Microbial Toxins

Edited by

Solomon Kadis
Research Laboratories
Albert Einstein Medical Center
Philadelphia, Pennsylvania

Alex Ciegler
United States Department of Agriculture
Agricultural Research Service
Northern Utilization Research and Development Division
Peoria, Illinois

Samuel J. Ajl
Research Laboratories
Albert Einstein Medical Center
Philadelphia, Pennsylvania

VOLUME VIII

FUNGAL TOXINS

1972

ACADEMIC PRESS • NEW YORK AND LONDON

ACADEMIC PRESS, INC.
111 Fifth Avenue, New York, New York 10003

United Kingdom Edition published by
ACADEMIC PRESS, INC. (LONDON) LTD.
24/28 Oval Road, London NW1 7DD

LIBRARY OF CONGRESS CATALOG CARD NUMBER: 78-84247

PRINTED IN THE UNITED STATES OF AMERICA

List of Contributors

Numbers in parentheses indicate the pages on which the authors' contributions begin.

ROBERT G. BENEDICT (*281*), *College of Pharmacy, University of Washington, Seattle, Washington*

JOSEPH FORGACS (*95*), *Automated Biochemical Laboratories and Ramapo General Hospital, Spring Valley, New York*

V. E. GRACEN, JR. (*131, 139*),* *Department of Agronomy, University of Georgia, Athens, Georgia*

DETLEF GRÖGER (*321*), *German Academy of Sciences at Berlin, Institute for Biochemistry of Plants, Halle/Saale, German Democratic Republic*

JOSEPH KUĆ (*211*), *Departments of Biochemistry and Botany and Plant Pathology, Purdue University, Lafayette, Indiana*

H. H. LUKE (*131, 139*), *U.S. Department of Agriculture, Crops Research Division and Department of Plant Pathology, University of Florida, Gainesville, Florida*

VERNON B. PERONE (*67*), *Environmental Health Service, Environmental Control Administration, Bureau of Occupational Safety and Health, Cincinnati, Ohio*

DONALD E. RICHARDS (*3*), *U.S. Department of Health, Education, and Welfare, Public Health Service, National Institute for Occupational Safety and Health, Cincinnati, Ohio*

C. A. SALEMINK (*193*), *Organic Chemistry Laboratory, State University of Utrecht, Utrecht, Holland*

LESTER D. SCHEEL (*47*), *U.S. Department of Health, Education, and Welfare, Public Health Service, National Institute for Occupational Safety and Health, Cincinnati, Ohio*

*Present address: Department of Plant Breeding and Biometry, New York State College of Agriculture, Cornell University, Ithaca, New York.

F. SCHURING (*193*), *Keuringsdienst van Waren (Food Inspection Service), Utrecht, Holland*

G. E. TEMPLETON (*169*), *Department of Plant Pathology, University of Arkansas, Fayetteville, Arkansas*

OTTO WIELAND (*249*), *Klinisch-Chemisches Institut, Städt. Krankenhaus München-Schwabing, Munich, Germany*

THEODOR WIELAND (*249*), *Max-Planck-Institut für medizinische Forschung, Abteilung Chemie, Heidelberg, Germany*

Preface

Ergot toxicity has been known to man for much of his recorded history; man, in addition, probably learned early to distinguish between the toxic and edible mushrooms. Yet, in spite of these clues and the fact that molds have been associated with illness as early as the nineteenth century, mycotoxicoses remained the "neglected" diseases until 1961 when the aflatoxins were discovered and found to be the cause of the "turkey X" syndrome. These findings resulted in a renaissance in mycotoxin research followed by a rapid accumulation of a massive body of literature. The mycotoxin problem was soon found to be worldwide, although it was most severe in the nonindustrialized areas of Africa and Asia. Epidemiological studies indicated that some of the mycotoxins played an etiological role in cancer, particularly in southern Africa. Yet the role as causative agents of disease of many of the mycotoxins discovered in the past decade remains to be determined.

In the three volumes devoted to the algal and fungal toxins (VI, VII, VIII) of this multivolume treatise on microbial toxins, the authors have attempted to comprehensively and critically review what has been accomplished as well as indicate future lines of research. These volumes are intended for scientists and graduate students in the various scientific disciplines for a multidisciplinary approach is required to resolve and find solutions to the many problems presented.

The extensiveness of the mycotoxin literature forced the editors to divide the originally planned single volume on algal and fungal toxins into three: VI, VII, and VIII. However, the divisions are arbitrary with no implication intended that the toxins in any given group are related with respect to structure, function, mode of action, or biosynthesis. Volume VI includes the toxins produced by the Aspergilli and Penicillia, Volume VII, the algal toxins and those mycotoxins produced by species in the genera *Fusarium*, *Rhizoctonia*, and *Pithomyces*, and this volume, the toxins produced by the fungal phytopathogens, the mushrooms, and those toxins synthesized in plants in response to fungal invasion or other injury.

We are grateful to the contributors and the staff of Academic Press for their fine cooperation.

SOLOMON KADIS
ALEX CIEGLER
SAMUEL J. AJL

Contents of Other Volumes

Contents

Section B

4. Stachybotryotoxicosis

JOSEPH FORGACS

Section C Phytopathogenic Toxins

5. Phytopathogenic Toxins

H. H. LUKE AND V. E. GRACEN, JR.

6. *Helminthosporium* Toxins

H. H. LUKE AND V. E. GRACEN, JR.

7. *Alternaria* Toxins Related to Pathogenesis in Plants

G. E. TEMPLETON

12. Ergot

DETLEF GRÖGER

SECTION A