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

DIVISION OF
CORPORATION FINANCE

October 7, 2010

David P. Perry
President and Chief Executive Officer
Anacor Pharmaceuticals, Inc.
1020 East Meadow Circle
Palo Alto, CA 94303-4230

Re: Anacor Pharmaceuticals, Inc.
Registration Statement on Form S-1
Filed September 10, 2010
File No. 333-169322

Dear Mr. Perry:

We have reviewed your registration statement and have the following comments. In some of our comments, we may ask you to provide us with information so we may better understand your disclosure.

Please respond to this letter by amending your registration statement and providing the requested information. If you do not believe our comments apply to your facts and circumstances or do not believe an amendment is appropriate, please tell us why in your response.

After reviewing any amendment to your registration statement and the information you provide in response to these comments, we may have additional comments.

General

1. Please note that our comments on your request for confidential treatment will be provided under separate cover.

2. Please note that when you file a pre-effective amendment containing pricing-related information, we may have additional comments. As you are likely aware, you must file this amendment prior to circulating the prospectus.

3. Please note that when you file a pre-effective amendment that includes your price range, it must be bone fide. We interpret this to mean that your range may not exceed $2 if you price below $20 and 10% if you price above $20.

4. Please note that where we provide examples to illustrate what we mean by our comments, they are examples and not complete lists. If our comments are applicable to portions of

the filing that we have not cited as examples, please make the appropriate changes in accordance with our comments.

5. Please provide us proofs of all graphic, visual or photographic information you will provide in the printed prospectus prior to its use.

Overview, page 1

6. Please briefly discuss the reasons that support your belief that your organization and boron chemistry platform has the potential to continue to yield clinical candidates at a similar pace and efficiency in the future.

Our Lead Topical Antifungal AN2690 for Onychomycosis, page 2

7. Please disclose in this section the percentage of efficacy actually achieved in the Phase II studies of AN2690 for Onychomycosis.

8. Please update your disclosure relating to the anticipated response from the FDA regarding the Special Protocol Assessment. We note that you anticipated a response in September 2010.

Our Lead Systemic Antibiotic GSK '052 for Gram-negative infections, page 3

9. You cite figures from 2002 for the number of hospital infections and associated deaths. Please update with more current information. Also, please clarify whether all of the infections and associated deaths were due to Gram-negative bacterial infections.

Our Collaboration with Eli Lilly and Company, page 5

10. We note your disclosure about your collaboration with Eli Lilly and Company. Please revise your disclosure here and in the Business section to provide a more narrow range of potential royalties within ten percentage points, for example "teens," "twenties," etc. Also, please describe in the Business section the agreement's term and termination provisions.

Industry and Market Data, page 41

11. Please revise your disclosure to clarify that you are liable for all statements in the registration statement, even those obtained from third parties.

Management's Discussion and Analysis of Financial Condition and Results of Operations
Critical Accounting Policies and Significant Judgments and Estimates
Stock-Based Compensation, page 55

12. Please revise your disclosure to present the intrinsic value of outstanding vested and unvested options as of the most recent balance sheet date based on the estimated IPO price.

13. Please revise your disclosure to clarify whether the Asian protective put method was the model used for all periods. Please explain why the marketability discount of 16% used as of June 30, 2010 reflects increased uncertainty of a near-term liquidity event from December 31, 2009 when your marketability discount was 12% and reflected continuing improvement in your prospects and likelihood of a liquidity event. Please explain why the volatility percentage used increased from 72% at December 31, 2009 to 99% at June 30, 2010.

14. Please revise your disclosure to clarify that there were no significant events that occurred between the date of the latest grant of stock options on August 20, 2010 and the last contemporaneous valuation as of June 30, 2010.

Liquidity and Capital Resources, page 63

15. Please expand your liquidity disclosure to discuss the changes in cash provided by/used in operating activities, investing activities and financing activities for all periods presented.

Business, page 67
Study 201: Open-Label (first, second and third cohorts)—Safety and Efficacy, page 76
Study 203: Open-Label—Efficacy of Lower Doses and Less Frequent Dosing, page 76

16. Please expand to disclose the p-values for the first, second and third cohorts from Study 201 and for Study 203.

Intellectual Property, page 87

17. Please expand your disclosure to indicate the expiration date of your patents. Also, with respect to the non-US patents that you have been granted, please disclose the foreign jurisdictions in which you have patent protection.

Compensation Discussion and Analysis, page 106
Cash Incentive Bonuses, page 108

18. Please expand your disclosure to identify in detail each of the corporate objectives and individual goals, including the "certain clinical studies," "certain performance

milestones" and all "corporate financing and financial objectives." To the extent that the corporate objectives and individual goals were quantitative, your disclosure should also be quantitative.

19. Please disclose for each of the corporate objectives and individual goals the assigned weight for the achievement of such objective.

20. For each of your named executive officers, please specifically indentify the particular corporate objective or objectives that were not achieved. We note that your current disclosure only generally identifies those objectives (for example "certain other clinical development and financial goals," "certain development goals," "certain development and program management-related goals," "research related goals").

Notes to Financial Statements

8. License, Research, Development and Commercialization Agreements, page F-23

21. Please expand your disclosure to include the termination provisions for your agreement with GSK. In addition, please revise your disclosure in the Subsequent Events footnote for your agreement with Eli Lilly to include the length of and termination provisions of the agreement.

10. Preferred Stock Warrant Liability, page F-26

22. Please revise your disclosure to clarify that upon the closing of a public offering, the warrants will become warrants to purchase shares of common stock.

11. Stockholders' Equity (Deficit)
Stock-Based Compensation, page F-30

23. We may have additional comments on your accounting for stock compensation and related disclosure once you have disclosed an estimated offering price. Please provide quantitative and qualitative disclosures explaining the difference between the estimated offering price and the fair value of each equity issuance.

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 the information the Securities Act of 1933 and all applicable Securities Act rules require. 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.

Notwithstanding our comments, in the event you request acceleration of the effective date of the pending registration statement please provide a written statement from the company acknowledging that:

- should the Commission or the staff, acting pursuant to delegated authority, declare the filing effective, it does not foreclose the Commission from taking any action with respect to the filing;

- the action of the Commission or the staff, acting pursuant to delegated authority, in declaring the filing effective, does not relieve the company from its full responsibility for the adequacy and accuracy of the disclosure in the filing; and

- the company may not assert staff comments and the declaration of effectiveness as a defense in any proceeding initiated by the Commission or any person under the federal securities laws of the United States.

Please refer to Rules 460 and 461 regarding requests for acceleration. We will consider a written request for acceleration of the effective date of the registration statement as confirmation of the fact that those requesting acceleration are aware of their respective responsibilities under the Securities Act of 1933 and the Securities Exchange Act of 1934 as they relate to the proposed public offering of the securities specified in the above registration statement. Please allow adequate time for us to review any amendment prior to the requested effective date of the registration statement.

You may contact Vanessa Robertson at (202) 551-3649 or Melissa Rocha at (202) 551-3854 if you have questions regarding comments on the financial statements and related matters. Please contact Sebastian Gomez Abero at (202) 551-3578 or me at (202) 551-3715 with any other questions.

Sincerely,

Jeffrey P. Riedler
Assistant Director

Cc: Mark B. Weeks
Michael E. Tenta
Cooley LLP
3175 Hanover Street
Palo Alto, CA 94304-1130