

Via Facsimile and U.S. Mail
Mail Stop 6010

December 9, 2008

Ms. Patricia Allen
Vice President of Finance and Treasurer
Alnylam Pharmaceuticals, Inc.
300 Third Street
Cambridge, MA 02142

**Re: Alnylam Pharmaceuticals, Inc.
Form 10-K for the Fiscal Year Ended December 31, 2007
File No. 000-50743**

Dear Ms. Allen:

We have reviewed your filing and have the following comments. In our comments, we ask you to provide us with information to better understand your disclosure. Where a comment requests 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 comments or on any other aspect of our review. Feel free to call us at the telephone numbers listed at the end of this letter.

Material Agreements

1. We note that you refer to several agreements throughout your Form 10-K and proxy statement, most notably the agreements with Tekmira Pharmaceuticals Corporation and the Massachusetts Institute of Technology. It appears that these agreements may be material to your business, but they are not filed as exhibits to your Form 10-K. Please explain why you do not believe that these agreements are material to your business, or, alternatively, please file them as exhibits to your 10-K.

Strategic Alliances, page 13

2. Please revise your disclosure in this section to include the following material terms:

Roche, pages 13-14

- the other therapeutic areas that Roche may expand the license to and the amount of additional payments they may receive to do so
- the aggregate development and sales milestone payments
- the expiration date of the last-to-expire patent covered under the license agreement

Novartis, pages 14-15

- aggregate potential research payments and milestone payments
- additional payments to be made by Novartis upon exercise of the integration option
- explanation of the operation of the integration option
- funding commitments from Novartis for pandemic flu alliance

Biogen Idec, page 16

- aggregate milestone payments
- duration and expiration of the agreement

Isis, page 16

- aggregate developmental and regulatory milestone payments and license fee
- duration and expiration of the agreement

Intellectual Property Related to Fundamental Aspects and Uses of siRNA and RNAi-related Mechanisms, page 18

3. Please revise the table in this section to include disclosure of the expiration dates of the various patents.

Note 11. Significant Agreements

Roche Alliance, page 99

4. Your disclosure states “As future milestones are achieved, and to the extent they are within the five year term, the amounts will be recognized as revenue prospectively over the remaining period of performance.” Please revise your disclosure a) to specify whether and to what extent you recognize a portion of the milestone when achieved including your method for determining the amount recognized and b) to what extent and how you recognize any remaining portion of the achieved milestone “prospectively over the remaining period of performance.” Further, specify the accounting, if different, for the milestones under the other agreements where future milestone payments may be received.

* * * *

Please respond to these comments within 10 business days or tell us when you will provide us with a response. Your letter should key your responses to our comments. Detailed cover 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 Christine Allen, Staff Accountant, at (202) 551- 3652 or Lisa Vanjoske, Assistant Chief Accountant, at (202) 551-3614 if you have any questions regarding the processing of your response as well as any questions regarding comments on the financial statements and related matters. You may contact Michael Rosenthal, Staff Attorney, at (202) 551-3674 or Jeffrey Riedler, Associate Director, at (202) 551-3715 with questions on any of the other comments. In this regard, do not hesitate to contact me, at (202) 551-3679.

Sincerely,

Jim B. Rosenberg
Senior Assistant Chief Accountant