

**Identification and Characterization of the Enzymes Involved in Biosynthesis
of FAD and Tetrahydromethanopterin in *Methanocaldococcus jannaschii***

Zahra Mashhadi

Dissertation submitted to the faculty of the Virginia Polytechnic Institute and State
University in partial fulfillment of the requirements for the degree of

Doctor of Philosophy

In

Biochemistry

Robert H. White, Ph.D. Chairperson
Dennis R. Dean, Ph.D.
Pablo Sobrado, Ph.D.
Marcy Hernick, Ph.D.
Florian D. Schubot, Ph.D.

June 30, 2010

Blacksburg, Virginia

Keywords: *Methanocaldococcus jannaschii*, tetrahydromethanopterin, riboflavin kinase, FAD
synthetase



Title: Structure and function of
archaeal RNA polymerases
Author: Werner Finn
Publication: Molecular Microbiology
Publisher: John Wiley and Sons
Date: Jan 1, 0014

Logged in as:
Zahra Mashhadi
Account #:
3000301795

LOGOUT

Copyright © 2007, John Wiley and Sons

Order Completed

Thank you very much for your order.

This is a License Agreement between Zahra Mashhadi ("You") and John Wiley and Sons ("John Wiley and Sons"). The license consists of your order details, the terms and conditions provided by John Wiley and Sons, and the [payment terms and conditions](#).

[Get the printable license.](#)

License Number	2416611011068
License date	Apr 26, 2010
Licensed content publisher	John Wiley and Sons
Licensed content publication	Molecular Microbiology
Licensed content title	Structure and function of archaeal RNA polymerases
Licensed content author	Werner Finn
Licensed content date	Jan 1, 0014
Start page	1395
End page	1404
Type of use	Dissertation/Thesis
Requestor type	University/Academic
Format	Electronic
Portion	Figure/table
Number of figures/tables	1
Original Wiley figure/table number(s)	Figure 1
Will you be translating?	No
Order reference number	
Total	0.00 USD

ORDER MORE...

CLOSE WINDOW

Copyright © 2010 Copyright Clearance Center, Inc. All Rights Reserved. [Privacy statement](#).
Comments? We would like to hear from you. E-mail us at customercare@copyright.com



**AMERICAN
SOCIETY FOR
MICROBIOLOGY**

Title: Identification and Characterization of an Archaeon-Specific Riboflavin Kinase
Author: Zahra Mashhadi, Robert H. White
Publication: Journal of Bacteriology
Publisher: American Society for Microbiology
Date: Apr 1, 2008
 Copyright © 2008, American Society for Microbiology

Logged in as:
Zahra Mashhadi
Account #:
3000301795

LOGOUT

Order Completed

Thank you for your order.

This is a License Agreement between Zahra Mashhadi ("You") and American Society for Microbiology ("American Society for Microbiology"). The license consists of your order details, the terms and conditions provided by American Society for Microbiology, and the [payment terms and conditions](#).

[Get the printable license.](#)

License Number	2414251248847
License date	Apr 22, 2010
Licensed content publisher	American Society for Microbiology
Licensed content publication	Journal of Bacteriology
Licensed content title	Identification and Characterization of an Archaeon-Specific Riboflavin Kinase
Licensed content author	Zahra Mashhadi, Robert H. White
Licensed content date	Apr 1, 2008
Volume	190
Issue	7
Start page	2615
End page	2618
Type of Use	Dissertation/Thesis
Format	Electronic
Portion	Excerpt
Number of pages requested	3
Order reference number	
Title of your thesis / dissertation	Identification and characterization of the enzymes involved in biosynthesis of FAD and tetrahydromethanoptein in Methanocaldococcus jannaschii
Expected completion date	Jun 2010
Estimated size(pages)	150
Billing type	Invoice
Billing address	1214 university city blvd. Apt#94 blacksburg, VA 24060 United States
Customer reference info	
Total	0.00 USD

ORDER MORE...

CLOSE WINDOW

Copyright © 2010 Copyright Clearance Center, Inc. All Rights Reserved. [Privacy statement](#).
Comments? We would like to hear from you. E-mail us at customer care@copyright.com

AMERICAN CHEMICAL SOCIETY LICENSE
TERMS AND CONDITIONS

Apr 20, 2010

This is a License Agreement between Zahra Mashhadi ("You") and American Chemical Society ("American Chemical Society") provided by Copyright Clearance Center ("CCC"). The license consists of your order details, the terms and conditions provided by American Chemical Society, and the payment terms and conditions.

All payments must be made in full to CCC. For payment instructions, please see information listed at the bottom of this form.

License Number	2413091007988
License Date	Apr 20, 2010
Licensed content publisher	American Chemical Society
Licensed content publication	Biochemistry
Licensed content title	An Fe ²⁺ -Dependent Cyclic Phosphodiesterase Catalyzes the Hydrolysis of 7,8-Dihydro-d-neopterin 2',3'-Cyclic Phosphate in Methanopterin Biosynthesis
Licensed content author	Zahra Mashhadi et al.
Licensed content date	Oct 1, 2009
Volume number	48
Issue number	40
Type of Use	Thesis/Dissertation
Requestor type ¹	Not specified
Format	Electronic
Portion	50% or more of original article
Author of this ACS article	Yes
Order reference number	
Title of the thesis / dissertation	Identification and characterization of the enzymes involved in biosynthesis of FAD and tetrahydromethanoptein in Methanocaldococcus jannaschii
Expected completion date	Jun 2010
Estimated size(pages)	150
Billing Type	Invoice
Billing Address	1214 university city blvd. Apt#94 blacksburg, VA 24060 United States

Customer reference
info
Total 0.00 USD
Terms and Conditions

Thesis/Dissertation

ACS / RIGHTSLINK TERMS & CONDITIONS THESIS/DISSERTATION

INTRODUCTION

The publisher for this copyrighted material is the American Chemical Society. By clicking "accept" in connection with completing this licensing transaction, you agree that the following terms and conditions apply to this transaction (along with the Billing and Payment terms and conditions established by Copyright Clearance Center, Inc. ("CCC"), at the time that you opened your Rightslink account and that are available at any time at <<http://myaccount.copyright.com>>).

LIMITED LICENSE

Publisher hereby grants to you a non-exclusive license to use this material. Licenses are for one-time use only with a maximum distribution equal to the number that you identified in the licensing process; any form of republication must be completed within 60 days from the date hereof (although copies prepared before then may be distributed thereafter).

GEOGRAPHIC RIGHTS: SCOPE

Licenses may be exercised anywhere in the world.

RESERVATION OF RIGHTS

Publisher reserves all rights not specifically granted in the combination of (i) the license details provided by you and accepted in the course of this licensing transaction, (ii) these terms and conditions and (iii) CCC's Billing and Payment terms and conditions.

PORTION RIGHTS STATEMENT: DISCLAIMER

If you seek to reuse a portion from an ACS publication, it is your responsibility to examine each portion as published to determine whether a credit to, or copyright notice of, a third party owner was published adjacent to the item. You may only obtain permission via Rightslink to use material owned by ACS. Permission to use any material published in an ACS publication, journal, or article which is reprinted with permission of a third party must be obtained from the third party owner. ACS disclaims any responsibility for any use you make of items owned by third parties without their permission.

REVOCATION

The American Chemical Society reserves the right to revoke a license for any reason, including but not limited to advertising and promotional uses of ACS content, third party usage, and incorrect figure source attribution.

LICENSE CONTINGENT ON PAYMENT

While you may exercise the rights licensed immediately upon issuance of the license at the end of the licensing process for the transaction, provided that you have disclosed complete and accurate details of your proposed use, no license is finally effective unless and until full payment is received from you (by CCC) as provided in CCC's Billing and Payment terms and conditions. If full payment is not received on a timely basis, then any license preliminarily granted shall be deemed automatically revoked and shall be void as if never granted. Further,

in the event that you breach any of these terms and conditions or any of CCC's Billing and Payment terms and conditions, the license is automatically revoked and shall be void as if never granted. Use of materials as described in a revoked license, as well as any use of the materials beyond the scope of an unrevoked license, may constitute copyright infringement and publisher reserves the right to take any and all action to protect its copyright in the materials.

COPYRIGHT NOTICE: DISCLAIMER

You must include the following copyright and permission notice in connection with any reproduction of the licensed material: "Reprinted ("Adapted" or "in part") with permission from REFERENCE CITATION. Copyright YEAR American Chemical Society."

WARRANTIES: NONE

Publisher makes no representations or warranties with respect to the licensed material.

INDEMNITY

You hereby indemnify and agree to hold harmless publisher and CCC, and their respective officers, directors, employees and agents, from and against any and all claims arising out of your use of the licensed material other than as specifically authorized pursuant to this license.

NO TRANSFER OF LICENSE

This license is personal to you or your publisher and may not be sublicensed, assigned, or transferred by you to any other person without publisher's written permission.

NO AMENDMENT EXCEPT IN WRITING

This license may not be amended except in a writing signed by both parties (or, in the case of publisher, by CCC on publisher's behalf).

OBJECTION TO CONTRARY TERMS

Publisher hereby objects to any terms contained in any purchase order, acknowledgment, check endorsement or other writing prepared by you, which terms are inconsistent with these terms and conditions or CCC's Billing and Payment terms and conditions. These terms and conditions, together with CCC's Billing and Payment terms and conditions (which are incorporated herein), comprise the entire agreement between you and publisher (and CCC) concerning this licensing transaction. In the event of any conflict between your obligations established by these terms and conditions and those established by CCC's Billing and Payment terms and conditions, these terms and conditions shall control.

JURISDICTION

This license transaction shall be governed by and construed in accordance with the laws of the District of Columbia. You hereby agree to submit to the jurisdiction of the courts located in the District of Columbia for purposes of resolving any disputes that may arise in connection with this licensing transaction.

THESES/DISSERTATION TERMS

Publishing implications of electronic publication of theses and dissertation material

Students and their mentors should be aware that posting of theses and dissertation material on the Web prior to submission of material from that thesis or dissertation to an ACS journal may affect publication in that journal. Whether Web posting is considered prior publication may be evaluated on a case-by-case basis by the journal's editor. If an ACS journal editor considers Web posting to be "prior publication", the paper will not be accepted for publication in that journal. If you intend to submit your unpublished paper to ACS for publication, check with the appropriate editor prior to posting your manuscript electronically.

If your paper has already been published by ACS and you want to include the text or portions

of the text in your thesis/dissertation in **print or microfilm formats**, please print the ACS copyright credit line on the first page of your article: "Reproduced (or 'Reproduced in part') with permission from [FULL REFERENCE CITATION.] Copyright [YEAR] American Chemical Society." Include appropriate information.

Submission to a Dissertation Distributor: If you plan to submit your thesis to UMI or to another dissertation distributor, you should not include the unpublished ACS paper in your thesis if the thesis will be disseminated electronically, until ACS has published your paper. After publication of the paper by ACS, you may release the entire thesis (not the individual ACS article by itself) for electronic dissemination through the distributor; ACS's copyright credit line should be printed on the first page of the ACS paper.

Use on an Intranet: The inclusion of your ACS unpublished or published manuscript is permitted in your thesis in print and microfilm formats. If ACS has published your paper you may include the manuscript in your thesis on an intranet that is not publicly available. Your ACS article cannot be posted electronically on a publicly available medium (i.e. one that is not password protected), such as but not limited to, electronic archives, Internet, library server, etc. The only material from your paper that can be posted on a public electronic medium is the article abstract, figures, and tables, and you may link to the article's DOI or post the article's author-directed URL link provided by ACS. This paragraph does not pertain to the dissertation distributor paragraph above.

Other conditions:

v1.1

Gratis licenses (referencing \$0 in the Total field) are free. Please retain this printable license for your reference. No payment is required.

If you would like to pay for this license now, please remit this license along with your payment made payable to "COPYRIGHT CLEARANCE CENTER" otherwise you will be invoiced within 48 hours of the license date. Payment should be in the form of a check or money order referencing your account number and this invoice number RLNK10770751.

Once you receive your invoice for this order, you may pay your invoice by credit card. Please follow instructions provided at that time.

Make Payment To:
Copyright Clearance Center
Dept 001
P.O. Box 843006
Boston, MA 02284-3006

If you find copyrighted material related to this license will not be used and wish to cancel, please contact us referencing this license number 2413091007988 and noting the reason for cancellation.

Questions? customercare@copyright.com or +1-877-622-5543 (toll free in the US) or +1-978-646-2777.
