

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

**FORM S-8
REGISTRATION STATEMENT
UNDER
THE SECURITIES ACT OF 1933**

ENZO BIOCHEM, INC.

(Exact name of Registrant as specified in its charter)

NEW YORK
*(State or Other Jurisdiction
of Incorporation or Organization)*

**527 Madison Avenue
New York, New York**
(Address of Principal Executive Offices)

13-2866202
*(I.R.S. Employer
Identification Number)*

10022
(Zip Code)

ENZO BIOCHEM, INC. 2011 INCENTIVE PLAN
(Full title of the plan)

Barry W. Weiner
President
Enzo Biochem, Inc.
527 Madison Avenue
New York, New York 10022
(212) 583-0100

(Name, Address, Including Zip Code, and Telephone Number, Including Area Code, of Agent For Service)

Copy to:

Robert H. Cohen, Esq.
Greenberg Traurig, LLP
MetLife Building
200 Park Avenue
New York, NY 10166
(212) 801-9200 (Phone)
(212) 801-6400 (Fax)

Indicate by check mark whether the registrant is a large accelerated filer, an accelerated filer, a non-accelerated filer, or a smaller reporting company. See the definitions of "large accelerated filer," "accelerated filer" and "smaller reporting company" in Rule 12b-2 of the Exchange Act. (Check one):

Large accelerated filer Accelerated filer Non-accelerated filer Smaller reporting company
(Do not check if a smaller Reporting company)

CALCULATION OF REGISTRATION FEE

Title of Each Class of Securities to be Registered	Amount to be Registered(1)(2)	Proposed Maximum Offering Price Per Share	Proposed Maximum Aggregate Offering Price	Amount of Registration Fee
Common Stock, par value \$0.01 per share	3,000,000	\$4.96(3)	\$14,880,000	\$1,727.57

- (1) Pursuant to Rule 416(a) under the Securities Act of 1933, as amended (the "Securities Act"), this Registration Statement shall also cover such indeterminate number of additional shares as may be issued to prevent dilution resulting from stock splits, stock dividends, or similar transactions.
- (2) Represents shares issuable upon the exercise of stock options or pursuant to stock or stock-based awards available to be granted under the Enzo Biochem, Inc. 2011 Incentive Plan (the "2011 Plan").
- (3) Estimated solely for the purpose of determining the amount of the registration fee pursuant to Rule 457(c) and Rule 457(h) under the Securities Act, based on the average of the high and low prices of the Company's common stock on the New York Stock Exchange on February 7, 2011.
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PART I
INFORMATION REQUIRED IN THE SECTION 10(a) PROSPECTUS

Item 1. Plan Information.

The documents containing information specified by Part I of Form S-8 will be sent or given to holders of stock options or stock or stock-based awards granted under the 2011 Plan, as specified in Rule 428(b)(1) promulgated by the SEC under the Securities Act. Such document(s) are not required to be filed with the SEC but constitute (along with the documents incorporated by reference into this Registration Statement pursuant to Item 3 of Part II hereof) a prospectus that meets the requirements of Section 10(a) of the Securities Act.

Item 2. Registrant Information and Employee Plan Annual Information.

The Registrant will furnish without charge to each person to whom the prospectus is delivered, upon the written or oral request of such person, a copy of any and all of the documents incorporated by reference in Item 3 of Part II of this Registration Statement, other than exhibits to such documents (unless such exhibits are specifically incorporated by reference to the information that is incorporated). Those documents are incorporated by reference in the Section 10(a) prospectus. Requests should be directed to Mr. Barry Weiner, at Enzo Biochem, Inc., 527 Madison Avenue, New York, New York 10022, telephone number (212) 583-0100.

PART II
INFORMATION REQUIRED IN THE REGISTRATION STATEMENT

ITEM 3. INCORPORATION OF DOCUMENTS BY REFERENCE

The following documents filed with the SEC are hereby incorporated by reference into this Registration Statement on Form S-8:

- (a) Our Annual Report on Form 10-K for the year ended July 31, 2010, filed on October 14, 2010.
- (b) Our Quarterly Report on Form 10-Q for the quarter ended October 31, 2010 filed on December 10, 2010; our Current Reports on Form 8-K filed on October 18, 2010, December 16, 2010 and January 18, 2011; and our definitive proxy statement on Schedule 14A filed on November 16, 2010 relating to our Annual Meeting of Shareholders held on January 14, 2011, as supplemented.
- (c) The description of our shares of common stock contained in our registration statement on Form 8-A, as filed with the SEC on December 8, 1999.

All documents subsequently filed by the Registrant pursuant to Sections 13(a), 13(c), 14 and 15(d) of the Securities Exchange Act of 1934, prior to the filing of a post-effective amendment to this Registration Statement which indicates that all securities offered hereby have been sold or which deregisters all securities then remaining unsold, shall be deemed to be incorporated by reference in this Registration Statement and to be part hereof from the date of filing of such documents. Any statement contained in a document incorporated or deemed to be incorporated by reference herein shall be deemed to be modified or superseded for the purposes of this Registration Statement to the extent a statement contained herein or in any other subsequently filed document which also is or is deemed to be incorporated by reference herein modifies or supersedes such statement. Any statement so modified or superseded shall not be deemed, except as so modified or superseded, to constitute a part of this Registration Statement.

ITEM 4. DESCRIPTION OF SECURITIES.

Not applicable.

ITEM 5. INTERESTS OF NAMED EXPERTS AND COUNSEL.

A shareholder of Greenberg Traurig, LLP beneficially owns in the aggregate 23,262 shares of the Registrant's common stock.

ITEM 6. INDEMNIFICATION OF DIRECTORS AND OFFICERS

The Registrant is a New York corporation. Sections 721 through 726 of the New York Business Corporation Law (the "BCL") provide that, in certain circumstances, a corporation may indemnify its directors and officers against judgments, fines, amounts paid in settlement and reasonable expenses, including attorneys' fees, actually and necessarily incurred as a result of any actual or threatened action or proceeding against such directors or officers, or by or in the right of any other enterprise which such directors or officers served in any capacity at the request of the corporation, by reason of the fact that such person acted in any of the capacities set forth above, if such director or officer (i) acted, in good faith, for a purpose which he or she reasonably believed to be in or not opposed to the best interests of the corporation and (ii) in criminal actions or proceedings, had no reasonable cause to believe that his or her conduct was unlawful; provided, however, that no indemnification may be provided where a final adjudication adverse to the director or officer establishes that his or her actions were committed in bad faith or were the result of active and deliberate dishonesty and were material to the cause of action adjudicated, or that he or she personally gained a financial profit or other advantage to which he or she was not legally entitled. A corporation is required to indemnify against reasonable expenses (including attorneys' fees) incurred by any director or officer who successfully defends any such action. The BCL also provides for indemnification of officers and directors in actions by or in the right of the corporation, subject to certain exceptions. Indemnification provided by these provisions of the BCL is not exclusive of any other rights to which a director or officer may be entitled. The foregoing statements are subject to the detailed provisions of the BCL.

The Registrant's Certificate of Incorporation states the following:

"Article 8. The Corporation shall, to the fullest extent permitted by the Business Corporation Law of the States of New York, indemnify any and all persons whom it shall have power to indemnify from and against any and all of the expenses, liabilities or other matters as provided under Articles of Seven of the Business Corporation Law of the State of New York."

"Article 12. No director of the Corporation shall be liable to the Corporation or its shareholders for damage for any breach of duty in such capacity, provided that nothing contained in this Article shall eliminate or limit the liability of a director (i) if a judgment or other final adjudication adverse to him establishes that his acts or omissions were in bad faith or involved acts or omissions were in bad faith or involved intentional misconduct or a knowing violation of law or that he personally gained in fact a financial profit or other advantage to which he was not legally entitled or that his acts violated Section 719 of the New York Business Corporation Law or (ii) for any act or omission prior to July 8, 1988."

ARTICLE V of the Registrant's By-Laws provides as follows:

"The Corporation shall, to the fullest extent permitted by the laws of the State of incorporation, indemnify any and all persons whom it shall have power to indemnify against any and all of the costs, expenses, liabilities or other matters incurred by them by reason of having been officers or directors of the Corporation, any subsidiary of the Corporation or of any other corporation for which he acted as officer or director at the request of the Corporation."

ITEM 7. EXEMPTION FROM REGISTRATION CLAIMED

Not applicable.

ITEM 8. EXHIBITS

<u>No.</u>	<u>Description</u>
4.1	Certificate of Incorporation.(1)
4.2	Certificate of Amendment of the Certificate of Incorporation, Filed March 17, 1980.(1)
4.3	Certificate of Amendment of the Certificate of Incorporation, Filed June 16, 1981.(1)
4.4	Certificate of Amendment to the Certificate of Incorporation, Filed July 22, 1988.(1)

- 4.5 Amended and Restated By-laws.(2)
- 4.6 Form of Common Stock Certificate.(1)
- 4.7 Enzo Biochem, Inc. 2011 Incentive Plan.(3)
- 4.8 Amended and Restated Enzo Biochem, Inc. 2005 Equity Compensation Incentive Plan.(4)
- 4.9 Enzo Biochem, Inc. 1999 Stock Option Plan.(5)
- 5.1 Legal Opinion of Greenberg Traurig, LLP.*
- 23.1 Consent of Ernst & Young LLP.*
- 23.2 Consent of Greenberg Traurig, LLP (included in exhibit 5.1).*
- 24.1 Powers of Attorney of the directors and certain officers of the Registrant (included on the signature page to the Registration Statement).*

* Filed herewith.

- (1) Incorporated by reference from the Registrant's Registration Statement on Form S-8 (Registration No. 333-123712) filed with the SEC on March 31, 2005.
- (2) Incorporated by reference from the Registrant's Current Report on Form 8-K dated October 14, 2010 and filed with the SEC on October 18, 2010.
- (3) Incorporated by reference from the Registrant's definitive proxy statement on Schedule 14A filed with the SEC on November 16, 2010.
- (4) Incorporated by reference from the Registrant's definitive proxy statement on Schedule 14A filed with the SEC on November 28, 2005.
- (5) Incorporated by reference from the Registrant's Registration Statement on Form S-8 (Registration No. 333-87153) filed with the SEC on September 15, 1999.

ITEM 9. UNDERTAKINGS

(a) The undersigned Registrant hereby undertakes:

(1) To file, during any period in which offers or sales are being made, a post-effective amendment to this Registration Statement:

- (i) to include any prospectus required by Section 10(a)(3) of the Securities Act;
- (ii) to reflect in the prospectus any facts or events arising after the effective date of this Registration Statement (or the most recent post-effective amendment thereof) which, individually or in the aggregate, represent a fundamental change in the information set forth in this Registration Statement; and
- (iii) to include any material information with respect to the plan of distribution not previously disclosed in this Registration Statement or any material change to such information in this Registration Statement;

Provided, however, that paragraphs (a)(1)(i) and (a)(1)(ii) do not apply if the registration statement is on Form S-8, and the information required to be included in a post-effective amendment by those paragraphs is contained in reports filed with or furnished to the SEC by the Registrant pursuant to Section 13 or Section 15(d) of the Exchange Act that are incorporated by reference in this Registration Statement.

(2) That, for the purpose of determining any liability under the Securities Act, each such post-effective amendment shall be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial *bona fide* offering thereof.

(3) To remove from registration by means of a post-effective amendment any of the securities being registered which remain unsold at the termination of the offering.

(b) The undersigned Registrant hereby undertakes that, for purposes of determining any liability under the Securities Act, each filing of the Registrant's annual report pursuant to Section 13(a) or Section 15(d) of the Exchange Act (and, where applicable, each filing of an employee benefit plan's annual report pursuant to Section 15(d) of the Exchange Act) that is incorporated by reference in this Registration Statement will be deemed to be a new registration statement relating to the securities offered therein, and the offering of such securities at that time shall be deemed to be the initial *bona fide* offering thereof.

(c) Insofar as indemnification for liabilities arising under the Securities Act of may be permitted to directors, officers and controlling persons of the Registrant pursuant to the foregoing provisions, or otherwise, the Registrant has been advised that in the opinion of the SEC such indemnification is against public policy as expressed in the Securities Act and is, therefore, unenforceable. In the event that a claim for indemnification against such liabilities (other than the payment by the Registrant of expenses incurred or paid by a director, officer or controlling person of the Registrant in the successful defense of any action, suit or proceeding) is asserted by such director, officer or controlling person in connection with the securities being registered, the Registrant will, unless in the opinion of its counsel the matter has been settled by controlling precedent, submit to a court of appropriate jurisdiction the question whether such indemnification by it is against public policy as expressed in the Securities Act and will be governed by the final adjudication of such issue.

SIGNATURES

Pursuant to the requirements of the Securities Act of 1933, the Registrant certifies that it has reasonable grounds to believe that it meets all of the requirements for filing on Form S-8 and has duly caused this Registration Statement to be signed on its behalf by the undersigned, thereunto duly authorized, in the City of New York, State of New York, on February 9, 2011.

ENZO BIOCHEM, INC.

By: /s/ Elazar Rabbani

Elazar Rabbani, Ph.D.
Chairman of the Board of Directors,
Chief Executive Officer and Secretary

POWER OF ATTORNEY

KNOW ALL PERSONS BY THESE PRESENT, that each person whose signature appears below constitutes and appoints Elazar Rabbani and Barry W. Weiner, and each or either of them, his true and lawful attorney-in-fact and agent, with full power of substitution and resubstitution, for him and in his name, place and stead, in any and all capacities, to sign any and all amendments, including post-effective amendments, to this Form S-8 Registration Statement, 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 might or could do in person, hereby ratifying and confirming all that said attorneys-in-fact and agents, or any of them, or their or his substitutes or substitute, may lawfully do or cause to be done by virtue hereof.

Pursuant to the requirements of the Securities Act of 1933, this Registration Statement has been signed below by the following persons in the capacities and on the dates indicated.

Date: February 9, 2011

By: /s/ Elazar Rabbani

Elazar Rabbani, Ph.D.
Chairman of the Board of Directors, Chief Executive Officer and Secretary
(Principal Executive Officer)

Date: February 9, 2011

By: /s/ Barry W. Weiner

Barry W. Weiner
President, Chief Financial Officer, Principal Accounting Officer, Treasurer and Director
(Principal Financial and Accounting Officer)

Date: February 9, 2011

By: /s/ Gregory M. Bortz

Gregory M. Bortz
Director

Date: February 9, 2011

By: /s/ Irwin C. Gerson

Irwin C. Gerson
Director

Date: February 9, 2011

By: /s/ Bernard L. Kasten

Bernard L. Kasten, M.D.
Director

Date: February 9, 2011

By: /s/ Stephen B. H. Kent

Stephen B.H. Kent, Ph.D.
Director

EXHIBIT INDEX

<u>No.</u>	<u>Description</u>
5.1	Legal Opinion of Greenberg Traurig, LLP.
23.1	Consent of Ernst & Young LLP.

[Letterhead of Greenberg Traurig, LLP]

February 9, 2011

Enzo Biochem, Inc.
60 Executive Boulevard
Farmingdale, New York 11735

Ladies and Gentlemen:

We have assisted in the preparation of the Registration Statement on Form S-8 (the "**Registration Statement**") filed with the Securities and Exchange Commission under the Securities Act of 1933, as amended (the "**Act**"), relating to an aggregate of 3,000,000 shares (the "**Shares**") of the common stock, par value \$0.01 per share ("**Common Stock**"), of Enzo Biochem, Inc., a New York corporation (the "**Company**"), issuable under the Enzo Biochem, Inc. 2011 Incentive Plan (the "**2011 Plan**").

In connection with the preparation of the Registration Statement and this opinion letter, we have examined, considered and relied upon the following documents (collectively, the "**Documents**"):

- (i) the Company's Certificate of Incorporation as amended through the date hereof;
- (ii) the Company's By-laws, as amended through the date hereof;
- (iii) resolutions of the board of directors and shareholders of the Company;
- (iv) the Registration Statement and schedules and exhibits thereto;
- (v) the 2011 Plan;
- (vi) a specimen stock certificate evidencing the Common Stock; and
- (vii) such other documents and matters of law as we have considered necessary or appropriate for the expression of the opinions contained herein.

In rendering the opinions set forth below, we have assumed without investigation the genuineness of all signatures and the authenticity of all Documents submitted to us as originals, the conformity to authentic original documents of all Documents submitted to us as copies, and the veracity of the Documents. As to questions of fact material to the opinions hereinafter expressed, we have relied upon the representations and warranties of the Company made in the Documents.

Based upon the foregoing examination, and subject to the qualifications set forth below, we are of the opinion that the Shares have been duly authorized and, when issued, delivered and paid for in accordance with the provisions of the 2011 Plan, will be validly issued, fully paid and non-assessable.

The opinion expressed above is limited to the laws of the State of New York, and we express no opinion as to the effect of the laws of any other jurisdiction. This letter has been prepared for your use in connection with the Registration Statement and is based upon the law as in effect and the facts known to us on the date hereof. We have not undertaken to advise you of any subsequent changes in the law or of any facts that hereafter may come to our attention.

In addition, we have assumed that the resolutions of the Company's board of directors or its compensation committee authorizing the Company to issue and deliver the Shares pursuant to the 2011 Plan and the applicable award agreements will be in full force and effect at all times at which such Shares are issued and delivered by the Company, and that the Company will take no action inconsistent with such resolutions.

We hereby consent to the filing of this opinion as an exhibit to the Registration Statement and to the reference to us in the Registration Statement. In giving this consent, we do not thereby admit that we are included within the category of persons whose consent is required by Section 7 of the Act and the rules and regulations promulgated thereunder.

Very truly yours,

/s/ Greenberg Traurig, LLP

GREENBERG TRAURIG, LLP

CONSENT OF INDEPENDENT REGISTERED PUBLIC ACCOUNTING FIRM

We consent to the incorporation by reference in the Registration Statement (Form S-8) pertaining to the 2011 Incentive Plan of Enzo Biochem, Inc. of our reports dated October 14, 2010, with respect to the consolidated financial statements and schedule of Enzo Biochem, Inc. and the effectiveness of internal control over financial reporting of Enzo Biochem, Inc. included in its Annual Report (Form 10-K) for the year ended July 31, 2010, filed with the Securities and Exchange Commission.

/s/ Ernst & Young LLP

Jericho, New York
February 9, 2011
