Methods in Enzymology

Volume 205

METALLOBIOCHEMISTRY

Part B

Metallothionein and Related Molecules

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Metallobiochemistry

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Metallothionein and Related Molecules

EDITED BY

James F. Riordan
Bert L. Vallee

CENTER FOR BIOCHEMICAL AND BIOPHYSICAL SCIENCES AND MEDICINE
HARVARD MEDICAL SCHOOL
BOSTON, MASSACHUSETTS

ACADEMIC PRESS, INC.
Harcourt Brace Jovanovich, Publishers
San Diego New York Boston
London Sydney Tokyo Toronto

This book is printed on acid-free paper. ♾

Academic Press, Inc.
San Diego, California 92101

United Kingdom Edition published by
ACADEMIC PRESS LIMITED
24-28 Oval Road, London NW1 7DX

Library of Congress Catalog Card Number: 54-9110

ISBN 0-12-182106-4 (alk. paper)

PRINTED IN THE UNITED STATES OF AMERICA
91 92 93 94 9 8 7 6 5 4 3 2 1

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Preface

This Metallobiochemistry volume of *Methods of Enzymology* is devoted to metallothionein and related proteins because of the tremendous upsurge of interest in this area, particularly in its biological function. While this function has remained enigmatic for more than three decades, its elucidation may well be imminent.

The detection of metallothionein was the consequence of a search for a cadmium protein. Spectroscopy revealed that it contained significant amounts of both cadmium and zinc as well as small amounts of copper and iron. Much as it was clearly a cadmium-containing protein, its zinc content was sufficiently impressive to lead to the descriptive term "metallothionein," which has proved to be an enduring epithet. It is and has remained the only protein known to contain cadmium in its native state. Since cadmium has been thought to be toxic, a steadily increasing concern with environmental protection focused special attention of toxicologists on this protein. Much research effort has continued to be devoted to this aspect of metallothionein chemistry and biology.

As the significance of its zinc content became more apparent, the quest for a role for metallothionein in zinc metabolism began to develop, particularly in relation to zinc metalloenzymes. Among those, the enzymes involved in nucleic acid metabolism seemed to provide a plausible rationale for the nutritional essentiality of zinc and even suggested a role for zinc in gene expression. In the past few years the world of "zinc fingers" began to flourish, and the similarities in zinc binding among some of these transcription factors, other DNA-binding proteins, and metallothionein have suggested a functional relationship between them and the postulate of a zinc regulatory process.

Difficulties in defining both the protein itself and the conditions for investigating its properties had greatly confused the metallothionein picture in the past. The state of that knowledge is now sufficiently secure so that it is appropriate to compile in this volume definitions of terms and standard operating procedures for the isolation, quantitation, and chemical and physical characterization of metallothioneins. We hope that those in the field and those wishing to enter it will find these contributions timely and useful in establishing the baselines for communication.

In assembling this volume, we have been extremely fortunate in having had the cooperation and support of a distinguished group of contributing authors. In particular, we would like to acknowledge the important editorial assistance of Jeremias H. R. Kägi, whose collaboration, cooperation,

and friendship we have enjoyed ever since the discovery of metallothionein in 1957. His advice and counsel were and remain invaluable. Finally, we thank the staff of Academic Press for their continued support and assistance. Our interaction with them has been a truly pleasant experience.

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