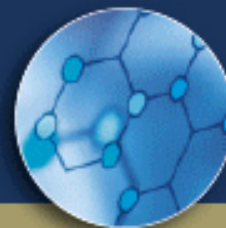
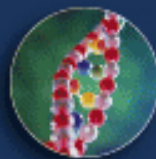




ANNUAL REVIEWS
A Nonprofit Scientific Publisher



Una publicación de 77 Años

Desde 1932

Navegar por la página de Annual Reviews



The screenshot shows the Annual Reviews website. A red arrow points to the 'Browse Publications' button in the left sidebar. The website header includes the Annual Reviews logo and a navigation bar with icons for various scientific fields. The main content area features a welcome message, a list of disciplines for online access, and a 'What's New' section for 2009.

ANNUAL REVIEWS
A Nonprofit Scientific Publisher

Browse Publications
[Activate Online Access](#)

Information For:

- Authors
- Individuals
- Librarians
- Vendors/Agents

Publications Catalog

Select One

Quick Links

- Home
- Activation Instructions
- AR Directory
- Course Reader Instructions
- Expected Publication Dates
- ISI Rankings
- News/Releases
- Order Online
- Permissions
- Pricing/Order Information
- Publications Catalog
- Supplemental Materials

[Recommend Annual Reviews to Your Librarian](#)

Welcome to Annual Reviews

Annual Reviews is proud to publish authoritative, analytic reviews in 37 focused disciplines within the Biomedical, Life, Physical, and Social Sciences. Annual Reviews publications are among the most highly cited in scientific literature. Annual Reviews offers publications in print and online to individuals, institutions, and consortia throughout the world. [Learn More About Annual Reviews](#)

Access Annual Reviews Content Online

Choose from the series below to view current Annual Reviews content online:

- Analytical Chemistry - New (2008)
- Anthropology
- Astronomy and Astrophysics
- Biochemistry
- Biomedical Engineering
- Biophysics
- Cell and Developmental Biology
- Clinical Psychology
- Earth and Planetary Sciences
- Ecology, Evolution, and Systematics
- Economics - New (2009)
- Entomology
- Environment and Resources
- Financial Economics - New (2009)
- Fluid Mechanics
- Genetics
- Genomics and Human Genetics
- Immunology
- Law and Social Science
- Marine Science - New (2009)
- Materials Research
- Medicine
- Microbiology
- Neuroscience
- Nuclear and Particle Science
- Nutrition
- Pathology: Mechanisms of Disease
- Pharmacology and Toxicology
- Physical Chemistry
- Physiology
- Phytopathology
- Plant Biology
- Political Science
- Psychology
- Public Health
- Resource Economics - New (2009)
- Sociology
- 2009 Economics Collection
- Site License Information

What's New

Annual Reviews Announces 3 NEW Economics titles publishing in 2009:

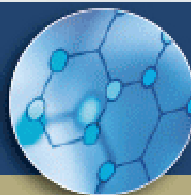
- [Annual Review of Economics](#)
- [Annual Review of Financial Economics](#)
- [Annual Review of Resource Economics](#)

Navegar por la pagina de Annual Reviews

<http://arjournals.annualreviews.org>



ANNUAL REVIEWS
A Nonprofit Scientific Publisher



Hello. [Sign in](#) to get personalized recommendations. New user? [Register now](#).

Welcome: Annual Reviews

[Home](#)

[Order](#)

[Browse](#)

[Search](#)

[Profile](#)

AR Journals Home Page

- [Pricing](#)
- [Online Activation Instructions](#)
- [Shopping Cart](#)
- [Individual Subscribers](#)
- [Institutional Subscribers](#)
- [Site License Information](#)
- [Email Announcements](#)
- [Course Reader Instructions](#)
- [Help](#)

**Sign up for
email alerts**

Welcome to Annual Reviews

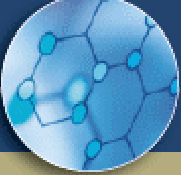
- **Activate Access**
Activate your online access via your account or access token.
- **Order**
Purchase Annual Reviews publications.
- **Browse**
View and link directly to all Annual Reviews content.
- **Search**
Search all Annual Reviews content.
- **Profile**
Register to customize your online experience.
- **Library Administration Tool**
Access usage statistics and manage your Annual Reviews subscriptions.
- **Help**
Obtain assistance in navigating this site.
- **Contact Us**
Have a question? Visit our contact page for email, phone and fax information.

Empieza en los periódicos de AR para acceder las séries específicas.

Cliquea en Browse para visualizar la suscripción de cada série.

Navegar por la pagina de Annual Reviews

**ANNUAL REVIEWS**
A Nonprofit Scientific Publisher



Hello, Jenni Rankin. We have [recommendations](#) for you.

Welcome: Annual Reviews [Log Out](#)

[Home](#) [Order](#) [Browse](#) [Search](#) [Profile](#) [Help](#) [Contact Us](#)

Access: ✓ = from Vol. 1; ✓ = to current or back volumes; No Icon = to abstracts only

[Browse](#)

[All Series By Suite](#) [Favorite Series](#) [Subscribed Series](#)

Series By Suite

Browse individual titles from the Annual Reviews Biomedical, Physical and Social Science Suites.

Biomedical Sciences

- ✓ [Biochemistry](#)
- ✓ [Biomedical Engineering](#)
- ✓ [Biophysics and Biomolecular Structure](#)
- ✓ [Cell and Developmental Biology](#)
- ✓ [Clinical Psychology](#)
- ✓ [Ecology, Evolution, and Systematics](#)
- ✓ [Entomology](#)
- ✓ [Genetics](#)
- ✓ [Genomics and Human Genetics](#)
- ✓ [Immunology](#)
- ✓ [Medicine](#)
- ✓ [Microbiology](#)
- ✓ [Neuroscience](#)
- ✓ [Nutrition](#)
- ✓ [Pathology: Mechanisms of Disease](#)
- ✓ [Pharmacology and Toxicology](#)
- ✓ [Physiology](#)

Physical Sciences

- ✓ [Astronomy and Astrophysics](#)
- ✓ [Biomedical Engineering](#)
- ✓ [Biophysics and Biomolecular Structure](#)
- ✓ [Computer Science](#)
- ✓ [Earth and Planetary Sciences](#)
- ✓ [Environment and Resources](#)
- ✓ [Fluid Mechanics](#)
- ✓ [Materials Research](#)
- ✓ [Nuclear and Particle Science](#)
- ✓ [Physical Chemistry](#)

Social Sciences

- ✓ [Anthropology](#)
- ✓ [Clinical Psychology](#)
- ✓ [Environment and Resources](#)
- ✓ [Law and Social Science](#)
- ✓ [Political Science](#)

Navegar por la página de Annual Reviews

Access:  = from Vol. 1;  = to current or back volumes; No Icon = to abstracts only
Series Home Page

Las señales de acceso ayudan a identificar los periódicos incluidos en la suscripción.



El verde sólido indica acceso completo a todos los volúmenes.



El verde solo en los bordes indica acceso a los periódicos actuales o a los back volumes

La falta de señal indica ninguna suscripción activa al periódico. Los usuarios apenas podrán consultar los resúmenes.

Accesando el Contenido en la Home Page de las Series

Welcome

[Log In \(Register\)](#) | [Log Out](#)

[Home](#) [Order](#) [Browse](#) [Search](#) [Profile](#) [Help](#) [Contact Us](#)

Access: = from Vol. 1; = to current or back volumes; No Icon = to abstracts only

Series Home Page

Annual Review of Biochemistry

[Sign up for email alerts](#)

Current Volume:
[View Volume 75 \(2006\)](#)

Purchase:
[Purchase Volume 75 \(2006\)](#)
[View Pricing 75 \(2006\)](#)

[View Forthcoming Content / Reviews in Advance](#)

2000s

- July 2006 (Vol. 75) Current Volume**
- July 2005 (Vol. 74)
- July 2004 (Vol. 73)
- July 2003 (Vol. 72)
- July 2002 (Vol. 71)
- July 2001 (Vol. 70)
- July 2000 (Vol. 69)

1990s

1980s

1970s

1960s

1950s

1940s

1930s

Quick Links

Quick Search:
Enter Keywords

☒ This series
☐ All series

[SEARCH](#)

[Advanced Search](#)

- [RSS \(Series Update Alert\)](#)
- [Editorial Committee](#)
- [Add to Favorites](#)
- [Email link to a friend](#)
- [View Biochemistry Errata](#)
- [View Most Downloaded Reviews](#)
- [View Most Cited Reviews](#)

Biomedical Sciences:

- [Biochemistry](#)
- [Biomechanics](#)
- [Engineering](#)
- [Biophysics and Biomolecular Structure](#)
- [Cell and Developmental Biology](#)
- [Clinical Immunology](#)
- [Ecology and Systematics](#)
- [Entomology](#)
- [Genetics](#)
- [Genomics](#)
- [Immunology](#)
- [Medicine](#)
- [Microbiology](#)
- [Neurobiology](#)
- [Nutrition](#)
- [Pathology of Disease](#)
- [Pharmacology and Toxicology](#)
- [Physiology](#)
- [Phytopathology](#)
- [Plant Biology](#)
- [Psychology](#)
- [Public Health](#)

Physical Sciences:

- [Astronomy and Astrophysics](#)
- [Biomedical Engineering](#)
- [Biophysics and Biomolecular Structure](#)
- [Computer Science](#)
- [Earth and Planetary Sciences](#)
- [Environment and](#)

De la home page de cada serie se tiene acceso a las Revisiones Siguietes (RIA – Reviews in Advance).

El contenido RIA da acceso a los títulos de las publicaciones que serán publicadas con hasta 7 meses de anticipo. Tu puedes también enviar la noticia a un amigo, o visualizar el resumen.

Navegar en un año específico de la serie de interés.

Accesando el Contenido en la Home Page de las Séries

Welcome

[Log In \(Register\)](#) | [Log Out](#)

[Home](#) | [Order](#) | [Browse](#) | [Search](#) | [Profile](#) | [Help](#) | [Contact Us](#)

[Table of Contents](#)
Annual Review of Biochemistry
[Future Reviews 2007](#)

[Series Home](#) > [Table of Contents](#)

Quick Links

Quick Search:
Enter Keywords
☐ This series
☐ All series

[Advanced Search](#)

☐ [RSS](#) (Series Update Alert)

Sign up for email alerts

Here we list reviews ready or planned for publication in the year(s) indicated below. These lists are revised as production proceeds. AR Reviews in Advance are full-length reviews published online immediately after editing and revision. (Minor changes may still occur before final publication online and in print.) [We offer recommendations for citing RIAs.](#) We also list here the reviews planned for publication, but not yet available in full text format. To sign up for alerts when final publication for this series is announced, register and update your profile. (Corrections: smoses@annualreviews.org)

[Add to Favorites](#) | [Track Citations](#) | [Email link to a friend](#) | [View Abstracts](#) | [Download to Citation Manager](#)

☐ To select/unselect all items click here

2007 Volume 76

☐ **The Structural Basis of DNA Polymerase Fidelity**
[Lorena Beese](#)
Annual Review of Biochemistry, Vol. 76 (Planned volume publication date July 2007)
[Citation](#)

☐ **Anthrax Toxin**
[R. John Collier](#), [John A. T. Young](#)
Annual Review of Biochemistry, Vol. 76 (Planned volume publication date July 2007)
[Citation](#)

☐ **Structural Biology of Nucleo-Cytoplasmic Transport**
[Elena Conti](#), [Fulvia Bono](#), [Atlanta Cook](#), [Martin Jinek](#)

Accesando el Contenido en un Volumen

Welcome [Log In \(Register\)](#) | [Log Out](#)

[Home](#) [Order](#) [Browse](#) [Search](#) [Profile](#) [Help](#) [Contact Us](#)

Access: = from Vol. 1; = to current or back volumes; No icon = to abstracts only

Table of Contents
Annual Review of Biochemistry
Volume 75, 2006



Purchase:
[Purchase Volume 75, 2006](#)
[View Pricing](#)

Other Years:
[Previous](#) | [All](#) | [Next](#)

[Sign up for email alerts](#)

[Add to Favorites](#) | [Track Citations](#) | [Email link to a friend](#) | [View Abstracts](#) | [Download to Citation Manager](#)

☐ To select/unselect all items click here

☐ **WANDERINGS OF A DNA ENZYMOLOGIST: From DNA Polymerase to Viral Latency**
 [J. Robert Lehman](#)
Annual Review of Biochemistry, Vol. 75: 1-17 (Volume publication date July 2006)
[Abstract](#) | [Full Text](#) | [PDF \(191 KB\)](#)

☐ **SIGNALING PATHWAYS IN SKELETAL MUSCLE REMODELING**
 [Rhonda Bassel-Duby](#), [Eric N. Olson](#)
Annual Review of Biochemistry, Vol. 75: 19-37 (Volume publication date July 2006)
[Abstract](#) | [Full Text](#) | [PDF \(258 KB\)](#)

☐ **BIOSYNTHESIS AND ASSEMBLY OF CAPSULAR POLYSACCHARIDES IN *ESCHERICHIA COLI***
 [Chris Whitfield](#)
Annual Review of Biochemistry, Vol. 75: 39-68 (Volume publication date July 2006)
[Abstract](#) | [Full Text](#) | [PDF \(359 KB\)](#)

☐ **ENERGY CONVERTING NADH:Quinone Oxidoreductase (Complex I)**
 [Ulrich Brandt](#)
Annual Review of Biochemistry, Vol. 75: 69-92 (Volume publication date July 2006)
[Abstract](#) | [Full Text](#) | [PDF \(1833 KB\)](#)

☐ **TYRPHOSTINS AND OTHER TYROSINE KINASE INHIBITORS**
 [Alexander Levitzki](#), [Eyal Mishani](#)
Annual Review of Biochemistry, Vol. 75: 93-109 (Volume publication date July 2006)

Quick Links

Quick Search:
Enter Keywords

☒ This volume
☐ This series
☐ All series

[Advanced Search](#)

-  [RSS](#) (Series Update Alert)
- [Editorial Committee](#)
- [Other Reviews of Interest](#)

En la página del volumen de interés, visualizar la tabla de contenido y elegir el artículo.

Elegir "Abstract", "Full Text HTML", o PDF.

RSS (nuevos ingresos), e-mail de alerta, artículos citados antes/depués, búsqueda rápida en un artículo)

Accesando el Contenido - Artículo

Home Order Browse Search Profile Help Contact Us

Full Text

Annual Review of Biochemistry

Vol. 75: 69-92 (Volume publication date July 2006)

(doi:10.1146/annurev.biochem.75.103004.142539)

First published online as a Review in Advance on March 10, 2006

[Series Home](#) > [Table of Contents](#) >

Full Text

[Prev. Article](#) | [Next Article](#)

[View/Print PDF](#) (1,833 KB)

[Add to Favorites](#)

[Email link to a friend](#)

ENERGY CONVERTING NADH:Quinone Oxidoreductase (Complex I)

Ulrich Brandt

Universität Frankfurt, Fachbereich Medizin, Zentrum der Biologischen Chemie, D-60590

Frankfurt am Main, Germany; email: brandt@zbc.kgu.de

Sections:

Quick Links

- [RSS](#) (Series Update Alert)
- [PubMed Citation](#)
- Alert me when:
[New articles cite this article](#)
- [RSS](#) (Citation Alert)
- [Download to citation](#)

ABSTRACT

Section:

NADH:quinone oxidoreductase (complex I) pumps protons across the inner membrane of mitochondria or the plasma membrane of many bacteria. Human complex I is involved in numerous pathological conditions and degenerative processes. With 14 central and up to 3 accessory subunits, complex I is among the largest membrane-bound protein assemblies. The peripheral arm of the L-shaped molecule contains flavine mononucleotide and eight or nine iron-sulfur clusters as redox prosthetic groups. Seven of the iron-sulfur clusters form a linear electron transfer chain between flavine and quinone. In most organisms, the seven most hydrophobic subunits forming the core of the membrane arm are encoded by the mitochondrial genome. Most central subunits have evolved from subunits of different hydrogenases and bacterial Na^+/H^+ antiporters. This evolutionary origin is reflected in three functional modules of complex I. The coupling mechanism of complex I most likely involves semiquinone intermediates that drive proton pumping through redox-linked conformational changes.

INTRODUCTION

Section:

As one of the most fundamental metabolic principles, the vast majority of biochemical pathways involves "bound hydrogen" intermediates in the form of NADH, NADPH, or reduced flavoproteins. NADH generated in catabolic pathways is fed into energy converting electron transfer chains via NADH:quinone oxidoreductases. Three enzyme families catalyze this reaction. This review focuses on proton translocating NADH:quinone oxidoreductase: This type of enzyme, usually called complex I, was first described in mitochondria (1), but it is also found in many eubacteria where it is frequently termed NADH dehydrogenase-1 or NDH-1 (2, 3, 4). Moreover, complex I is involved in bacterial photosynthetic electron transport (5, 6). In some

Contents

INTRODUCTION.....	2
EARLY YEARS IN BALTIMORE ...	2
DNA POLYMERASE IN ST. LOUIS	4
FIRST INDEPENDENT	
RESEARCH—	
EXONUCLEASE I.....	8
THE MOVE WEST—STANFORD	9
NUCLEASES	9
BACK TO DNA POLYMERASE....	9
DNA LIGASE	10
BACK TO DNA POLYMERASE	
AGAIN.....	11
EUKARYOTIC DNA	
REPLICATION	12
REC A.....	13
HERPES VIRUS DNA	
REPLICATION	14
CURRENT WORK ON HSV-1	
LATENCY	15
ENVOI.....	15

Visualizar el artículo on-line o en PDF.

job, we were spared the worst of that dreadful period.

EARLY YEARS IN BALTIMORE

My early years were uneventful. I was a good, but not outstanding, student. During my last two years of high school, to help support the family, I worked part-time in a large meat market as a butcher's assistant. I became quite a skillful meat cutter and was promised a full-time job after high school graduation, a not inconsequential prospect because the United States was still mired in the Depression, and the possibility of college after high school graduation was very remote. All of this changed with the attack on Pearl Harbor by the Japanese on Sunday, December 7, 1941. I can still recall the radio announcer breaking in on the broadcast of the New York Philharmonic Symphony to report that Pearl Harbor had been attacked. The following day, the entire student body of my high school assembled to hear the radio broadcast of President Franklin D. Roosevelt's speech, "December 7, 1941 a date that will live in infamy." I remem-

Accesando las Figuras

Figure 1 Subcomplexes and subunits of bovine heart complex I. The assignment of subunits to the subcomplexes of complex I was made according to References 18 and 19, and for the central hydrophobic subunits, the figure includes suggestions from Reference 111. Flavoprotein (FP) is part of I λ (light yellow), and I α essentially is a combination of I λ and I γ (yellow). I β (blue gray) forms the major part of the membrane integral arm of complex I. Central subunits are in blue, accessory subunits found in all eukaryotic complexes are in red, and metazoa specific subunits are in purple. Subunits marked with an asterisk are predicted to contain a single transmembrane domain (19).

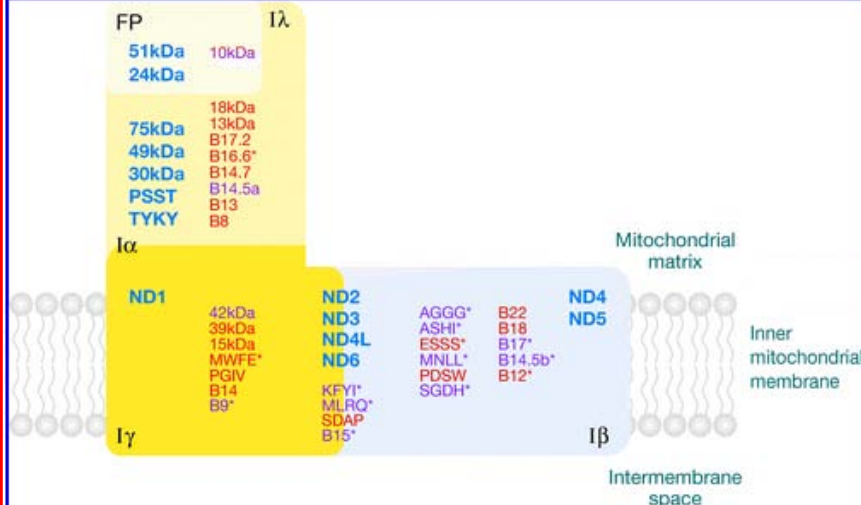
[Information about Downloading](#)



[View larger version \(36K\)](#)

Central Subunits

Sequence analysis immediately reveal subunits are highly total of 52–59 transmembrane domains consistently predicted redox prosthetic group mitochondria and the complex, which part containing the observed for complex I.



[Click to view](#)

Brandt U. 2006.
Annu. Rev. Biochem. 75:69–92

[View larger version \(208K\)](#)

[Download as a PowerPoint slide \(66K\)](#)

Las figuras pueden ser vistas en tamaño grande y también pueden ser guardadas para utilización en presentaciones.

Except for some plants, algae, and protists, the seven hydrophobic subunits are encoded by the mitochondrial genome in most eukaryotes (Table 1). However, in some cryptophytic algae such as *Rhodomonas salina* up to 12 subunits are encoded by mitochondria (33). In other organisms

Accesando Literatura Citada

LITERATURE CITED

Section: Choose

1. Hatefi Y, Haavik AG, Griffiths DE. 1962. *J. Biol. Chem.* 237:1676-80 [Medline] [ISI]
2. Matsubuchi K, Ohnishi T, Kaback HR. 1987. *Biochemistry* 26:7732-37 [CrossRef] [Medline] [ISI]
3. Yagi T, Yano T, DiBernardo S, Matsuno-Yagi A. 1998. *Biochim. Biophys. Acta* 1364:125-33 [CrossRef] [Medline] [ISI]
4. Friedrich T. 1998. *Biochim. Biophys. Acta* 1364:134-46 [CrossRef] [Medline] [ISI]
5. Baccarini Melandri A, Zannoni D, Melandri BA. 1973. *Biochim. Biophys. Acta* 314:298-311 [CrossRef] [Medline]
6. Dupuis A, Chevallet M, Darrouzet E, Duborjal H, Lunardi J, Issartel JP. 1998. *Biochim. Biophys. Acta* 1364:147-65 [CrossRef] [Medline] [ISI]
7. Hayashi M, Nakayama Y, Unemoto T. 2001. *Biochim. Biophys. Acta* 1505:37-44 [CrossRef] [Medline] [ISI]
8. Kerscher S. 2000. *Biochim. Biophys. Acta* 1459:274-83 [CrossRef] [Medline] [ISI]
9. Ohnishi T, Kawaguchi K, Hagihara B. 1966. *J. Biol. Chem.* 241:1797-806 [Medline] [ISI]
10. Schagger H, Pfeiffer K. 2000. *EMBO J.* 19:1777-83 [CrossRef] [Medline] [ISI]
11. Schagger H, de Coo R, Bauer MF, Hofmann S, Godinot C, Brandt U. 2004. *J. Biol. Chem.* 279:36349-53 [CrossRef] [Medline] [ISI]
12. Acin-Perez R, Bayona-Bafaluy MP, Fernandez-Silva P, Moreno-Loshuertos R, Perez-Martos A, et al. 2004. *Mol. Cell* 13:805-15 [CrossRef] [Medline] [ISI]
13. Smeitink J, van den Heuvel L, DiMauro S. 2001. *Nat. Rev. Genet.* 2:342-52 [CrossRef] [Medline] [ISI]
14. Smeitink JAM, van den Heuvel LWPJ, Koopman WJH, Nijtmans LGJ, Ugalde C, Willems PHGM. 2004. *Curr. Neurovasc. Res.* 1:29-40 [CrossRef]
15. Weidner U, Geier S, Ptock A, Friedrich T, Leif H, Weiss H. 1993. *J. Mol. Biol.* 233:109-22 [CrossRef] [Medline] [ISI]
16. Ohnishi T. 1998. *Biochim. Biophys. Acta* 1364:186-206 [CrossRef] [Medline] [ISI]
17. Hinchliffe P, Sazanov LA. 2005. *Science* 309:771-74 [CrossRef] [Medline] [ISI]
18. Carroll J, Fearley EM, Shannon RJ, Hirst J, Walker JE. 2003. *Mol. Cell. Proteomics* 2:117-26 [CrossRef] [Medline] [ISI]
19. Hirst J, Carroll J, Fearley EM, Shannon RJ, Walker JE. 2003. *Biochim. Biophys. Acta* 1604:135-50 [CrossRef] [Medline] [ISI]
20. Cardol P, Vanrobaeys F, Devreese B, Van Beeumen J, Matagne RF, Remacle C. 2004. *Biochim. Biophys. Acta* 1658:212-24 [CrossRef] [Medline] [ISI]
21. Heazlewood JL, Howell KA, Millar AH. 2003. *Biochim. Biophys. Acta* 1604:159-69 [CrossRef] [Medline] [ISI]
22. Abdrakhmanova A, Zickermann V, Bostina M, Radermacher M, Schagger H, et al. 2004. *Biochim. Biophys. Acta* 1658:149-56 [CrossRef] [Medline] [ISI]

La parte de "Literature Cited" en cada artículo es una importante fuente de consulta. Incluye links suplementarios a las publicaciones CrossRef, Medline® y ISI's Web of Science® de las referencias que fueron usadas para la revisión.

Accesando Literatura Citada

CrossRef - resultado de búsqueda.

LITERATURE CITED

Section: Choose

1. Hafei Y, Haavik AG, Griffiths DE. 1962. *J. Biol. Chem.* 237:1676-80 [Medline] [ISI]
2. Matsushita K, Ohnishi T, Kaback HR. 1987. *Biochemistry* 26:7732-37 [CrossRef] [Medline] [ISI]
3. Yagi T, Yano T, Di Bernardo S, Matsuno-Yagi A. 1998. *Biochim. Biophys. Acta* 1364:125-33 [CrossRef] [Medline] [ISI]
4. Friedrich T. 1998. *Biochim. Biophys. Acta* 1364:134-46 [CrossRef] [Medline] [ISI]
5. Baccarini Melandri A, Zannoni D, Melandri BA. 1973. *Biochim. Biophys. Acta* 314:298-311 [CrossRef] [Medline]
6. Dupuis A, Chevallet M, Darrouzet E, Duborjal H, Lunardi J, Issartel JP. 1998. *Biochim. Biophys. Acta* 1364:147-65 [CrossRef] [Medline] [ISI]
7. Hayashi M, Nakayama Y, Unemoto T. 2001. *Biochim. Biophys. Acta* 1509:1-10 [CrossRef] [Medline] [ISI]
8. Kerscher S. 2000. *Biochim. Biophys. Acta* 1459:274-82 [CrossRef] [Medline] [ISI]
9. Ohnishi T, Kawaguchi K, Hagihara B. 1966. *J. Biol. Chem.* 241:111-15 [Medline] [ISI]
10. Schagger H, Pfeiffer K. 2000. *EMBO J.* 19:1777-83 [CrossRef] [Medline] [ISI]
11. Schagger H, de Coo R, Bauer MF, Hofmann S, Godinot C. 2000. *Chem. 279*:36349-53 [CrossRef] [Medline] [ISI]
12. Acin-Perez R, Bayona-Bafaluy MP, Fernandez-Silva P, Morello J, Perez-Martos A, et al. 2004. *Mol. Cell* 13:805-15 [CrossRef] [Medline] [ISI]
13. Smeitink J, van den Heuvel L, DiMauro S. 2001. *Nat. Rev. Clin. Oncol.* 7:103-15 [CrossRef] [Medline] [ISI]
14. Smeitink JAM, van den Heuvel LWEJ, Koopman WJH, Nijtmann L, Willems PHGM. 2004. *Curr. Neurol. Res.* 1:29-40 [CrossRef] [Medline] [ISI]
15. Weidner U, Geier S, Ptock A, Friedrich T, Leif H, Weiss H. 2003. *Biochim. Biophys. Acta* 1604:109-22 [CrossRef] [Medline] [ISI]
16. Ohnishi T. 1998. *Biochim. Biophys. Acta* 1364:186-206 [CrossRef] [Medline] [ISI]
17. Hinchliffe P, Sazanov LA. 2005. *Science* 309:771-74 [CrossRef] [Medline] [ISI]
18. Carroll J, Fearnley JM, Shannon RJ, Hirst J, Walker JE. 2003. *Mol. Cell* 11:117-26 [CrossRef] [Medline] [ISI]
19. Hirst J, Carroll J, Fearnley JM, Shannon RJ, Walker JE. 2003. *Biochim. Biophys. Acta* 1604:135-50 [CrossRef] [Medline] [ISI]
20. Cardol P, Vanrobaeys F, Devreese B, Van Beeumen J, Matton D. 2004. *Biochim. Biophys. Acta* 1658:212-24 [CrossRef] [Medline] [ISI]
21. Heazlewood JL, Howell KA, Millar AH. 2003. *Biochim. Biophys. Acta* 1604:109-22 [CrossRef] [Medline] [ISI]
22. Abdrakhmanova A, Zickermann V, Bostina M, Radermacher M, Schagger H, et al. 2004. *Biochim. Biophys. Acta* 1658:148-56 [CrossRef] [Medline] [ISI]

http://www.mcponline.org - Analysis of the Subunit Composition of Complex I from Bovine Heart Mitochondria -- Carroll et al. 2 (2): 117 -- Molecular & Cellular Proteomics - Mozilla

Molecular & Cellular PROTEOMICS
Annual Review of Biochemistry
Relevant Research Online & in Print
ASBMB Members Order TODAY and SAVE!

HOME HELP FEEDBACK SUBSCRIPTIONS ARCHIVE SEARCH TABLE OF CONTENTS

QUICK SEARCH: [advanced]
Author: Keyword(s):
Go
Year: Vol: Page:

Originally published in Press as doi:10.1074/mcp.M300014-MCP200 on February 22, 2003.
Molecular & Cellular Proteomics 2:117-126, 2003.
© 2003 by The American Society for Biochemistry and Molecular Biology, Inc.

Research

Analysis of the Subunit Composition of Complex I from Bovine Heart Mitochondria^{*,S}

Joe Carroll, Ian M. Fearnley, Richard J. Shannon, Judy Hirst and John E. Walker[†]

From the Medical Research Council Dunn Human Nutrition Unit, The Wellcome Trust/MRC Building, Hills Road, Cambridge CB2 2XY, United Kingdom

Complex I purified from bovine heart mitochondria is a multisubunit membrane-bound assembly. In the past, seven of its subunits were shown to be products of the mitochondrial genome, and 35 nuclear encoded subunits were identified. The complex is L-shaped with one arm in the plane of the membrane and the other lying orthogonal to it in the mitochondrial matrix. With mildly chaotropic detergents, the intact complex has been resolved into various subcomplexes. Subcomplex I_α represents the extrinsic arm, subcomplex I_β consists of subcomplex I_α plus part of the membrane arm, and subcomplex I_γ is another substantial part of the membrane arm. The intact complex and these three subcomplexes have been subjected to extensive reanalysis. Their subunits have been separated by three independent methods (one-dimensional SDS-PAGE, two-dimensional isoelectric focusing/SDS-PAGE, and reverse phase high pressure liquid chromatography (HPLC)) and analyzed by tryptic peptide mass fingerprinting and tandem mass spectrometry. The masses of many of the intact subunits have also been measured by electrospray ionization mass spectrometry and have provided valuable information about post-translational modifications. The presence of the known 35 nuclear encoded subunits in complex I has been confirmed, and four additional nuclear encoded subunits have been detected. Subunits B16.6, B14.7, and ESSS were discovered in the SDS-PAGE analysis of subcomplex I_α, in the two-dimensional gel analysis of the intact complex, and in the HPLC analysis of subcomplex I_β, respectively. Despite many attempts, no sequence information has been obtained yet on a fourth new subunit (mass 10,566 ± 2 Da) also detected in the HPLC analysis of subcomplex I_β. It is unlikely that any more subunits of the bovine complex remain undiscovered. Therefore, the intact enzyme is a complex of 46 subunits, and, assuming there is one copy of each subunit in the complex, its mass is 980 kDa.

[†]To whom correspondence should be addressed: Medical Research Council Dunn Human Nutrition Unit, The Wellcome Trust/MRC Bldg., Hills Rd., Cambridge CB2 2XY, UK. Tel.: 44-1223-252701; Fax: 44-1223-252705; E-mail: walker@mrc-dunn.cam.ac.uk

This article has been cited by other articles: ([Search Google Scholar for Other Citing Articles](#))

Accesando Literatura Citada

LITERATURE CITED

Section: Choose

1. Hatefi Y, Haavik AG, Griffiths DE. 1962. *J. Biol. Chem.* 237:1676-80 [Medline] [ISI]
2. Matsushita K, Ohnishi T, Kaback HR. 1987. *Biochemistry* 26:7732-37 [CrossRef] [Medline] [ISI]
3. Yagi T, Yano T, Di Bernardo S, Matsuno-Yagi A. 1998. *Biochim. Biophys. Acta* 1364:125-33 [CrossRef] [Medline] [ISI]
4. Friedrich T. 1998. *Biochim. Biophys. Acta* 1364:134-46 [CrossRef] [Medline] [ISI]
5. Baccarini Melandri A, Zannoni D, Melandri BA. 1973. *Biochim. Biophys. Acta* 314:298-311 [CrossRef] [Medline]
6. Dupuis A, Chevallet M, Darrouzet E, Duborjal H, Lunardi J, Issartel JP. 1998. *Biochim. Biophys. Acta* 1364:147-65 [CrossRef] [Medline] [ISI]
7. Hayashi M, Nakayama Y, Unemoto T. 2001. *Biochim. Biophys. Acta* [CrossRef] [Medline] [ISI]
8. Kerscher S. 2000. *Biochim. Biophys. Acta* 1459:274-83 [CrossRef] [Medline]
9. Ohnishi T, Kawaguchi K, Hagihara B. 1966. *J. Biol. Chem.* 241:1797-8 [Medline] [ISI]
10. Schagger H, Pfeiffer K. 2000. *EMBO J.* 19:1777-83 [CrossRef] [Medline]
11. Schagger H, de Coor R, Bauer MF, Hofmann S, Godinot C, Brandt U. 1999. *Chem.* 279:36349-53 [CrossRef] [Medline] [ISI]
12. Acin-Perez R, Bayona-Bafaluy MP, Fernandez-Silva F, Moreno-Loshuete A, Perez-Martos A, et al. 2004. *Mol. Cell* 13:805-15 [CrossRef] [Medline]
13. Smeitink J, van den Heuvel L, DiMauro S. 2001. *Nat. Rev. Genet.* 2:34 [CrossRef] [Medline] [ISI]
14. Smeitink JAM, van den Heuvel LWPJ, Koopman WJH, Nijtmans LGJ, Willems PHGM. 2004. *Curr. Neurovasc. Res.* 1:29-40 [CrossRef]
15. Weidner U, Geier S, Ptoek A, Friedrich T, Leif H, Weiss H. 1993. *J. Biol. Chem.* 268:233:109-22 [CrossRef] [Medline] [ISI]
16. Ohnishi T. 1998. *Biochim. Biophys. Acta* 1364:186-206 [CrossRef] [Medline]
17. Hinchliffe P, Sazanov LA. 2005. *Science* 309:771-74 [CrossRef] [Medline]
18. Carroll J, Fearnley JM, Shannon RJ, Hirst J, Walker JE. 2003. *Mol. Cell* 2:117-26 [CrossRef] [Medline] [ISI]
19. Hirst J, Carroll J, Fearnley JM, Shannon RJ, Walker JE. 2003. *Biochim. Biophys. Acta* 1604:135-50 [CrossRef] [Medline] [ISI]
20. Cardol P, Vanrobaeys F, Devreese B, Van Beeumen J, Matagne RF. 2004. *Biochim. Biophys. Acta* 1658:212-24 [CrossRef] [Medline] [ISI]
21. Heazlewood JL, Howell KA, Millar AH. 2003. *Biochim. Biophys. Acta* 1606:1-10 [CrossRef] [Medline] [ISI]
22. Abdrakhmanova A, Zickermann V, Bostina M, Radermacher M, Schagger H, et al. 2004. *Biochim. Biophys. Acta* 1658:148-56 [CrossRef] [Medline] [ISI]

Medline® - resultado de búsqueda.

http://www.ncbi.nlm.nih.gov/Entrez/ PubMed Mozilla Firefox

NCBI PubMed

A service of the National Library of Medicine and the National Institutes of Health

Search: PubMed for [Go] [Clear]

Limits Preview Index History Clipboard Details

Display: Abstract Show: 20 Sort by: Send to:

All: 1 Review: 0

1: Mol Cell Proteomics. 2003 Feb;2(2):117-26. Epub 2003 Feb 22.

Full Text FREE

Analysis of the subunit composition of complex I from bovine heart mitochondria.

Carroll J, Fearnley JM, Shannon RJ, Hirst J, Walker JE

Medical Research Council Dunn Human Nutrition Unit, The Wellcome Trust/MRC Building, Hile Road, Cambridge CB2 2XY, United Kingdom.

Complex I purified from bovine heart mitochondria is a multisubunit membrane-bound assembly. In the past, seven of its subunits were shown to be products of the mitochondrial genome. The complex is L-shaped with one arm in the plane of the membrane and the other lying orthogonal to it in the mitochondrial matrix. With mild detergents, the intact complex has been resolved into various subcomplexes. Subcomplex lambda represents the extrinsic arm, subcomplex alpha consists of subcomplex lambda plus the membrane arm, and subcomplex beta is another substantial part of the membrane arm. The intact complex and these three subcomplexes have been subjected to extensive reanalysis and have provided valuable information about post-translational modifications. The presence of the known 35 nuclear encoded subunits in complex I has been confirmed, and four additional encoded subunits have been detected. Subunits B16.6, B14.7, and ESSS were discovered in the SDS-PAGE analysis of subcomplex lambda, in the two-dimensional gel analysis of and in the HPLC analysis of subcomplex beta, respectively. Despite many attempts, no sequence information has been obtained yet on a fourth new subunit (mass 10,566 +/- 2 Da) in the HPLC analysis of subcomplex beta. It is unlikely that any more subunits of the bovine complex remain undiscovered. Therefore, the intact enzyme is a complex of 46 subunits, and, as one copy of each subunit in the complex, its mass is 980 kDa.

PMID: 12644575 [PubMed - indexed for MEDLINE]

Display: Abstract Show: 20 Sort by: Send to:

Write to the Help Desk

NCBI | NLM | NIH

Department of Health & Human Services

Privacy Statement | Freedom of Information Act | Disclaimer

Accesando Literatura Citada

LITERATURE CITED

Section: Choose

1. Hatefi Y, Haavik AG, Griffiths DE. 1962. *J. Biol. Chem.* 237:1676-80 [Medline] [ISI]
2. Matsushita K, Ohnishi T, Kaback HR. 1987. *Biochemistry* 26:7732-37 [CrossRef] [Medline] [ISI]
3. Yagi T, Yano T, Di Bernardo S, Matsuno-Yagi A. 1998. *Biochim. Biophys. Acta* 1364:125-33 [CrossRef] [Medline] [ISI]
4. Friedrich T. 1998. *Biochim. Biophys. Acta* 1364:134-46 [CrossRef] [Medline] [ISI]
5. Baccarini Melandri A, Zannoni D, Melandri BA. 1973. *Biochim. Biophys. Acta* 314:298-311 [CrossRef] [Medline]
6. Dupuis A, Chevallet M, Darrouzet E, Duborjal H, Lunardi J, Issartel J. *Biochim. Biophys. Acta* 1364:147-65 [CrossRef] [Medline] [ISI]
7. Hayashi M, Nakayama Y, Unemoto T. 2001. *Biochim. Biophys. Acta* [CrossRef] [Medline] [ISI]
8. Kersch S. 2000. *Biochim. Biophys. Acta* 1459:274-83 [CrossRef] [ISI]
9. Ohnishi T, Kawaguchi K, Hagihara B. 1966. *J. Biol. Chem.* 241:1797- [Medline] [ISI]
10. Schägger H, Pfeiffer K. 2000. *EMBO J.* 19:1777-83 [CrossRef] [Medline]
11. Schägger H, de Coo R, Bauer MF, Hofmann S, Godnot C, Brandt U. *Chem.* 279:36349-53 [CrossRef] [Medline] [ISI]
12. Acin-Perez R, Bayona-Bafaluy MP, Fernandez-Silva P, Moreno-Loshu Perez-Martos A, et al. 2004. *Mol. Cell* 13:805-15 [CrossRef] [Medline]
13. Smeitink J, van den Heuvel L, DiMauro S. 2001. *Nat. Rev. Genet.* 2:3- [CrossRef] [Medline] [ISI]
14. Smeitink JAM, van den Heuvel LWJP, Koopman WJH, Nijtmans LGJ, Willems PHGM. 2004. *Curr. Neurovasc. Res.* 1:29-40 [CrossRef]
15. Weidner U, Geier S, Ptock A, Friedrich T, Leif H, Weiss H. 1993. *J.* 233:109-22 [CrossRef] [Medline] [ISI]
16. Ohnishi T. 1998. *Biochim. Biophys. Acta* 1364:186-206 [CrossRef] [Medline]
17. Hinchliffe P, Sazanov LA. 2005. *Science* 309:771-74 [CrossRef] [Medline]
18. Carroll J, Fearnley IM, Shannon RJ, Hirst J, Walker JE. 2003. *Mol. C.* 2:117-26 [CrossRef] [Medline] [ISI]
19. Hirst J, Carroll J, Fearnley IM, Shannon RJ, Walker JE. 2003. *Biochim. Biophys. Acta* 1604:135-50 [CrossRef] [Medline] [ISI]
20. Cardol P, Vanrobaeys F, Devreese B, Van Beeumen J, Matagne RF, Remacle C. 2004. *Biochim. Biophys. Acta* 1658:212-24 [CrossRef] [Medline] [ISI]
21. Heazlewood JL, Howell KA, Millar AH. 2003. *Biochim. Biophys. Acta* 1604:159-69 [CrossRef] [Medline] [ISI]
22. Abdrakhmanova A, Zickermann V, Bostina M, Rademacher M, Schägger H, et al. 2004. *Biochim. Biophys. Acta* 1668:148-56 [CrossRef] [Medline] [ISI]

ISI® - resultado de búsqueda.

http://apps.isiknowledge.com - Full Record -- Content Enhancement Links 4.3 - Mozilla Firefox

Web of Science®

Full Record

Record 1 of 1

Title: Analysis of the subunit composition of complex I from bovine heart mitochondria

Author(s): Carroll J, Fearnley IM, Shannon RJ, Hirst J, Walker JE

Source: MOLECULAR & CELLULAR PROTEOMICS 2 (2): 117-126 FEB 2003

Document Type: Article

Language: English

Cited References: 55

Abstract: Complex I purified from bovine heart mitochondria is a multisubunit membrane-bound assembly. In the past, seven of its subunits were shown to be products of the mitochondrial genome, and 35 nuclear encoded subunits were identified. The complex is L-shaped with one arm in the plane of the membrane and the other lying orthogonal to it in the mitochondrial matrix. With mildly chaotropic detergents, the intact complex has been resolved into various subcomplexes. Subcomplex Ilambda represents the extrinsic arm, subcomplex Ialpha consists of subcomplex Ilambda plus part of the membrane arm, and subcomplex Ibeta is another substantial part of the membrane arm. The intact complex and these three subcomplexes have been subjected to extensive reanalysis. Their subunits have been separated by three independent methods (one-dimensional SDS-PAGE, two-dimensional isoelectric focusing/SDS-PAGE, and reverse phase high pressure liquid chromatography (HPLC)) and analyzed by tryptic peptide mass fingerprinting and tandem mass spectrometry. The masses of many of the intact subunits have also been measured by electrospray ionization mass spectrometry and have provided valuable information about post-translational modifications. The presence of the known 35 nuclear encoded subunits in complex I has been confirmed, and four additional nuclear encoded subunits have been detected. Subunits B16.6, B14.7, and ESSS were discovered in the SDS-PAGE analysis of subcomplex Ilambda, in the two-dimensional gel analysis of the intact complex, and in the HPLC analysis of subcomplex I, respectively. Despite many attempts, no sequence information has been obtained yet on a fourth new subunit (mass 10,566 +/- 2 Da) also detected in the HPLC analysis of subcomplex Ibeta. It is unlikely that any more subunits of the bovine complex remain undiscovered. Therefore, the intact enzyme is a complex of 46 subunits, and, assuming there is one copy of each subunit in the complex, its mass is 980 kDa.

Addresses: Walker JE (reprint author), MRC, Dunn Human Nutr Unit, Hills Rd, Wellcome Trust MRC Bldg, Cambridge, CB2 2XY England
MRC, Dunn Human Nutr Unit, Cambridge, CB2 2XY England

Publisher: AMER SOC BIOCHEMISTRY MOLECULAR BIOLOGY INC, 9650 ROCKVILLE PIKE, BETHESDA, MD 20814-3996 USA

Subject Category: BIOCHEMICAL RESEARCH METHODS

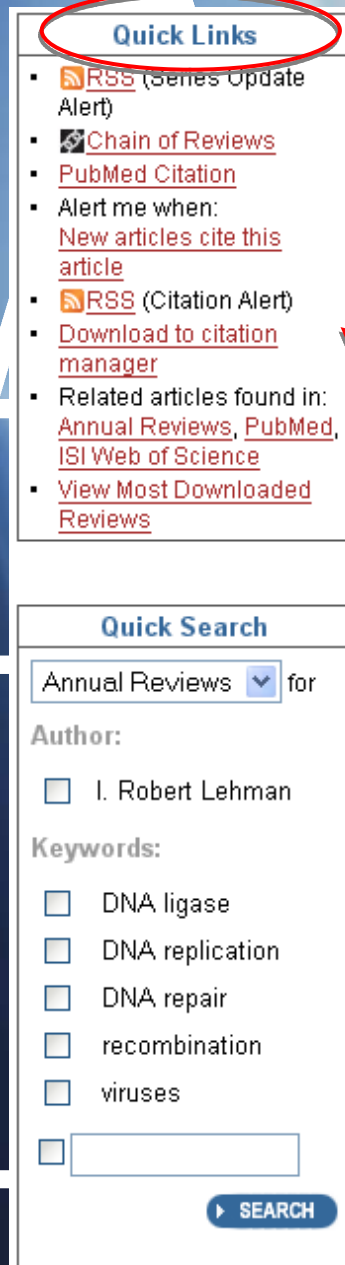
IDS Number: 665NV

ISSN: 1535-9476

Record 1 of 1

Acceptable Use Policy
Copyright © 2006 The Thomson Corporation

Accesando los Links en el Artículo



Quick Links

- [RSS](#) (Series Update Alert)
- [Chain of Reviews](#)
- [PubMed Citation](#)
- Alert me when:
[New articles cite this article](#)
- [RSS](#) (Citation Alert)
- [Download to citation manager](#)
- Related articles found in:
[Annual Reviews](#), [PubMed](#), [ISI Web of Science](#)
- [View Most Downloaded Reviews](#)

Quick Search

Annual Reviews for

Author:

☐ I. Robert Lehman

Keywords:

☐ DNA ligase

☐ DNA replication

☐ DNA repair

☐ recombination

☐ viruses

☐

- RSS - alertas cuando se ha agregado nuevo contenido
- En “Chain of Reviews” – visualizar una lista de artículos citados
- Busca artículos on-line que citan el artículo de Annual Review seleccionado en ISI’s Web of Science® / Buscar artículos relacionados en la Annual Reviews, ISI’s Web of Science® y Medline®
- Link para bibliografías de artículos citados en CrossRef, ISI® y Medline®
- Link para artículos que citan el artículo seleccionado y recibe alertas cuando nuevos artículos citaren el artículo
- Visualiza los artículos mas consultados

Accesando “Quick Search” en el Artículo

Quick Links

-  [RSS \(Series Update Alert\)](#)
-  [Chain of Reviews](#)
- [PubMed Citation](#)
- Alert me when:
[New articles cite this article](#)
-  [RSS \(Citation Alert\)](#)
- [Download to citation manager](#)
- Related articles found in:
[Annual Reviews](#), [PubMed](#), [ISI Web of Science](#)
- [View Most Downloaded Reviews](#)

Quick Search

Annual Reviews  for

Author:

☐ I. Robert Lehman

Keywords:

☐ DNA ligase

☐ DNA replication

☐ DNA repair

☐ recombination

☐ viruses

☐

 **SEARCH**

- Refina su búsqueda por nuevas palabras-clave.
- Utiliza los campos del menu para direccionar su búsqueda. Las opciones incluyen Annual Reviews, PubMed y CrossRef.

“Quick Links” en la Homepage de la Série

- Regístrate para recibir alertas por e-mail, tablas de los últimos contenidos, y alertas de actualizaciones de las séries
- Link para enviar e-mail a un amigo

Home Order Browse Search Profile

Access: ✓ = from Vol. 1; ✓ = to current or back volumes; No Icon = to abstracts only

Table of Contents

Annual Review of Biochemistry

Volume 75, 2006



Purchase:

[Purchase Volume 75, 2006](#)

[View Pricing](#)

Other Years:

[Previous](#) | [All](#) | [Next](#)

Sign up for
email alerts

[Add to Favorites](#) | [Track Citation](#) | [Email link to a friend](#) | [View Abstracts](#)

[Download to Citation Manager](#)

☐ To select/unselect all items click here

☐ **WANDERINGS OF A DNA ENZYMOLOGIST: From DNA Polymerase to Viral Latency**

[I. Robert Lehman](#)

Annual Review of Biochemistry, Vol. 75: 1-17 (Volume publication date July 2006)

[Abstract](#) | [Full Text](#) | [PDF \(191 KB\)](#)

- ☒ This volume
- ☐ This series
- ☐ All series

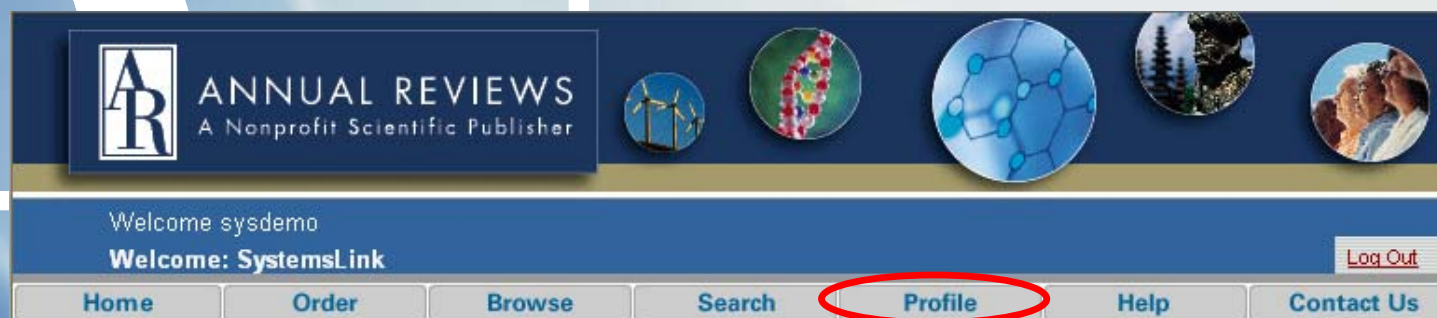
[SEARCH](#)

[Advanced Search](#)

- [RSS \(Series Update Alert\)](#)
- [Editorial Committee](#)
- [Other Reviews of Interest](#)

Creando una Cuenta Personal

En la página principal de Annual Review, clicas en Profile.



En la página del Profile, clicas en la opción Register Now y incluye sus informaciones.

The page you requested requires you to log in first. Please enter your username and password in the form below.

Log in (Registered Users):

Username:

Password:

☐ Remember Me

Not Yet Registered?

Benefits of Registration Include:

- A Unique User Profile that will allow you to manage your current subscriptions (including online access)
- The ability to create favorites lists down to the article level
- The ability to customize email alerts to receive specific notifications about the topics you care most about and special offers from Annual Reviews

[Register Now](#)

[\[Forgotten your password?\]](#)



Creando una Cuenta Personal

Los usuarios que se registran tendrán la posibilidad de:

- Recibir alertas de los temas o series de su interés
- Crear lista de “favoritos”
- Salvar búsquedas completas

Una vez que el formulario esté completo, utiliza el menú para definir sus preferencias

Journals | Articles | Recommended Articles | **Alerts** | Access | Account info

Sign Up for Email Alerts

The Annual Reviews Email Alert service notifies registered users via email when new content is made available on our site. Sign up to receive:

- Alerts when new content is made available on the Annual Reviews site.
- Citation alerts for the chapters of your choice.
- Special Announcements from Annual Reviews.

Your email alerts will be sent to **edison.penachin@systemsint.info**. To change your email address, visit the [account info](#) tab.

En una Cuenta Personal

En el botón **Alerts** elige las series de las cuales te interesa recibir informaciones y cliquea en **submit**.

Your Table of Contents Email Alerts

Annual Reviews will notify you when new content is available in the following publications.

Biomedical Sciences

- ☐ Biochemistry
- ☐ Biomedical Engineering
- ☒ Biophysics and Biomolecular Structure
- ☐ Cell and Developmental Biology
- ☐ Clinical Psychology
- ☒ Ecology, Evolution, and Systematics
- ☐ Entomology
- ☒ Genetics
- ☒ Genomics and Human Genetics
- ☐ Immunology
- ☐ Medicine
- ☐ Microbiology
- ☒ Neuroscience
- ☐ Nutrition
- ☐ Pathology: Mechanisms of Disease
- ☐ Pharmacology and Toxicology
- ☐ Physiology
- ☐ Phytopathology
- ☐ Plant Biology
- ☐ Psychology
- ☐ Public Health

Physical Sciences

- ☐ Astronomy and Astrophysics
- ☐ Biomedical Engineering
- ☒ Biophysics and Biomolecular Structure
- ☐ Computer Science
- ☐ Earth and Planetary Sciences
- ☒ Environment and Resources
- ☐ Fluid Mechanics
- ☐ Materials Research
- ☐ Nuclear and Particle Science
- ☐ Physical Chemistry

Social Sciences

- ☐ Anthropology
- ☐ Clinical Psychology
- ☒ Environment and Resources
- ☐ Law and Social Science
- ☐ Political Science
- ☐ Psychology
- ☐ Public Health
- ☐ Sociology

Así tu puedes realizar búsquedas y salvarlas en sus favoritos, definir sus alertas por tema y por frecuencia.

Salvar las búsquedas

1. Haz una búsqueda de un término
2. En la página de resultados, localiza el botón “Save search”
3. Elige el nombre para la búsqueda y la frecuencia de alertas

☐ 2. **Blood Cells and Blood Cell Development in the Animal Kingdom**

[Volker Hartenstein](#)

[Annual Review of Cell and Developmental Biology](#). Volume 22, Page 677-712, Nov 2006

Recent findings strongly suggest that the molecular pathways involved in the development and function of blood cells are highly conserved among vertebrates and various invertebrate phyla. This has led to a renewed interest regarding homologies between bloo...

[Abstract](#) | [Full Text](#) | [PDF \(1658 KB\)](#) | [Add to Favorites](#) | [Related](#)

☐ 3. **MATHEMATICAL MODELING OF TUMOR-INDUCED ANGIOGENESIS**

[M.A.J. Chaplain](#), [S.R. McDougall](#), [A.R.A. Anderson](#)

[Annual Review of Biomedical Engineering](#). Volume 8, Page 233-257, Aug 2006

► **SEARCH**

Save Search

Saved search name:

Blood cells

You can receive an e-mail alert when new articles match this search.

Alert me: Weekly ▼

 [RSS](#) (Keyword Alert)

► **SAVE**

Citaciones

Para ver cuantas veces un artículo fué citado en Annual Reviews

1. Elige alguna serie de Annual Reviews (por ejemplo Phytopatology)
2. En la nueva página, elige la opción “View Most Cited Reviews”

Es actualizado a cada 24 horas de acuerdo con los datos del ISI.

✓ View Forthcoming Content / Reviews in Advance

☐ ✓ 2000s

✓ September 2006 (Vol. 44) **Current Volume**

✓ September 2005 (Vol. 43)

✓ September 2004 (Vol. 42)

✓ September 2003 (Vol. 41)

✓ September 2002 (Vol. 40)

✓ September 2001 (Vol. 39)

✓ September 2000 (Vol. 38)

☐ ✓ 1990s

☐ ✓ 1980s

☐ ✓ 1970s

☐ ✓ 1960s

Quick Links

Quick Search:

Enter Keywords

☒ This series

☐ All series

► **SEARCH**

[Advanced Search](#)

- [RSS](#) (Series Update Alert)
- [Current Editorial Committee](#)
- [Add to Favorites](#)
- [Email link to a friend](#)
- [View Most Downloaded Reviews](#)
- [View Most Cited Reviews](#)

Alertas

Para recibir alertas de los títulos relacionados

1. Accesa al índice de las series, elige un artículo y cliquea en “Track citations”.

Table of Contents

Annual Review of Plant Biology

Volume 57, 2006



Purchase:

[Purchase Volume 57, 2006](#)

[View Pricing](#)

Other Years:

[Previous](#) | [All](#) | [Next](#)

Sign up for
email alerts

[Add to Favorites](#) | [Track Citations](#) | [Email link to a friend](#) | [View Abstracts](#) |
[Download to Citation Manager](#)

☐ To select/unselect all items click here

☒ **LOOKING AT LIFE: From Binoculars to the Electron Microscope**

✓ [Sarah P. Gibbs](#)

Annual Review of Plant Biology, Vol. 57: 1-17 (Volume publication date June 2006)

[Citation](#) | [Full Text](#) | [PDF \(209 KB\)](#)

Contents

Quick Links

Quick Search:

Enter Keywords

- ☒ This volume
- ☐ This series
- ☐ All series

[SEARCH](#)

[Advanced Search](#)

- [RSS](#) (Series Update Alert)
- [Editorial Committee](#)
- [Other Reviews of Interest](#)

Artículos con más frecuencia de downloads

Elige una serie de Annual Reviews. Cliquea en “View most Downloaded Reviews”

Esta información es actualizada cada 24 horas de acuerdo con los downloads del artículo.



Current Volume:

[View Volume 31 \(2006\)](#)

Purchase:

[Purchase Volume 31 \(2006\)](#)

[View Pricing 31 \(2006\)](#)

Former titles of this AR series:

Annual Review of Energy and the Environment ([1991](#)--2002) (ISSN 1056-3466)

Annual Review of Energy ([1976](#)--1990) (ISSN 0362-1626)

✓ [View Forthcoming Content / Reviews in Advance](#)

2000s

- ✓ November 2006 (Vol. 31) **Current Volume**
- ✓ November 2005 (Vol. 30)
- ✓ November 2004 (Vol. 29)
- ✓ November 2003 (Vol. 28)
- ✓ November 2002 (Vol. 27)
- ✓ November 2001 (Vol. 26)
- ✓ November 2000 (Vol. 25)

1990s

1980s

1970s

Quick Links

Quick Search:

Enter Keywords

- ☒ This series
- ☐ All series

[SEARCH](#)

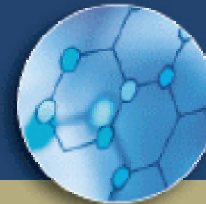
[Advanced Search](#)

- [RSS](#) (Series Update Alert)
- [Current Editorial Committee](#)
- [Add to Favorites](#)
- [Email link to a friend](#)
- [View Environment and Resources Errata](#)
- [View Most Downloaded Reviews](#)
- [View Most Cited Reviews](#)

Búsquedas



ANNUAL REVIEWS
A Nonprofit Scientific Publisher



Hello. [Sign in](#) to get personalized recommendations. New user? [Register now](#).

Welcome: Annual Reviews

[Home](#)

[Order](#)

[Browse](#)

[Search](#)

[Profile](#)

[Help](#)

[Contact Us](#)

AR Journals Home Page

- [Pricing](#)
- [Online Activation Instructions](#)
- [Shopping Cart](#)
- [Individual Subscribers](#)
- [Institutional Subscribers](#)
- [Site License Information](#)
- [Email Announcements](#)
- [Course Reader Instructions](#)
- [Help](#)

[Sign up for
email alerts](#)

Welcome to Annual Reviews

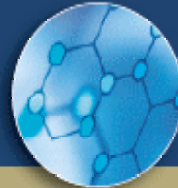
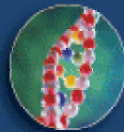
- **Activate Access**
Activate your online access via your Annual Reviews subscription or access token.
- **Order**
Purchase Annual Reviews publications online.
- **Browse**
View and link directly to all Annual Reviews content.
- **Search**
Search all Annual Reviews content.
- **Profile**
Register to customize your online experience.
- **Library Administration Tool**
Access usage statistics and manage your Annual Reviews account.
- **Help**
Obtain assistance in navigating this site.
- **Contact Us**
Have a question? Visit our contact page for more information.

Empieza su
búsqueda en la
Home Page de AR.
Cliquea en
“Search” para
accesar una base
de búsqueda.

Búsquedas



ANNUAL REVIEWS
A Nonprofit Scientific Publisher



Hello. [Sign in](#) to get personalized recommendations. New user? [Register now](#).

Welcome: Annual Reviews

[Home](#)

[Order](#)

[Browse](#)

[Search](#)

[Profile](#)

[Help](#)

[Contact Us](#)

Advanced Search

[Search Tips](#) | [Previous and Saved Searches](#)

Find reviews with	all of the words	
	the exact phrase	
	at least one of the words	
	none of the words	
Location	Search for my words	anywhere in the review
Author	Return reviews written by	
Publication	Return reviews published in	Tip: You can select more than one item Any Series Biomedical Sciences Analytical Chemistry (2008) Biochemistry Biomedical Engineering
Date	Return reviews published between	1930 and 2007

En **Search** tienes la posibilidad de hacer la búsqueda utilizando los campos:

- Full text
- Abstract
- Article title
- Author
- Keywords
- Volume year
- Specific date range

Búsquedas

**ANNUAL REVIEWS**
A Nonprofit Scientific Publisher

Welcome sysdemo
Welcome: SystemsLink

HomeOrderBrowseSearchProfile

Search Results

[Search Tips](#) | [Previous and Saved Searches](#)

Access: ✓ = from Vol. 1; ✓ = to current or back volumes; No icon = to abstracts only

Results 1-4 of 4 for **biodiesel** [[save search](#) | [RSS search alert](#)]. Order by: [Relevancy](#) [Date](#)

✓ **The Production of Unusual Fatty Acids in Transgenic Plants**
Johnathan A. Napier
The ability to genetically engineer plants has facilitated the generation of oilseeds synthesizing non-native fatty acids. Two particular classes of fatty acids are considered in this review. First, so-called industrial fatty acids, which usually contain f...
Annual Review of Plant Biology. Volume 58, Page 295-319, Jun 2007

✓ **Hydrogenases and Hydrogen Photoproduction in Oxygenic Photosynthetic Organisms***
Maria L. Ghirardi, Matthew C. Posewitz, Pin-Ching Maness, Alexandra Dubini, Jianping Yu, Michael Seibert
The photobiological production of H₂ gas, using water as the only electron donor, is a property of two types of photosynthetic microorganisms: green algae and cyanobacteria. In these organisms, photosynthetic water splitting is functionally linked to H₂ pr...

Restrict results to reviews published in:

[Annual Review of Plant Biology](#) (2)

[Annual Review of Environment and Resources](#) (2)

Restrict results to reviews written by:

[Dubini, Alexandra](#) (1)

- Se puede definir el intervalo de años donde se desea recuperar la información, y ordenar por fecha o por la pertenencia del artículo.
- Después de la búsqueda, podemos restringir por série o por autor con sólo un click

Ejemplo de Búsqueda - Biodiesel

Abstract

Annual Review of Plant Biology

Vol. 58: 71-91 (Volume publication date June 2007)

(doi:10.1146/annurev.arplant.58.032806.103848)

First published online as a Review in Advance on December 6, 2006

Hydrogenases and Hydrogen Photoproduction in Oxygenic Photosynthetic Organisms*

Maria L. Ghirardi,¹ Matthew C. Posewitz,² Pin-Ching Maness,¹ Alexandra Dubini,¹
Jianping Yu,¹ and Michael Seibert¹

¹National Renewable Energy Laboratory, Golden, Colorado 80401; email:
maria_ghirardi@nrel.gov, pinching_maness@nrel.gov, alexandra_dubini@nrel.gov,
jianping_yu@nrel.gov, mike_seibert@nrel.gov

²Colorado School of Mines, Environmental Science and Engineering Division, Golden, Colorado
80401; email: matthew_posewitz@nrel.gov

The photobiological production of H₂ gas, using water as the only electron donor, is a property of two types of photosynthetic microorganisms: green algae and cyanobacteria. In these organisms, photosynthetic water splitting is functionally linked to H₂ production by the activity of hydrogenase enzymes. Interestingly, each of these organisms contains only one of two major types of hydrogenases, [FeFe] or [NiFe] enzymes, which are phylogenetically distinct but perform the same catalytic reaction, suggesting convergent evolution. This idea is supported by the observation that each of the two classes of hydrogenases has a different metallo-cluster, is encoded by entirely different sets of genes (apparently under the control of different promoter elements), and exhibits different maturation pathways. The genetics, biosynthesis, structure, function, and O₂ sensitivity of these enzymes have been the focus of extensive research in recent years. Some of this effort is clearly driven by the potential for using these enzymes in future biological or biohybrid systems to produce renewable fuel or in fuel cell applications.

[Full Text](#) [PDF](#)

[Series Home](#) [Table of Contents](#)

Abstract

[Prev. Article](#) | [Next Article](#)

[View/Print PDF](#) (405 KB)

[Add to Favorites](#)

[Email link to a friend](#)

Quick Links

- [RSS](#) (Series Update Alert)
- [PubMed Citation](#)
- Alert me when:
[New articles cite this article](#)
- [RSS](#) (Citation Alert)
- [Download to citation manager](#)
- Related articles found in:
[Annual Reviews](#), [PubMed](#)
- [View Most Downloaded Reviews](#)

Quick Search

Annual Reviews for

Authors:

- ☐ Maria L. Ghirardi
- ☐ Matthew C. Posewitz
- ☐ Pin-Ching Maness
- ☐ Alexandra Dubini
- ☐ Jianping Yu
- ☐ Michael Seibert

Ejemplo de Búsqueda - Leptina

body weight and leptin

AR Search

Results 1-20 of 107 for body weight and leptin [[save search](#) | [RSS search alert](#)]. Order by: Relevancy [Date](#)

✓ LEPTIN

Rexford S. Ahima, Jeffrey S. Flier

The discovery of the adipose-derived hormone leptin has generated enormous interest in the interaction between peripheral signals and brain targets involved in the regulation of feeding and energy balance. Plasma leptin levels correlate with fat stores an...

Annual Review of Physiology. Volume 62, Page 413-437, Mar 2000

✓ EFFECTS OF NEUROPEPTIDES AND LEPTIN ON NUTRIENT PARTITIONING:

Dysregulations in Obesity

Bernard Jeanrenaud, Françoise Rohner-Jeanrenaud

Body weight homeostasis is maintained via a series of complex interactions that occur between the brain (particularly the hypothalamus) and the periphery, notably via the hormone leptin, which is synthesized in and secreted from adipose tissue. Under norm...

Annual Review of Medicine. Volume 52, Page 339-351, Feb 2001

✓ COMMON ENDOCRINE CONTROL OF BODY WEIGHT, REPRODUCTION, AND BONE MASS

Shu Takeda, Florent Elefteriou, Gerard Karsenty

Bone mass is maintained constant between puberty and menopause by the balance between osteoblast and osteoclast activity. The existence of a hormonal control of osteoblast activity has been speculated for years by analogy to osteoclast biology. Through th...

Annual Review of Nutrition. Volume 23, Page 403-411, Jul 2003

✓ FOOD INTAKE AND THE REGULATION OF BODY WEIGHT

Stephen C. Woods, Michael W. Schwartz, Denis G. Baskin, Randy J. Seeley

This chapter reviews the recent literature on hormonal and neural signals critical to the regulation of individual meals and body fat. Rather than eating in response to acute energy deficits, animals eat when environmental conditions (social and learned f...

Annual Review of Psychology. Volume 51, Page 255-277, Feb 2000

Restrict results to reviews
published in:

[Annual Review of Nutrition](#) (42)

[Annual Review of Medicine](#) (13)

[Annual Review of Pharmacology
and Toxicology](#) (9)

[Annual Review of Physiology](#) (9)

[Annual Review of Cell and
Developmental Biology](#) (8)

[Annual Review of Immunology](#) (5)

[Annual Review of Genetics](#) (4)

[Annual Review of Neuroscience](#)
(4)

[Annual Review of Biochemistry](#)
(3)

[Annual Review of Entomology](#) (2)

Restrict results to reviews
written by:

Resultado de Búsqueda - Leptina

Abstract

Annual Review of Psychology

Vol. 51: 255-277 (Volume publication date February 2000)
(doi:10.1146/annurev.psych.51.1.255)

FOOD INTAKE AND THE REGULATION OF **BODY WEIGHT**

Stephen C. Woods¹ Michael W. Schwartz² Denis G. Baskin² and Randy J. Seeley¹

¹Department of Psychiatry, University of Cincinnati Medical Center, Cincinnati, Ohio, 45267,
email: steve.woods@psychiatry.uc.edu

²Division of Metabolism, Endocrinology and Nutrition, Department of Medicine, University of Washington, and the Puget Sound Veterans Administration Health Care System, Seattle, Washington, 98195,

This chapter reviews the recent literature on hormonal and neural signals critical to the regulation of individual meals and **body** fat. Rather than eating in response to acute energy deficits, animals eat when environmental conditions (social and learned factors, food availability, opportunity, etc.) are optimal. Hence, eating patterns are idiosyncratic. Energy homeostasis, the long-term matching of food intake to energy expenditure, is accomplished via controls over the size of meals. Individuals who have not eaten sufficient food to maintain their normal **weight** have lower levels of adiposity signals (**leptin** and insulin) in the blood and brain, and one consequence is that meal-generated signals (such as CCK) are less efficacious at reducing meal size. The converse is true if individuals are above their normal **weight**, when they tend to eat smaller meals. The final section reviews how these signals are received and integrated by the CNS, as well as the neural circuits and transmitters involved.

[Series Home](#) > [Table of Contents](#) >
Abstract

[Prev. Article](#) | [Next Article](#)
[View/Print PDF](#) (95.6 KB)
[Add to Favorites](#)
[Email link to a friend](#)

Quick Links

-  [RSS](#) (Series Update Alert)
-  [Chain of Reviews](#)
- [PubMed Citation](#)
- [ISI Citation](#)
- [Citing Papers via ISI Web of Science](#) (90 or more)
- [Citing Papers via CrossRef](#)
- Alert me when:
[New articles cite this article](#)
-  [RSS](#) (Citation Alert)
- [Download to citation manager](#)
- Related articles found in:
[Annual Reviews](#), [PubMed](#), [ISI Web of Science](#)
- [View Most Downloaded Reviews](#)

Quick Search

[Full Text](#) [PDF](#)

Resultado de Busca - Leptina

Chain of Reviews: [Annual Reviews chapters connected to this topic](#)

Most recent citing papers (via CrossRef)

Altered Expression of SOCS3 in the Hypothalamic Arcuate Nucleus during Seasonal Body Mass Changes in the Field Vole, *Microtus agrestis*

[E. Król](#), [A. Tups](#), [Z. A. Archer](#), [A. W. Ross](#), [K. M. Moar](#), [L. M. Bell](#), [J. S. Duncan](#), [C. Mayer](#), [P. J. Morgan](#), [J. G. Mercer](#)

Journal of Neuroendocrinology 19(2):83 (2007)

[\[CrossRef\]](#)

Nicotine regulates mRNA expression of feeding peptides in the arcuate nucleus in neonatal rat pups

[L.Z. Huang](#), [U.H. Winzer-Serhan](#)

Developmental Neurobiology 67(3):363 (2007)

[\[CrossRef\]](#)

Intracerebroventricular Infusion of Leptin into Mature Merino Rams of Different Metabolic Status: Effects on Blood Concentrations of Glucose and Reproductive and Metabolic Hormones

[P Celi](#), [D Blache](#), [MA Blackberry](#), [GB Martin](#)

Reproduction in Domestic Animals 41(1):79 (2006)

[\[CrossRef\]](#)

LMC International Food Congress 2006: Nutrigenomics and Health – From Vision to Food

Scandinavian Journal of Nutrition 50(0):3 (2006)

[\[CrossRef\]](#)

THE COW AS A MODEL TO STUDY FOOD INTAKE REGULATION

[Michael S. Allen](#), [Barry J. Bradford](#), [Kevin J. Harvatine](#)

Annual Review of Nutrition 25:523-547 (2005)

[Abstract](#) | [Full Text](#) | [PDF \(210 KB\)](#)

AUTHORS:

- ☐ Stephen C. Woods
- ☐ Michael W. Schwartz
- ☐ Denis G. Baskin
- ☐ Randy J. Seeley

Keywords:

- ☐ satiety
- ☐ energy homeostasis
- ☐ neuropeptides
- ☐ leptin
- ☐ insulin
- ☐ hypothalamus

[▶ SEARCH](#)

Noticias

1. Biblioteca de Referencias

El “social bookmarking” permite a los usuarios importar las citaciones de los artículos de Annual Reviews directamente para sus cuentas en CiteULike, Connotea, y Del.icio.us, por los botones arriba de la caja de Quick Links, en la página del artículo.

The screenshot displays the Annual Reviews website interface. At the top, the logo for 'ANNUAL REVIEWS A Nonprofit Scientific Publisher' is visible, along with several circular icons representing different scientific fields. Below the header, a navigation bar contains links for Home, Order, Browse, Search, Profile, Help, and Contact Us. The main content area features the title 'Annual Review of Cell and Developmental Biology' and the specific article 'How Does Voltage Open an Ion Channel?' by Francesco Tombola, Medha M. Pathak, and Ehud Y. Isacoff. The article's volume and publication date are also listed. On the right side, there are links for 'Series Home', 'Table of Contents', 'Abstract', 'Prev. Article', 'Next Article', 'Full-text HTML', 'View/Print PDF (1,285.9 KB)', 'Add to Favorites', and 'Cite this article'. A red arrow points to a set of social bookmarking icons (CiteULike, Connotea, Del.icio.us) located above the 'Quick Links' section. The 'Quick Links' section includes links for 'RSS (Series Update Alert)', 'Chain of Reviews', and 'PubMed Citation'.

Abstract
Annual Review of Cell and Developmental Biology
Vol. 22: 23-52 (Volume publication date November 2006)
(doi:10.1146/annurev.cellbio.21.020404.145837)
First published online as a Review in Advance on May 5, 2006

How Does Voltage Open an Ion Channel?

Francesco Tombola,^{1,4} Medha M. Pathak,² and Ehud Y. Isacoff^{1,2,3,*}

¹Department of Molecular and Cell Biology, University of California, Berkeley, California 94720; email: tombola@berkeley.edu

²Biophysics Graduate Group, University of California, Berkeley, California 94720; email: medha@socrates.berkeley.edu

[Series Home](#) > [Table of Contents](#) > **Abstract**

[Prev. Article](#) | [Next Article](#)
[Full-text HTML](#)
[View/Print PDF \(1,285.9 KB\)](#)
[Add to Favorites](#)
[Cite this article](#)

Quick Links

- [RSS \(Series Update Alert\)](#)
- [Chain of Reviews](#)
- [PubMed Citation](#)

Noticias

2. Búsqueda desde Google

Cuando se llega a un artículo de AR partiendo de una búsqueda en el Google se puede volver a la búsqueda original por un link en la página del artículo. Hay una nota en la parte superior del resumen o del texto completo que avisa que la búsqueda en AR llevaría a XXX citaciones, en la base de datos de AR. Para que se haga tal búsqueda es sólo clicar en el link.

The screenshot shows the Annual Reviews website interface. At the top, there is a navigation bar with links: Home, Order, Browse, Search, Profile, Help, and Contact Us. Below the navigation bar, a red box highlights a note: "Note: Performing your original search, *bilayer membrane protein*, in Annual Reviews will retrieve 47 citations." The main content area displays the title "Annual Review of Biophysics and Biomolecular Structure" and the authors "Thomas J. McIntosh¹ and Sidney A. Simon^{2,3}". On the right side, there are links for "Series Home", "Table of Contents", "Abstract", "Prev. Article", "Next Article", "Full-text HTML", "View/Print PDF (236.2 KB)", "Add to Favorites", and "Email link to a friend".

Annual Reviews
A Nonprofit Scientific Publisher.

Hello: [Sign in](#) to get personalized recommendations. New user? [Register now](#)

[Home](#) [Order](#) [Browse](#) [Search](#) [Profile](#) [Help](#) [Contact Us](#)

Note: Performing your original search, *bilayer membrane protein*, in Annual Reviews will retrieve **47 citations**.

Abstract
Annual Review of Biophysics and Biomolecular Structure
Vol. 35: 177-198 (Volume publication date June 2006)
(doi:10.1146/annurev.biophys.35.040405.102022)

ROLES OF BILAYER MATERIAL PROPERTIES IN FUNCTION AND DISTRIBUTION OF MEMBRANE PROTEINS

Thomas J. McIntosh¹ and Sidney A. Simon^{2,3}

[Series Home](#) > [Table of Contents](#) > [Abstract](#)
[Prev. Article](#) | [Next Article](#)
[Full-text HTML](#)
[View/Print PDF \(236.2 KB\)](#)
[Add to Favorites](#)
[Email link to a friend](#)