Methods in ENZYMOLOGY

Volume 437

Globins and Other Nitric Oxide-Reactive Proteins, Part B

Edited by

Robert K. Poole

VOLUME FOUR HUNDRED AND THIRTY-SEVEN

METHODS IN ENZYMOLOGY

Globins and Other Nitric Oxide-Reactive Proteins, Part B

EDITED BY

ROBERT K. POOLE
Department of Molecular Biology and Biotechnology
The University of Sheffield
Sheffield, UK

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Editors-in-Chief

JOHN N. ABELSON AND MELVIN I. SIMON

Division of Biology
California Institute of Technology
Pasadena, California

Founding Editors

SIDNEY P. COLOWICK AND NATHAN O. KAPLAN

Contributors

Stefania Abbruzzetti
Dipartimento di Fisica, Università degli Studi di Parma, Parma, Italy, and NEST CNR-INFM, Pisa, Italy

Maqsudul Alam
Department of Microbiology, and Advanced Studies in Genomics, Proteomics, and Bioinformatics, College of Natural Sciences, University of Hawaii, Honolulu, Hawaii

Cesar Arrese-Igor
Departamento de Ciencias del Medio Natural, Universidad Pública de Navarra, Campus de Arrosadia, E-31006 Pamplona, Navarre, Spain

Idoia Ariz
Instituto de Agrobiotecnología, Universidad Pública de Navarra-CSIC-Gobierno de Navarra, Campus de Arrosadía, E-31006 Pamplona, Navarre, Spain

Iñigo Auzmendi
Departamento de Ciencias del Medio Natural, Universidad Pública de Navarra, Campus de Arrosadia, E-31006 Pamplona, Navarre, Spain

Juan B. Barroso
Grupo de Señalización Molecular y Sistemas Antioxidantes en Plantas, Unidad Asociada al CSIC (EEZ), Área de Bioquímica y Biología Molecular, Universidad de Jaén, E-23071 Jaén, Spain

Stefano Bettati
Department of Biochemistry and Molecular Biology, University of Parma, Parma, Italy

Axel Bidon-Chanal
Departament de Fisicoquímica, Facultat de Farmàcia, Universitat de Barcelona, Barcelona, Spain

Diane Bodenmiller
School of Biology, Georgia Institute of Technology, Atlanta, Georgia

D. Bourgeois
Institut de Biologie Structurale Jean-Pierre Ebel, CEA, CNRS, Université Joseph Fourier and European Synchrotron Radiation Facility, Grenoble Cedex, France

Nick E. Le Brun
Centre for Metalloprotein Spectroscopy and Biology, School of Chemical Sciences and Pharmacy, University of East Anglia, Norwich, United Kingdom

Stefano Bruno
Department of Biochemistry and Molecular Biology, University of Parma, Parma, Italy, and Dipartimento di Biochimica e Biologia Molecolare, Università degli Studi di Parma, Parma, Italy

M. Brunori
Dipartimento di Scienze Biochimiche "A. Rossi Fanelli," Università di Roma "La Sapienza," Roma, Italy

Maurizio Brunori
Department of Biochemical Sciences, CNR Institute of Molecular Biology and Pathology and Istituto Pasteur–Fondazione Cenci Bolognetti Sapienza, University of Rome, Rome, Italy

Julea N. Butt
Centre for Metalloprotein Spectroscopy and Biology, School of Biological Sciences, and School of Chemical Sciences and Pharmacy, University of East Anglia, Norwich, United Kingdom

Luciana Capece
Departamento de Química Inorgánica, Analítica y Química Física/INQUIMAE-CONICET, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Ciudad Universitaria, Buenos Aires, Argentina

Alfonso Carreras
Grupo de Señalización Molecular y Sistemas Antioxidantes en Plantas, Unidad Asociada al CSIC (EEZ), Área de Bioquímica y Biología Molecular, Universidad de Jaén, E-23071 Jaén, Spain

Maria Arménia Carrondo
Instituto de Tecnologia Química e Biológica, Universidade Nova de Lisboa, Oeiras, Portugal

Margaret Castor
University of Washington School of Medicine, Seattle, Washington

Mounira Chaki
Grupo de Señalización Molecular y Sistemas Antioxidantes en Plantas, Unidad Asociada al CSIC (EEZ), Área de Bioquímica y Biología Molecular, Universidad de Jaén, E-23071 Jaén, Spain

Myles R. Cheesman
Centre for Metalloprotein Spectroscopy and Biology, School of Chemical Sciences and Pharmacy, University of East Anglia, Norwich, United Kingdom

Thomas A. Clarke
Centre for Metalloprotein Spectroscopy and Biology, School of Biological Sciences, University of East Anglia, Norwich, United Kingdom

Jordi Cohen
Beckman Institute, University of Illinois, Urbana, Illinois

Jeffrey A. Cole
School of Biosciences, University of Birmingham, Edgbaston, Birmingham

Chris E. Cooper
Department of Biological Sciences, University of Essex, Colchester, United Kingdom

Francisco J. Corpas
Departamento de Bioquimica, Biología Celular y Molecular de plantas, Estación Experimental del Zaidín, CSIC, Spain

Jason C. Crack
Centre for Metalloprotein Spectroscopy and Biology, School of Chemical Sciences and Pharmacy, University of East Anglia, Norwich, United Kingdom

Rainer Cramm
Institut für Biologie/Mikrobiologie, Humboldt-Universität zu Berlin, Berlin, Germany

Alejandro Crespo
Departamento de Química Inorgánica, Analítica y Química Física/INQUIMAE-CONICET, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Ciudad Universitaria, Buenos Aires, Argentina

Benoît D'Autréaux
Laboratoire Stress Oxydant et Cancer, Service de Biologie Intégrative et Génétique Moléculaire, Institut de Biologie et de Technologies de Saclay, CEA-Saclay, Gif-sur-Yvette Cedex, France

M. Delledonne
Dipartimento Scientifico e Tecnologico, Università degli Studi di Verona, Verona, Italy

Filip Desmet
University of Antwerp, Department of Physics, SIBAC Laboratory, Antwerp, Belgium

Ray Dixon
John Innes Centre, Colney, Norwich, United Kingdom

Sabine Van Doorslaer
University of Antwerp, Department of Physics, SIBAC Laboratory, Antwerp, Belgium

Sam Efromovich
Department of Mathematical Sciences, University of Texas at Dallas, Richardson, Texas

Tsuyoshi Egawa
Department of Physiology and Biophysics, Albert Einstein College of Medicine, Bronx, New York

Francisco J. Esteban
Grupo de Señalización Molecular y Sistemas Antioxidantes en Plantas, Unidad Asociada al CSIC (EEZ), Área de Bioquímica y Biología Molecular, Universidad de Jaén, E-23071 Jaén, Spain

Dario A. Estrin
Departamento de Química Inorgánica, Analítica y Química Física/INQUIMAE-CONICET, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Ciudad Universitaria, Buenos Aires, Argentina

Serena Faggiano
Department of Biochemistry and Molecular Biology, University of Parma, Parma, Italy, and Dipartimento di Biochimica e Biologia Molecolare, Università degli Studi di Parma, Parma, Italy

Ferric C. Fang
University of Washington School of Medicine, Seattle, Washington

Sarah J. Field
Center for Metalloprotein Spectroscopy and Biology, School of Biological Sciences, University of East Anglia, Norwich, United Kingdom

Elena Forte
Department of Biochemical Sciences, CNR Institute of Molecular Biology and Pathology and Istituto Pasteur–Fondazione Cenci Bolognetti Sapienza, University of Rome, Rome, Italy

Carlos Frazão
Instituto de Tecnologia Química e Biológica, Universidade Nova de Lisboa, Oeiras, Portugal

Tracey Allen K. Freitas
Department of Microbiology, University of Hawaii, Honolulu, Hawaii

Marie-Alda Gilles-Gonzalez
Department of Biochemistry, University of Texas Southwestern Medical Center, Dallas, Texas

Alessandro Giuffrè
Department of Biochemical Sciences, CNR Institute of Molecular Biology and Pathology and Istituto Pasteur–Fondazione Cenci Bolognetti Sapienza, University of Rome, Rome, Italy

Stephen D. Golden
Department of Chemistry, Loyola University Chicago, Chicago, Illinois

Vera L. Gonçalves
Instituto de Tecnologia Química e Biológica, Universidade Nova de Lisboa, Oeiras, Portugal

Esther M. González
Departamento de Ciencias del Medio Natural, Universidad Pública de Navarra, Campus de Arrosadia, E-31006 Pamplona, Navarre, Spain

Gonzalo Gonzalez
Department of Biochemistry, University of Texas Southwestern Medical Center, Dallas, Texas

David Grainger
School of Biosciences, University of Birmingham, Edgbaston, Birmingham, United Kingdom

Elena Grandi
Dipartimento di Fisica, Università degli Studi di Parma, Parma, Italy

Jeffrey Green
Department of Molecular Biology and Biotechnology, University of Sheffield, Sheffield, United Kingdom

Victor Guallar
Catalan Institute for Research and Advanced Studies (ICREA), Computational Biology Program, Barcelona Supercomputing Center, Barcelona, Spain

Kim H. Hebelstrup
Department of Plant Science, University of Manitoba, Winnipeg, Manitoba, Canada

Andrew M. Hemmings
Centre for Metalloprotein Spectroscopy and Biology, School of Biological Sciences, and School of Chemical Sciences and Pharmacy, University of East Anglia, Norwich, United Kingdom

Robert D. Hill
Department of Plant Science, University of Manitoba, Winnipeg, Manitoba, Canada

Jay C. D. Hinton
Institute of Food Research, Norwich, United Kingdom

Rebecca S. Holladay
Department of Biological Sciences, University of Essex, Colchester, United Kingdom

Adrian J. Jervis
Department of Molecular Biology and Biotechnology, University of Sheffield, Sheffield, United Kingdom

Jessica Jones-Carson
University of Colorado Health Sciences Center, Aurora, Colorado

Marta C. Justino
Instituto de Tecnologia Química e Biológica, Universidade Nova de Lisboa, Oeiras, Portugal

Gemma Kemp
Centre for Metalloprotein Spectroscopy and Biology, School of Chemical Sciences and Pharmacy, University of East Anglia, Norwich, United Kingdom

Estíbaliz Larrainzar
Departamento de Ciencias del Medio Natural, Universidad Pública de Navarra, Campus de Arrosadia, E-31006 Pamplona, Navarre, Spain

Lucy Lee
Department of Molecular Biology and Biotechnology, University of Sheffield, Sheffield, United Kingdom

Changyuan Lu
Department of Physiology and Biophysics, Albert Einstein College of Medicine, Bronx, New York

F. Javier Luque
Departament de Fisicoquímica, Facultat de Farmàcia, Universitat de Barcelona, Barcelona, Spain

Marcelo A. Marti
Departamento de Química Inorgánica, Analítica y Química Física/INQUIMAE-CONICET, Facultad de Ciencias Exactas y Naturales, Universidad de Buenos Aires, Ciudad Universitaria, Buenos Aires, Argentina

Maria G. Mason
Department of Biological Sciences, University of Essex, Colchester, United Kingdom

Andrey D. Matorin
Center for Metalloprotein Spectroscopy and Biology, School of Biological Sciences, University of East Anglia, Norwich, United Kingdom

Paul C. Mills
Centre for Metalloprotein Spectroscopy and Biology, School of Biological Sciences, University of East Anglia, Norwich, United Kingdom

James W. B. Moir
Department of Biology, University of York, Heslington, York

Claire E. Monk
Department of Molecular Biology and Biotechnology, University of Sheffield, Sheffield, United Kingdom

Jose F. Moran
Instituto de Agrobiotecnología, Universidad Pública de Navarra-CSIC-Gobierno de Navarra, Campus de Arrosadía, E-31006 Pamplona, Navarre, Spain

Andrea Mozzarelli
Department of Biochemistry and Molecular Biology, University of Parma, Parma, Italy, and Dipartimento di Biochimica e Biologia Molecolare, Università degli Studi di Parma, Parma, Italy

Masahiro Mukai
Mitsubishi Kagaku Institute of Life Sciences, Minamiooya, Machida, Tokyo, Japan

Peter Nicholls
Department of Biological Sciences, University of Essex, Colchester, United Kingdom

Karin Nienhaus
Institute of Biophysics, University of Ulm, Ulm, Germany

G. Ulrich Nienhaus
Institute of Biophysics, University of Ulm, Ulm, Germany, and Department of Physics, University of Illinois at Urbana–Champaign, Urbana, Illinois

Erik Østergaard-Jensen
Department of Molecular Biology, University of Aarhus, Aarhus, Denmark

Kenneth W. Olsen
Department of Chemistry, Loyola University Chicago, Chicago, Illinois

Susie R. Poock
Centre for Metalloprotein Spectroscopy and Biology, School of Biological Sciences, University of East Anglia, Norwich, United Kingdom

Robert K. Poole
Department of Molecular Biology and Biotechnology, University of Sheffield, Sheffield, United Kingdom

Steven T. Pullan
Department of Molecular Biology and Biotechnology, University of Sheffield, Sheffield, United Kingdom

Robert C. Read
University of Sheffield, Sheffield, United Kingdom

David J. Richardson
Center for Metalloprotein Spectroscopy and Biology, School of Biological Sciences, University of East Anglia, Norwich, United Kingdom

Luis A. Del Río
Departamento de Bioquimica, Biología Celular y Molecular de plantas, Estación Experimental del Zaidín (EEZ), CSIC, Apartado 419, E-18080 Grannada, Spain

Luca Ronda
Department of Biochemistry and Molecular Biology, University of Parma, Parma, Italy, and Dipartimento di Biochimica e Biologia Molecolare, Università degli Studi di Parma, Parma, Italy

William E. Royer, Jr.
Department of Biochemistry and Molecular Pharmacology, University of Massachusetts Medical School, Worcester, Massachusetts

Jennifer A. Saito
Department of Microbiology, University of Hawaii, Honolulu, Hawaii

Lígia M. Saraiva
Instituto de Tecnologia Química e Biológica, Universidade Nova de Lisboa, Oeiras, Portugal

Paolo Sarti
Department of Biochemical Sciences, CNR Institute of Molecular Biology and Pathology and Istituto Pasteur–Fondazione Cenci Bolognetti Sapienza, University of Rome, Rome, Italy

Francesca M. Scandurra
Department of Biochemical Sciences, CNR Institute of Molecular Biology and Pathology and Istituto Pasteur–Fondazione Cenci Bolognetti Sapienza, University of Rome, Rome, Italy

Klaus Schulten
Beckman Institute, University of Illinois, Urbana, Illinois

Vukica Šrajer
Center for Advanced Radiation Sources, University of Chicago, Illinois

Christopher A. G. Söderberg
Centre for Metalloprotein Spectroscopy and Biology, School of Biological Sciences, University of East Anglia, Norwich, United Kingdom

Mark Shepherd
University of Sheffield, Western Bank, Sheffield, United Kingdom

Hirofumi Shoun
Department of Biotechnology, University of Tokyo, Bunkyo-ku, Tokyo, Japan

Eduardo Henrique Silva Sousa
Department of Biochemistry, University of Texas Southwestern Medical Center, Dallas, Texas

Stephen Spiro
Department of Molecular and Cell Biology, University of Texas at Dallas, Richardson, Texas

Tania M. Stevanin
School of Medicine and Biomedical Science, University of Sheffield, Sheffield, United Kingdom

Tania Stevanin
University of Sheffield, Sheffield, United Kingdom

Katja Strube
Institut für Biologie/Mikrobiologie, Humboldt-Universität zu Berlin, Berlin, Germany

Miguel Teixeira
Instituto de Tecnologia Química e Biológica, Universidade Nova de Lisboa, Oeiras, Portugal

Andrew J. Thomson
Centre for Metalloprotein Spectroscopy and Biology, School of Chemical Sciences and Pharmacy, University of East Anglia, Norwich, United Kingdom

Faye H. Thorndycroft
Center for Metalloprotein Spectroscopy and Biology, School of Biological Sciences, University of East Anglia, Norwich, United Kingdom

Melanie J. Thomson
Department of Biology, University of York, Heslington, York

Nick Tucker
John Innes Centre, Colney, Norwich, United Kingdom

Jason Tuckerman
Department of Biochemistry, University of Texas Southwestern Medical Center, Dallas, Texas

Estíbaliz Urarte
Instituto de Agrobiotecnología, Universidad Pública de Navarra-CSIC-Gobierno de Navarra, Campus de Arrosadía, E-31006 Pamplona, Navarre, Spain

Raquel Valderrama
Grupo de Señalización Molecular y Sistemas Antioxidantes en Plantas, Unidad Asociada al CSIC (EEZ), Área de Bioquímica y Biología Molecular, Universidad de Jaén, E-23071 Jaén, Spain

B. Vallone
Dipartimento di Scienze Biochimiche "A. Rossi Fanelli," Università di Roma "La Sapienza," Roma, Italy

E. Vandelle
Dipartimento Scientifico e Tecnologico, Università degli Studi di Verona, Verona, Italy

Andrés Vazquez-Torres
University of Colorado Health Sciences Center, Aurora, Colorado

Cristiano Viappiani
Dipartimento di Fisica, Università degli Studi di Parma, Parma, Italy, and NEST CNR-INFM, Pisa, Italy

João B. Vicente
Instituto de Tecnologia Química e Biológica, Universidade Nova de Lisboa, Oeiras, Portugal

Nicholas J. Watmough
Center for Metalloprotein Spectroscopy and Biology, School of Biological Sciences, University of East Anglia, Norwich, United Kingdom

Jessica Van Wonderen
Centre for Metalloprotein Spectroscopy and Biology, School of Chemical Sciences and Pharmacy, University of East Anglia, Norwich, United Kingdom

Syun-Ru Yeh
Department of Physiology and Biophysics, Albert Einstein College of Medicine, Bronx, New York

Li Zhang
Department of Biology, University of Kentucky, Lexington, Kentucky

PREFACE

The genesis of ideas for these two volumes of *Methods in Enzymology* appears to be a talk (subtitled *Bloody Bacteria*) that I presented at the Agouron Institute meeting in Santa Fe, New Mexico, in April 2006. The topic of the meeting was *Oxygen,* but my message was not how microbial hemoglobins manage oxygen but rather how the primary function of many such hemoglobins is nitric oxide detoxification. Despite my straying from my brief, John Abelson and Mel Simon generously invited me to consider editing a volume of *Methods in Enzymology* to cover these emerging aspects of such a well-studied protein family. Further discussion of the proposal at the XIVth International Conference on Dioxygen Binding and Sensing Proteins at Stazione Zoologica Anton Dohrn in beautiful Napoli later that year—warmly hosted by Cinzia Verde and Guido di Prisco—generated much interest and support. The result was a two-volume heterodimer: I hope cooperativity can be found in Volumes 436 and 437.

Just as the organizers of the Agouron Institute conference interpreted *Oxygen* with commendable flexibility, *Methods in Enzymology* has allowed some freedom in the definition of an enzyme. In 1994, when the topic *Hemoglobins (Part C)* was last covered explicitly in this series (Volume 232), some justification for labeling a hemoglobin as an enzyme might have been warranted. But as Maurizio Brunori pointed out in 1999 (*Trends in Biochemical Sciences*, 24, 158–161), the promotion of hemoglobin to the status of "honorary enzyme" had been conferred decades earlier by Monod, Wyman, and Changeux. In 2007, the idea that certain hemoglobins, even those not displaying allosteric heme–heme interactions, have enzymatic functions is well established, the most obvious examples being those hemoglobins that transform substrates into products, such as nitric oxide into nitrate.

Other topics covered in these volumes are not new to the *Methods in Enzymology* series either. The most recent coverage of overtly related topics was *Nitric Oxide (Part E)* in Volume 396 (2005) and *Oxygen Sensing* in Volume 381 (2004). I hope, however, that the particular juxtaposition of topics in these two volumes will draw attention to the intimate links between globins, their gaseous ligands (nitric oxide, oxygen, and carbon monoxide), and the sensing and detoxification of these biologically critical small molecules. There is a strong microbial flavor in these volumes, reflecting some of the most exciting developments in recent years. Volume

436 deals with some chemical and analytical aspects of nitric oxide and methods for bacterial and archaeal hemoglobins, as well as diverse (especially "newer") hemoglobins in plants and animals. Volume 437 covers various non-hemoglobin nitric oxide-detoxifying proteins, sensors for gaseous ligands, advanced spectroscopic tools, and aspects of the functions of these proteins in microbial and plant physiology. In each volume, some chapters serve not as methodological recipes but short reviews to place the methods in a proper framework.

These volumes would not have been possible without the tremendous enthusiasm of so many colleagues, contributors, and friends around the world. I thank them all, and also Tari Broderick and Cindy Minor (Elsevier, San Diego, California), for their help and encouragement in leading these volumes to a successful and timely outcome.

ROBERT K. POOLE