounting officer sign this Form 10-K in this capacity. If John Poyhonen, your chief financial officer, is also your controller or principal accounting officer please indicate beneath his signature that he is signing the Form 10-K in the capacity of chief financial officer and controller or principal accounting officer.

Schedule 14A

Executive Compensation

Compensation Discussion and Analysis, page 20

3. You disclose on page 20 that your compensation programs are “benchmarked” against the programs of the company’s peer group, which consists of 29 companies in the biotech industry.
 - Please revise your disclosure to identify the name of each of the companies which are included in the peer group. Please refer to Item 402(b)(2)(xiv) of Regulation S-K.
 - Please expand your disclosure to explain how you use the programs of the company’s peer group to set executive compensation. If you adjust executive compensation so that it reflects a specific percentile of peer group programs, please so disclose.
4. We note that you have described the material terms of the following agreements but have not filed the agreements as exhibits to your annual report:
 - 2008 Bonus Plan; and
 - Employment Letter Agreement with David Berger.

Please file the agreement as an exhibit, or provide a legal analysis as to why the agreement need not be filed as an exhibit pursuant to Item 601(b)(10)(iii)(A) of Regulation S-K.

Components of Executive Compensation Programs, page 21

Base Salary, page 21

5. We note that each named executive officer's base salary increased during fiscal year 2008. We further note your disclosure on page 21 that the Compensation Committee determined 2008 salaries based on an assessment of the "executive's performance" against job responsibilities, overall company performance and competitive salary information. Please expand your disclosure to describe why and how your Compensation Committee increased base salaries.

Annual Performance-Based Bonus, page 21

6. We note your disclosure on page 22 that each named executive officer's bonus is calculated primarily based on the company's achievement of corporate goals, and the corresponding description of your corporate goals for 2008. Your Compensation Discussion and Analysis does not provide sufficient disclosure regarding the corporate objectives used to determine your executive officers' annual performance-based bonus. Please provide us with draft disclosure for your 2009 proxy statement which provides the following:

- The corporate objectives;
- Confirmation that you will disclose the achievement of the objectives;
- And a discussion of how the level of achievement will affect the actual bonuses to be paid.

To the extent that the objectives are quantified, the discussion in your proxy statement should also be quantified.

7. We note your disclosure on page 22 that a component of bonus determination is based on individual goals. Your Compensation Discussion and Analysis does not disclose the individual objectives used to determine your executive officers' annual performance-based bonus. Please provide us with draft disclosure for your 2009 proxy statement which provides the following:

- The performance objectives;
- Confirmation that you will disclose the achievement of the objectives; and
- A discussion of how the level of achievement will affect the actual bonuses to be paid.

To the extent that the objectives are quantified, the discussion in your proxy statement should also be quantified.

* * *

Please respond to these comments within 10 business days or tell us when you will provide us with responses. Please furnish a letter that keys your response to our comments and

provide the requested information. Detailed letters greatly facilitate our review. Please furnish your letter on EDGAR under the form type label CORRESP.

We urge all persons who are responsible for the accuracy and adequacy of the disclosure in the filing to be certain that the filing includes all information required under the Securities Exchange Act of 1934 and that they have provided all information investors require for an informed investment decision. Since the company and its management are in possession of all facts relating to a company's disclosure, they are responsible for the accuracy and adequacy of the disclosures they have made.

In connection with responding to our comments, please provide, in your letter, a statement from the company acknowledging that:

- the company is responsible for the adequacy and accuracy of the disclosure in the filing;
- staff comments or changes to disclosure in response to staff comments do not foreclose the Commission from taking any action with respect to the filing; and
- the company may not assert staff comments as a defense in any proceeding initiated by the Commission or any person under the federal securities laws of the United States.

In addition, please be advised that the Division of Enforcement has access to all information you provide to the staff of the Division of Corporation Finance in our review of your filing or in response to our comment on your filing.

Please contact Rose Zukin at (202) 551-3239 or me at (202) 551-3715 with any questions.

Sincerely,

Jeffrey P. Riedler
Assistant Director