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

FORM 8-K

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

DATE OF REPORT (DATE OF EARLIEST EVENT REPORTED): JULY 10, 2003

LEXICON GENETICS INCORPORATED
(EXACT NAME OF REGISTRANT AS SPECIFIED IN ITS CHARTER)

DELAWARE
(STATE OR OTHER JURISDICTION OF
INCORPORATION OR ORGANIZATION)

000-30111
(COMMISSION FILE NUMBER)

76-0474169
(I.R.S. EMPLOYER
IDENTIFICATION NUMBER)

8800 TECHNOLOGY FOREST PLACE
THE WOODLANDS, TEXAS 77381
(ADDRESS OF PRINCIPAL EXECUTIVE
OFFICES AND ZIP CODE)

(281) 863-3000
(REGISTRANT'S TELEPHONE NUMBER,
INCLUDING AREA CODE)

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ITEM 5. OTHER EVENTS AND REGULATION FD DISCLOSURE

On July 10, 2003, RCM Financial Services, L.P. and Cogene Biotech Ventures, L.P. purchased an aggregate of 5,000,000 shares of our common stock from the Estate of Gordon A. Cain and The Gordon and Mary Cain Foundation in a private transaction not registered under the Securities Act of 1933. The aggregate purchase price for the shares, which was negotiated by the parties in June 2003 based upon prices prevailing at such time, was \$23,750,000. The purchased shares remain "restricted securities" under the Securities Act and may not be sold absent an effective registration statement or an exemption from the registration requirements of the Securities Act.

RCM Financial Services, L.P. and Cogene Biotech Ventures, L.P. are limited partnerships in which Robert C. McNair is the principal investor. The Chairman of our Board of Directors, C. Thomas Caskey, M.D., is President and Chief Executive Officer of Cogene Biotech Ventures, L.P. Dr. Caskey holds investment and voting power over the 1,000,000 shares purchased by Cogene Biotech Ventures, L.P. and, as a result, is deemed to have beneficial ownership of these shares. Dr. Caskey disclaims beneficial ownership of such shares.

In connection with the transaction, we entered into a letter agreement with RCM Financial Services, L.P. and Cogene Biotech Ventures, L.P. that (1) confirms that the purchasers are entitled to the benefits provided under our registration rights agreement and (2) modifies our existing obligations under the registration rights agreement by committing to maintain the effectiveness of any resale registration statement requested by the purchasers for a minimum of two years or until the distribution contemplated by such registration statement is complete. Both the letter agreement and the registration rights agreement are included in this filing as exhibits.

ITEM 7. FINANCIAL STATEMENTS AND EXHIBITS

(c) Exhibits

EXHIBIT NO.	DESCRIPTION
99.1	-- Amended and Restated Registration Rights Agreement dated as of May 7, 1998 by and among Lexicon Genetics Incorporated and the stockholders named therein (filed as Exhibit 4.1 to the Company's Registration Statement on Form S-3 (Registration No. 333-67294) and incorporated by reference herein).
99.2	-- Letter Agreement relating to Registration Rights dated as of July 10, 2003 by and among Lexicon Genetics Incorporated, RCM Financial Services, L.P. and Cogene Biotech Ventures, L.P.

SIGNATURES

Pursuant to the requirements 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.

LEXICON GENETICS INCORPORATED

Date: July 10, 2003

By: /s/ JEFFREY L. WADE

Jeffrey L. Wade
Executive Vice President and
General Counsel

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| 99.2 | -- Letter Agreement relating to Registration Rights dated as of July 10, 2003 by and among Lexicon Genetics Incorporated, RCM Financial Services, L.P. and Cogene Biotech Ventures, L.P. |

July 10, 2003

RCM Financial Services, L.P.
Cogene Biotech Ventures, L.P.
4400 Post Oak Parkway, Suite 1400
Houston, Texas 77027
Attention: M. Robert Dussler

Dear Sirs:

This letter is intended to provide clarification of certain terms of the Amended and Restated Registration Rights Agreement, dated as of May 7, 1998 (the "Registration Rights Agreement"), among Lexicon Genetics Incorporated ("Lexicon") and the persons named therein, and to supplement the terms of the Registration Rights Agreement to the extent necessary to effect the provisions set forth below, in connection with the purchase in a private placement (the "Purchase") by RCM Financial Services, L.P. and Cogene Biotech Ventures, L.P. ("Purchasers") of an aggregate of 5,000,000 shares (the "Shares") of Lexicon's common stock from the Estate of Gordon A. Cain and The Gordon and Mary Cain Foundation. Capitalized terms used without definition in this letter shall have the meanings given to such terms in the Registration Rights Agreement.

1. Lexicon acknowledges and agrees that the Shares are and, upon completion of the Purchase will be, Cain Shares and Registrable Securities for purposes of the Registration Rights Agreement, and will be deemed for purposes of Section 2.1 thereof to be "shares held by Gordon A. Cain."

2. Lexicon agrees that, in the case of any registration of the Shares under the Registration Rights Agreement, at its expense, Lexicon will use Commercially Reasonable Best Efforts to keep a Registration Statement on Form S-3 (or a substitute form that may be adopted by the Commission) effective for five years or until the Purchasers have completed the distribution of all of their Registrable Securities thereunder, as provided in Section 5(a) thereof; provided, however, that if Lexicon files such Registration Statement on Form S-3 (or such substitute form) but such registration ceases to be effective during the two-year period after the date of the effectiveness of such Form S-3, or if Lexicon is not eligible to file a Registration Statement on Form S-3 (or such substitute form) when a request for registration is made by a Purchaser, Lexicon will file a Registration Statement on Form S-1 (or a substitute form that may be adopted by the Commission) and keep such registration effective until the second anniversary of the effectiveness of such Form S-3 or Form S-1, as the case may be.

3. Lexicon agrees that it will not decline, under the provisions of Section 2.1(b)(vi), to effect a registration of Registrable Securities requested by a Purchaser without the consent of the Purchaser requesting such registration.

Please acknowledge your agreement to the terms set forth herein by signing this letter in the space provided below and returning the signed copy to the undersigned.

Very truly yours,

LEXICON GENETICS INCORPORATED

By: /s/ Jeffrey L. Wade

Jeffrey L. Wade
Executive Vice President and
General Counsel

Acknowledged and agreed
this 10th day of July, 2003:

RCM FINANCIAL SERVICES, L.P.

By: /s/ M. Robert Dussler

M. Robert Dussler, Vice President

COGENE BIOTECH VENTURES, L.P.

By: /s/ M. Robert Dussler

M. Robert Dussler, Vice President